Users Experience of Mobile Money in Nigeria

Sunday A. Olaleye

Oulu Business School
University of Oulu
Oulu, Finland
sunday.olaleye@oulu.fi

Ismaila T. Sanusi, Solomon S. Oyelere

Philosophical Faculty, School of Computing
University of Eastern Finland
Joensuu, Finland
{ismails, solomon.oyelere}@uef.fi

Abstract—**Mobile money is an upshot of the conventional banking system that creates an opportunity for the financially excluded group of people. It allows the unbanked in the rural areas and the underbanked in the urban centers to have access to financial services. User experience is all encompassing as it affects the emotion and the attitude of the user of a product or services. This study reviewed the related literature about mobile money user's experience. Quantitative data analysis technique was used in the study. The study contributes positively to the mobile money literature with a framework that highlights the importance of privacy, security, and convenience as an enhancer of mobile money user's experience while the system anxiety negatively depicts the mobile money users'. We explicate the theoretical contributions, implications for the managers and offers a useful suggestion for the future study.**

Keywords— **Mobile money; User experience; Nigeria**

I. INTRODUCTION

Mobile money is an upshot of the conventional banking system that creates an opportunity for the financially excluded group of people. It allows the unbanked in the rural areas and the underbanked in the urban centers to have access to financial services. Nigeria is part of mobile money advancement in the world today as it is diffusing gradually in the financial sector and its potential to the economy is remarkable. Statistics shows that 57% of Nigerian adults did not have access to financial services, but 64% of the adult owns a mobile phone while 84% have access to a mobile phone [1]. Similarly, the use of mobile devices in the educational sector is prevalent [2], [3]. Nigerians lived communally and sharing of resources is very easy. A member of Nigeria community that lacks a mobile phone, can borrow from a friend or a neighbor for a transaction. The benefits of mobile money cannot be optimized until full attention is paid to the importance of a user experience (UX). The ancillary function of mobile banking to the conventional banking system is now a global emergent that gives hope to the financial inclusion of the neglected banking users. Mobile money is now available in two-thirds of low and middle-income countries with registered accounts that surpassed half billion in 2016. Presently, mobile money providers undertake more than 43 million transactions per day globally and overtake the bank accounts users in Sub-Saharan Africa with 277 million registered accounts as at December 2016 [4].

User experience (UX) study is popular in information systems research domain. However, other research disciplines are giving attention to UX though with a different name such as customer or consumer experience, which is common in the marketing field. Reference [5] examines the UX regarding time and argues that timing factor is not a single effort that can improve UX but community connectivity that is built on trust will enhance social interactions that can foster good UX. Reference [6] studied the quality of experience (QoE) with a focus on its advances and challenges. The quality of experience is defined as "how a user perceives the usability or degree of satisfaction of a service" [6]. The above-stated definition emphasized perception of usability, which could be easy to use or difficult to use and degree of satisfaction that could be high satisfaction, medium satisfaction and low satisfaction. However, this definition is concise, but the word 'product' is missing. References [7], [8] describes "mobile money as a provision of financial services through mobile phones." They mentioned that 1.8 billion people have a mobile phone in their possession without a bank account and concentrate on the importance of law in relation to trust to mitigate risks the mobile users encountered such as e-money provider bankruptcy, fraud and illiquidity. Reference [8] also looks at the confidence as a component of UX and dwell on privacy and security issues.

UX is all encompassing as it affects the emotion and the attitude of the user of a product or services. For UX to be holistic it requires multiple disciplinary touch and combination of different fields of study such as computer, engineering, interface design, marketing, graphical, and industrial design. The quality input of all the contributors to a product or service to create satisfaction for the end-users is very important. The lesson learnt through usability accumulates as a UX. There are three angles to the UX: The manufacturer's need the UX as a feedback to optimize its products, services and to create added-value that will retain the system users. The system user's need products or services that over-perform its expectation while the third consists of the third party that the user's share its experience with regarding mobile money transactions. The UX either positive or negative is communicated to the third party in the form of word-of-mouth, social media, mobile devices which in turn spread the news. The scenario highlighted indicates the importance of UX in business. Taking the UX serious will lessen system

user's complaints, brand switch and customer's churning while its neglect will be devastating to the company progress.

Reference [9] in its study concerning mobile money user experience in Nigeria found that user's logistic thoughtfulness, awareness and access, product design and trust are the critical issues that are affecting the mobile money UX. Low literacy level in the rural areas, poor road network, scattered settlement, lack of knowledge of mobile money platform availability, complex mobile money platform design with an unfriendly interface, misplacement of user's segmentation and insecurity contributes to the four blocks of UX mentioned. There are more white-papers and professional articles on mobile money user's experience in Nigeria context than the peer-reviewed articles. The extant studies discussed accessibility, design, trust and quality of experience in relation to quality service but this study stand to fill the research gap by harmonizing the system anxiety construct with privacy, trust and security since Nigeria is presently witnessing a serious challenge in technology security [10]. The study frames the following research questions: (1) how do security awareness and assurance enhance the UX of mobile money? (2) Why is system anxiety an important factor for mobile money UX? (3) How does UX contribute to the success of mobile money stakeholders?

This study reviewed related literature to mobile money user's experience in part two. Part three explain the methodology for the study. Part four describes the data analysis technique and present the findings. The final part explicates the theoretical contribution, implications for the managers and offers a useful suggestion for the future study. We used the quantitative method, and the study contributes positively to the mobile money literature with a framework that highlights the importance of privacy, security, and convenience as an enhancer of mobile money user's experience while the system anxiety negatively depicts the mobile money users.'

II. CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Related literatures on mobile money were reviewed and we concentrate on privacy, security, convenience, system anxiety as the predictor of user experience. We situate the relationship of the independent's variables with the dependent variable and posit hypotheses based on the literature reviewed (see Table 1 and Figure 1 for details).

Privacy

Privacy refers to the ability of an individual to "control the terms under which personal information is acquired and used" [11]. Privacy is also considered to exist when consumers can control their personal information [12] or restrict the use of their personal information [13]. Extant studies report the growing privacy concerns amongst internet customers [14]; suggesting that there should be a mechanism that enables customers to manage the privacy of their personal data online [15]. For example, [16] found that an Internet user's decision to conduct e-commerce transactions is influenced by privacy concerns, as well as their perception of the need for

government surveillance to secure the Internet environment from fraud, crime, and terrorism, which is then balanced against their concerns about government intrusion. According to [17], the reliance on the collection and use of data in today's technology dependent society has increased privacy concerns. As argued by [18], customer's data privacy issues have not been understood very well which requires further research to enable better management of customer-merchant relationship. The privacy concerns might have effect on the experience of the users of the mobile money platform. We thus hypothesize that:

H1: Privacy concern has positive impact on mobile money user experience.

Security

An issue that plagues the online markets is security threats, such as dubious websites, fraudulent access or attacks on consumers' computers from hackers [19] and these factors may erode confidence in using online platforms. Security is seen in a broad sense to encompass the protection of assets including both physical and digital. In internet context, security refers to the perceptions about security regarding the means of payment and the mechanism for storing and transmission of information [20]. [21] sees security in the handling of private data as it shows the consumer's perception of practices regarding personal data protection carried out by the financial services web site, and the security of the information system in which these practices are to be found. Perceived need for security is therefore defined as one's perceived need for the safekeeping of physical or informational assets [17]. [15] study reveals that users show concern about unsecured websites. According to [17], an individual's perceived need for security should influence the perception of usefulness of the device. Thus, we hypothesis that:

H2: Security of mobile money platform will positively influence its user experience.

Convenience

Convenience is the time and effort required to interact through a channel [22] which is stressed to likely be an important consideration for consumers across both the informational and transactional stages. [23] concluded that consumers who shop on the Internet are convenience oriented. Studies have shown that convenience has impact on the mobile money users' during transactions. This is evident in [24] assertion that mobile banking proliferation is because of the convenience enjoyed by the users with ease and time saved. [25] also found convenience and time as the important factors that drive consumers to engage in mobile commerce. This suggests that the convenience enjoyed while using mobile money platform will affect the user experience in using mobile money. It is therefore hypothesized that:

H3: Convenience to use mobile money platform will positively influence user experience.

System Anxiety
System anxiety can be described as the apprehension or fear that results when an individual is faced with the possibility of using IS [25]. Studies show that many computer users feel anxious when dealing with computer systems, especially when initially interacting with them [26]. [27] found computer anxiety to be the strongest predictor of negative attitude toward computers among the demographic, personality, and cognitive style variables. College students with little or no computer experience had more anxiety toward computers than those who had previous experience as concretized in study of [28]. [29] [30] study shows that technology anxiety decreases perceived ease of use, which in turn facilitates the intention to use information technology. Because system anxiety may have effect on user experience of mobile money, we hypothesize that:

H4: System Anxiety on mobile money platform will have a negative effect on user experience.
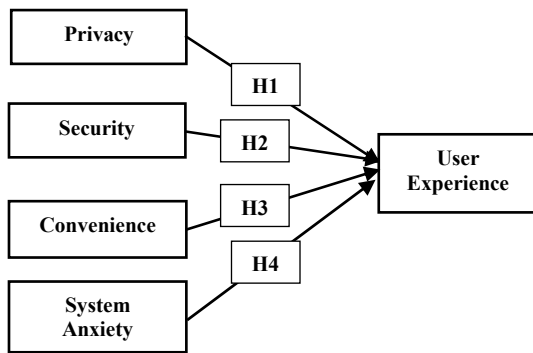

Fig. 1. Conceptual framework and hypotheses

III. METHODOLOGY

Instrument development
    The survey questions used in this study were developed based on the extant literature, discussed in the previous section. The constructs were adapted as follows; privacy is measured by items adapted from [31], Security [32], Convenience [27], [33], [34], System Anxiety [33] and User experience [27], [33], [34]. The questionnaire used a seven-point Likert-type scale ranging from 1 "strongly disagree" to 7 "strongly agree."

Data collection
        The offline survey questions were sent out to mobile money users, as 151 hardcopies were found useful for data analysis.   The profile of the respondents was composed of 81 males (54%) and 70 females (46%) where 81 (54%) were single and 70 (46%) are married. Regarding education, 85 (56%) had bachelor degrees, 45 (30%) had high school or diploma certificate, 17 (11%) had master's degree, 3 (2%) had doctoral degree and only 1 (1%) person had no formal education. Students represents over 50% of the respondents

making them the highest respondents as teaching professionals, self-employed and public and private sector workers are also involved. The demography further shows that most 109 (72%) of the respondents earn less than ₦100,000. The profile overview of the respondents can be found in table 4.

Table 1. Source of observed variables used to measure latent constructs

Constructs and measurement items
Privacy (Awad, Farag, and Krishnan 2006)
I am concerned that using mobile money collects too much personal information about me.
I am concerned about threats to my personal privacy when using the m-money.
I believe that mobile money vendor will protect my information from unauthorized person.
Security (Arun, Brown, and Tang 2009)
I feel comfortable that mobile money technological structures adequately protect me from problems.
Secured mobile money platform allay me fear of cyber theft
Convenience (Davis, 1989; Wu, 2011; Igbaria et al., 1997; Venkatesh et al., 2003; Venkatesh and Davis, 2000; López-Nicolás et al., 2008, Chauhan, 2015)
I believe m-money reduces turnaround time to transfer money
M-money system reduces stress for me
System Anxiety (Venkatesh et al., 2003)
I hesitate to use mobile money platform for fear of making mistakes that I cannot correct.
I am scared of losing a lot of information by using mobile money system.
User *Experience* (Davis, 1989; Wu, 2011; Igbaria et al., 1997; Venkatesh et al., 2003; Venkatesh and Davis, 2000; López-Nicolás et al., 2008, Chauhan, 2015)
I believe m-money is simple and understandable for performing transactions
I believe that the use of m-money is trouble-free

Note: Items of the constructs adopted from the corresponding authors

Table 2. Overall CFA for the measurement model.

Constructs and items	SL	Mean	SD	CA	CR	AVE
Privacy					.845	.647
PR1	0.88	4.93	1.58	.79		
PR2	0.80	4.79	1.43	.79		
PR3	0.74	5.17	1.44	.78		
Security					.792	.663
SR2	0.67	4.91	1.46	.78		
SR3	0.95	5.09	1.43	.79		
Convenience					.752	.611
CON3	0.92	5.40	1.43	.78		
CON4	0.62	4.52	1.59	.77		
System Anxiety					.704	.544
SA2	0.68	4.90	1.50	.78		
SA3	0.79	4.75	1.44	.79		
User Experience					.784	.649
UE2	0.91	4.77	1.75	.78		
UE3	0.69	3.69	1.57	.78		

SL= Standardized loadings

Table 2 and 3 shows the measurement model displaying the high reliability and convergent validity for each construct. The reliability and construct validity (convergent and discriminant validity) in the measurement model were tested. The reliability of the model was confirmed, as the values of Cronbach's alpha were higher than 0.7. The values of composite reliability and average variance extracted (AVE) were greater than 0.7 and

0.5, respectively for convergent validity which is tandem with [35], [36] assertion.

Table 3. Latent Variable Correlations

	CON	PR	SR	SA	UX
Convenience	**0.782**				
Privacy	-0.0381	**0.804**			
Security	0.0815	0.0837	**0.814**		
System Anxiety	0.1064	-0.0708	0.109	**0.738**	
User Experience	0.4003	0.1743	0.1724	-0.2168	**0.805**

The square root of AVEs (shown in bold at diagonal) and factor correlation coefficients

Table 4. Demography Characteristics of the Respondents

Variable	Classification	Frequency	Percentage%
Marital Status	Single	81	54.0
	Married	70	46.0
Gender	Male	81	54.0
	Female	70	46.0
Education	High School/Diploma	45	30.0
	Bachelor Degree	85	56.0
	Master's Degree	17	11.0
	Doctorate Degree	3	2.0
	No Formal Education	1	1.0
Tribe	Yoruba	118	78.0
	Igbo	16	10.0
	Hausa	10	7.0
	Others	7	5.0
Occupation	Armed Forces	2	1.0
	Teaching	14	9.0
	Professionals	18	12.0
	Public Sector	14	9.0
	Private Sector	13	9.0
	Self-Employed	85	56.0
	Student	3	2.0
	Researcher Others	2	1.0
Monthly Earnings	Less than ₦100000	109	72.0
	₦100000-₦200000	26	17.0
	₦200001-₦300000	9	6.0
	₦300001-₦400000	5	3.0
	₦400001-₦500000	1	1.0
	₦500001-₦600000	1	1.0
	₦600001 or more	0	0.0

IV. RESULTS

Partial least square (PLS) path modelling was used in this study to test the hypotheses using SmartPLS 2.0 software. PLS tests the measurement and path models simultaneously. PLS, a structural equation modelling (SEM) approach, aids in analyzing the causal research models comprising multiple constructs with multiple items [37].

Table 5 and Figure 2 gives a description of the hypotheses tested including path coefficients and variance explanation.

System Anxiety on mobile money platform will have a negative effect on user experience with SA → UE β = -.27 and t = 3.28 and Privacy concern has positive impact on user experience, PR→ UE β = .16 and t = 1.98. Security is positively associated with user experience, SR → UE β = .16 and t = 2.05 and Convenience with mobile money platform will positively influence user experience of mobile money, CN→ UE β = .42 and t = 5.15. Convenience is found to be the

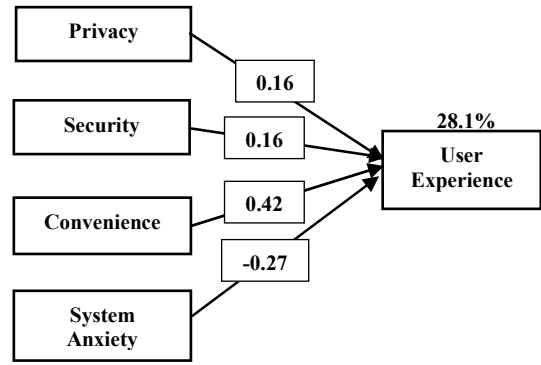most influential determinant of user experience with mobile money.

Fig. 2. Conceptual framework and Tested hypotheses

Table 5. Standardized path coefficients and corresponding hypothesis results

Hyp.	Path	Mean	SD	Beta	T-test	Result
H1	PR→ UX	0.17	0.079	0.16	1.98	Yes
H2	SR → UX	0.15	0.075	0.16	2.05	Yes
H3	CN→ UX	0.42	0.082	0.42	5.15	Yes
H4	SA→ UX	-0.26	0.081	-0.27	3.28	Yes

Hyp. = Hypothesis, SD = Standard deviation, PR = Privacy, SR= Security, CN= convenience, SA = System Anxiety, TR= Trust and UE= User Experience

V. DISCUSSION AND IMPLICATION

Identity theft is deeply penetrating in Nigeria as cyberpunks intensify their effort to impersonate innocent people by committing crimes in their names, hacking their company's chat system, taking possession of the third party social media account to implicate the vulnerable social media users. They also monitor and taking over computer files with phishing scam. Stealing credit and debit card information and opening of credit card accounts in third-party's name is a routine. The prevailing online crime now in Nigeria is bank account impersonation. The cyber terrorist break into susceptible bank account information and serve the convincible a court order to implicate him in a fraud. Due to the prevailing online insecurity in Nigeria, this study examines the factors that are responsible for mobile money users' experience either in positive or negative mode.

The study probe into the influence of privacy, security, convenience and system anxiety on mobile users' experience since the users of mobile money system are playing an important role in mobile money business success. For mobile money users to be free from uncertainty of money transaction, the mobile money providers need to build mobile money platform with confidence elements such as private policy and security features that can sustain the confidence of the mobile money users. In addition, they need to make the mobile money platform convenient for the users with less complicating design and users' friendly interface. How security awareness and assurance enhance the user's experience of mobile money,

why system anxiety an important factor for mobile money user's experience and how user's experience contribute to the success of mobile money stakeholders are the focus of this study. The result supports the inevitability of trust building with policy, security, convenience and allay of system anxiety fear. This study contributes to the information systems literature with focus on mobile money. First, combination of privacy, security, and convenience positively predict the user's experience of mobile money in Nigeria context and convenience is the highest predictor of user's experience criterion. Second, system anxiety is negatively significant to user's experience with the indication that when the system anxiety to use mobile money platform increases, the user's experience decreases.

Managerially, the outcome of this study straightens out the importance of UX and the elements that enhances UX. It enlightens the mobile money stakeholders in five ways: first, mobile money platform need to be simple to use and there is a need to put the demographic and psychographic status of the unbanked and underbanked into consideration while designing the mobile money interface. Second, the mobile money platforms need security effects that will reduce the insecurity tension of the mobile money users. Third, when optimizing and re-engineering the business process of mobile money, it is utmost to co-create with mobile money user's past-experience and to place emphasizes on privacy assurance, strong security elements, and to introduce biometric authentication and mobile apps authenticator. This will go a long way to prevent password forgetfulness and reduce the risk of cyber-terrorists' threats. Fourth, there is a need for the mobile money providers to put digital divide of the technocrat and the technophobes into consideration and come up with a mobile money platform that will serve the rural unbanked and the city underbanked. Fifth, there should be consideration of Nigeria ethnicity and due to mutation of culture, an interface that showcase major languages in Nigeria will help to include the rural financially excluded.

VI. LIMITATION AND FURTHER RESEARCH

Limitations of this study, while important, do not invalidate its exploratory nature. First, we used academic environment for data gathering among several other areas that should be involved as mobile money users cut across all occupations. Although the environment consists of the technocrats and the technophobes who are prone to using mobile money, it is impossible to form a complete opinion of the user experience without input from other community. We cannot tell if other community and tribes left out in the sample share the same views of those who were sampled. Future studies related to this study could involve the platform users absent from the study, but could also further expand the concepts involved in the discussion of the user experience and adoption of mobile money by the banked, underbanked, and unbanked employing behavioral and information systems theories with conceptual approaches. This will give insight to deeper attitudinal and technology characteristics of the mobile money users. It will be interesting for future researchers to know more about the

mobile money profiling and segmentation as this will help the mobile money providers to target different segment with different products and services. One aspect that should not be overlooked in future studies is the discussion of more theory or model design to determine other factors that affects user experience.

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