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Mobile Banking Adoption in the United States: Adapting mobile banking features from low-income countries

Research-in-Progress

by

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INTRODUCTION

This is a work-in-progress research paper on Mobile Banking (mBanking) in the USA that draws upon mBanking deployment successes in low-income countries. The research investigates mBanking adoption at a large (over 24,000 students) university in the southeast United States, with plans to collect data from low-income countries (Ghana, Kenya, and Ethiopia). The completed study will compare the results from the USA to those in low-income countries with a view to developing a theoretical framework that compares US adoption patterns to those in low-income countries.

The paper has three objectives: identification of the core mBanking features evidenced in the dominant mBanking solutions within low-income countries, identification of a theoretical framework for mBanking use, and an empirical study to understand the adoption of mBanking in the US as contrasted to its adoption in the low-income countries. We borrow from Internet banking studies and adapt a theoretical framework for mBanking use. We conduct surveys and interviews to empirically test our theoretical model. We identify common mBanking features from solution providers in low-income countries and apply it to our target population in the US.

In January 2011 the United States' Federal Deposit Insurance Corporation (FDIC), as a major part of its economic inclusion campaign to reach out to the unbanked and under-banked communities, sponsored nine banks to launch economic inclusion program for the seventeen

million unbanked and forty-three million under-banked residents in the United States (Corporation 2011). Students are part of these sixty million people that make up the unbanked and under-banked US residents. Students aren't building the credit history needed to get loans and often are unable to take advantage of the less costly forms of financial products. There are similarities between low-income countries and the unbanked and under-banked communities in the US. Hence, this study looks at common mBanking features in low-income countries and tests to see their likely adoption in the US.

BACKGROUND

Mobility of technologies and how they have impacted our lives is not a contemporary phenomenon. For example, simple portable technologies such as paper and complex ones such as the motor car and the desktop computer were invented many years ago and have lived with us for decades. However, their emergence did not generate as much interest to pursue mobility studies among Information Systems (IS) researchers as have been witnessed by mobile information and communication technologies (ICTs), in contemporary times. Recent enthusiasm in mobility research can be explained by the fact that contemporary portable ICTs afford un-tethered interaction and information processing via ICTs even when in transit (Dahlbom and Ljungberg 1998; Kristoffersen and Ljungberg 2000). Complemented by the proliferation of wireless networks and internet communications, portable ICTs have revolutionised modes of computing and interaction in society (Kopomaa 2000; Ling 2004).

Mobile computing is a dynamic process that is deeply rooted in both sociological and psychological phenomena such as perception, motives, personality, and action (Wiredu 2010). It is not a simple transmutation of static or desktop computing which analysis can be based solely on the principles of location-tethered computing. The essence of mobility is premised on the fact that even without portable computers, human movement is always an action conducted to satisfy a need. The introduction of mobile computing can potentially introduce additional actions to those which originally caused the movement of the individual. In this sense, the nature of the individual's goal-oriented actions bears significantly on the complexity of mobile computing. In other words, the degree of complexity in mobile computing will vary depending on the needs and motives of the mobile individual (Kristoffersen and Ljungberg 2000).

Mobile Services and Adoption

In IS research, mobile computers have generated a new wave of research efforts which seek to understand their relationship with society and business organisations in terms of computational services. To this end, studies have focused on aspects of mobile technologies such as usability (Sørensen and Al Taitoon 2008; Wiredu 2007), context-awareness and ubiquity (Kleinrock 1996; Want and Schilit 2001; Weiser 1993), interaction (Dix et al. 2000; Kietzmann 2008), convergence (Lyytinen and Yoo 2002), and adoption (Sarker and Wells 2003; Meso et al 2005).

Of these aspects, adoption is fundamental because none of the other aspects can manifest or be meaningful without it. Accessing mobile information services can be a dominant or passive component of an activity depending on the functional diversity of the technology (Sørensen et al. 2002). Besides, the specific human activities that they mediate is an important precursor to a holistic understanding of the adoption in mobile banking (Liang and Wei 2004; Luarn and Lin 2005). In short, the adoption of mobile services depends on a person's physiological, psychological and sociological circumstances as well as the level of technological innovation.

This means that the technology adoption model that is founded on static or desktop computers (Davis 1989), needs appendages to make it applicable to the analysis of mobile services adoption. Wiredu (2007), for example, models mobile computing in terms of the type of information service that can be obtained from a portable ICT, and asserts that these services are dependent upon several factors – the size of the technology, the nature of the task, and the conditions provided by time, space and context within which the user uses a mobile ICT artefact to perform a task. All of these mean that an understanding of the adoption of mobile services such as mobile banking and mobile commerce requires a consideration of a broader range of parameters (Sarker and Wells 2003).

Mobile Banking Services Adoption

Defined as the use of a portable ICT for performing balance checks, account transactions, payments, credit applications and other banking transactions, mobile banking is increasingly diffusing and affecting consumer behaviour (Suoranta and Mattila 2004). It facilitates the timely delivery of account information to bank customers, and their making of payments, deposits, withdrawals, and transfers. Tiwari and colleagues (2006), for example talk about ubiquity,

immediacy, localization, instant connectivity, pro-active functionality, and simple authentication procedure as peculiar customer benefits. These benefits complement banks' benefits such as adapting to customer needs, and exploiting distribution channels, image enhancement and revenue generation.

These benefits, plus the potential time and place independence of mobile services (Dix et al. 2000), and the overall effort-saving qualities offered (Suoranta 2003), suggest that mobile banking services should be valued and adopted by consumers. However, their adoption by both banks and their customers is not straightforward because of organizational, perceptual and societal challenges.

Firstly, one set of challenges of mobile banking adoption is brought by frictions in inter-organizational relationships between banks, mobile operators, credit card companies, telecommunication operators and retailers. Each of these players have distinct core competencies (Kim et al. 2009). For example, banks are eager to supplement traditional banking with additional channels such as offshore and mobile banking. However, they do not have adequate telecommunications infrastructure. Conversely, telecommunications service providers are looking to leverage their infrastructure with new business opportunities, but they normally have inadequate financial knowhow. Thus, such players come together to form a value network. However, they may have somewhat selfish motives that may inhibit their mutual complementation in providing mobile banking services (Mallat et al. 2004).

Secondly, various perspectives to users' perceptions of mobile banking that induce adoption have been proposed in the mobile banking literature. Propositions have been underpinned by user's perception of parameters such as technological innovation (Akturan and Tezcan 2010), demographics and elitism (Crabbe et al. 2009), trust (Kim et al. 2009), security (Laforet and Xiaoyan 2005), gender (Riquelme and Rios 2010), and income levels (Medhi et al. 2009).

Thirdly, the marked variations in these perspectives modelled from these parameters indicate that the context of geography has considerable effects on them. The parameters have been studied in the context of particular countries and geographical zones such as Ghana (Crabbe et al. 2009), Brazil (Cruz et al. 2010), China (Laforet and Xiaoyan 2005), and Finland (Suoranta 2003). Thus, the potential mobile banking adopter's societal circumstances, affecting his or her perceptions, will also affect his or her adoption.

Core Mobile Banking Features in Low-income Countries

Mobile banking (mBanking) is a subset of eBanking which in turn is a subset of electronic commerce. The genre can be described as eCommerce >> eBanking >> mBanking >> mPayments. There are two models in mBanking adoption: additive model and transformative model. The additive model entails providing additional services to an already existing bank account holder. The Transformative model is where mobile ICTs are employed to provide or target financial products to the unbanked (Porteous 2006). In the US, mBanking has the potential to accommodate both models because its reach has the potential of extending to both high- and low-income groups. However, mBanking in the US has predominantly been following the additive model.

GSM Association (GSMA), online mobile money community, identified twenty-two African countries that have deployed some form of mBanking, 40% of the 54 African countries (Exchange 2011). Sixteen of the twenty-two countries use solution providers that cross country borders. For this study we selected common mBanking features in low-income countries from solution providers that have deployment in at least two African countries. Based on these criteria we identified eight solution providers including Airtel, Celpay, mPesa, MTN, Orage, and Tigo (Negash, 2011). We compiled the major mBanking features provided by the eight solution providers to understand the types of services being offered in low-income countries; the features are described in Table 1 (Negash, 2011). The mBanking features we identified are all accessible through SMS (Short Message Services); smartphones are also becoming more prevalent. Smartphones provide graphical user interface for mBanking services. In low-income counties, the operating systems and software platform market for smartphones is dominated by four vendors including Nokia's Symbian (38%), Google's Android (23%), Apple's iPhone (16%), and Research In Motion's Blackberry (16%). The remaining 7% market share is provided by Microsoft's Windows phone 7, Samsung's Bada, and HP's webOS/Palm platforms. The recent announcement by Nokia to adopt Microsoft's platform, however, has put the Windows Phone 7 platform at the forefront (FactBox 2011).

mBanking services currently offered by large US banks include account alerts (security alerts and reminders); account balance (updates and history); customer service via mobile; branch or ATM location information; bill pay (deliver online payment, i.e. electric bill, by secure agents

and mobile client application); funds transfer; transaction verification; and mortgage alerts (Association 2009). While mBanking services are available in the US, penetration of mBanking in the US is dismal. Current penetration levels are under 1% (Association 2009).

Table 1. Description of mBanking Features

Feature	Description
Airtime top-up	Prepaid airtime for cell phone use
Bank transfer	Making money transfer at a bank account using mobile phone
Bill payment	Paying bills (i.e. electric bill) from a mobile phone
Domestic transfer	Transferring money from a domestic mobile account to another
International transfer	Transferring money from an international mobile account to another
Loan payment	Offering loans (conventional or microfinance) and authorizing payment via cell phones
Manage bank account	Balance inquiry and alert information
Salary disbursement	Disbursing salary payments to mBanking account
Multicurrency	mBanking account that supports more than one currency transaction
Universality of account	Ability to access mBanking account from multiple countries without reregistration
Cash-in	Method of adding money to mBanking account. Level-1: pre-paid card including debit and credit cards; Level-2: Bank ACH transfer including online banking; and Level-3: agent POS casher
Cash-out	Method of withdrawing money from mBanking account. Level-1: pre-paid card including debit and credit cards; Level-2: Bank ACH transfer including online banking; and Level-3: agent POS casher
On-boarding	The process of creating mBanking account. Level-1: POS-agent location-automated/manual; Level-2: self-service with browser; and Level-3: cell phone

The proprietary nature of the banking system is one reason for the slow uptake of mBanking in the US. Evidence from successful mBanking implementations in low-income countries indicate that such solutions thrive because of the existence of an mBanking ecosystem that includes financial institutions, wireless operators, and technology solution provider. Carol Realini, CEO of Obopay, US-based mBanking solution with deployment in India, states that an optimal mobile payment system must have two qualities: affordability and openness (Radjou 2009). Affordable enough to handle small transactions with a low cost business model. And open network that support different mobile carriers. "Unfortunately, most carriers ignore this reality and are trying to create mobile payment offerings that run only on their proprietary network, while traditional banks struggle to offer affordable services because their costs are just too high" (Radjou 2009).

To understand the potential impact of mBanking, particularly the transformative model of mBanking, in the US, one needs to just consider the size of the remittance market – moneys remitted from the US to other countries by residents of the US. The remittance market size in 2010 was $325 billion and expected to reach $374 billion by 2012. Even during the economic downturn of the last couple of years remittance was resilient when compared to private debt and portfolio equity (Mohapatra et al. 2010). The top ten recipient of migrant remittance in 2010 were four European countries and six countries with population over 90 million: India ($55 billion), China ($51 billion, Mexico ($23 billion), Philippines ($21 billion), France ($16 billion), Germany ($12 billion), Bangladesh ($11 billion), Belgium ($10 billion), Spain ($10 billion), and Nigeria ($10 billion). The vast volume of these remittances is conducted via mBanking which has reduced the cost of small amount transfers from about 10 percent down to 3 percent (Mohapatra et al. 2010). This market is indicative of the potential size and impact that within-US mBanking can grow exponentially. For this reason, an understanding of factors that influence mBanking adoption within the US becomes paramount.

THEORETICAL FRAMEWORK

The US mBanking growth is expected to parallel Internet banking adoption; it took 10-years for Internet banking to reach its first 40-million customers, the same is expected for mBanking (Association 2009). Consumers intention of use for mBanking is similar to their intention for Internet banking (Association 2009). Hence for this study we have adopted a theoretical research framework that has been used for Internet banking adoption.

In most of the research on Internet banking Technology Acceptance Model (TAM) has received considerable attention and empirical support among researchers (Wang et al. 2003). As a result many researchers use the TAM model including Sathye (1999), Shanmugam and Guru (2000), Tan and Teo (2000), Sherif Kamel and Ahmed Hassan (2003), Chung and Paynter (2002), Chang (2003), Wang, et al. (2003), Eriksson (2005), Jaruwachirathanakul and Fink (2005), Lassar and colleagues (2005), Ndubisi and colleagues (2005), and Cheng and colleagues (2006).

In this study an extended Technology Acceptance Model (TAM2) research framework was considered appropriate due to its predictive power, simplicity and small number of constructs to predict intention (Agarwal and Prasad 1999). This study adapted a research framework developed by Pikkarainen et al. (2004) and Suh and Han (2002).

Pikkarainen et al. (2004) found that perceived ease of use, perceived usefulness, perceived enjoyment, information about availability of Internet banking, security and privacy, and quality of Internet connection as determinant factors. Sathye (1999) identified security concerns, and a lack of awareness of Internet banking service and its benefits as factors that determine adaption.

Bhattacherjee's (2001) research revealed that satisfaction with the Internet banking was the strongest predictor of users' continuance intention followed by perceived usefulness. Suh and Han (2002) investigated the effect of trust on customers' acceptance of Internet banking. The results supported the hypothesis that trust is a significant determinant of the intention to use Internet banking.

In this study we modified the Pikkarainen et al. (2004) model by renaming "information about availability of Internet banking" as "lack of awareness" (Sathye 1999). We added the trust construct (Suh and Han 2002), renamed "quality of Internet connection" as "mobile network quality", and added a new construct—Regulation and Compliance—to account for the mandatory regulations and compliance in the banking industry. Our research model has seven constructs as shown in Figure 1.

METHODS AND HYPOTHESES

Interview and survey are the primary means by which data for this study is being collected. We adapted survey instruments from prior studies and reworded them to fit our study context, for example, changing the wording from Internet banking to mobile banking.

Perceived usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis et al. 1989). The ultimate reason people exploit mBanking systems is that they find the systems useful for their banking-transactions needs. As a result the following hypothesis is formulated:

H1: Perceived usefulness (PU) has a positive effect on consumer behavioral intention to use mBanking systems.

Perceived ease of use (PEOU) is a perception about operating a technology with less effort (Davis et al. 1989). mBanking systems need to be both easy to learn and easy to use. Technological innovations that are easy to use will be less threatening to the individual (Moon and Kim 2001). This implies that perceived ease of use is expected to have a positive influence on users' perception of credibility in their interaction with mBanking systems. Hence, the following hypothesis is proposed:

H2: Perceived ease of use (PEOU) has a positive effect on consumer acceptance of mBanking.

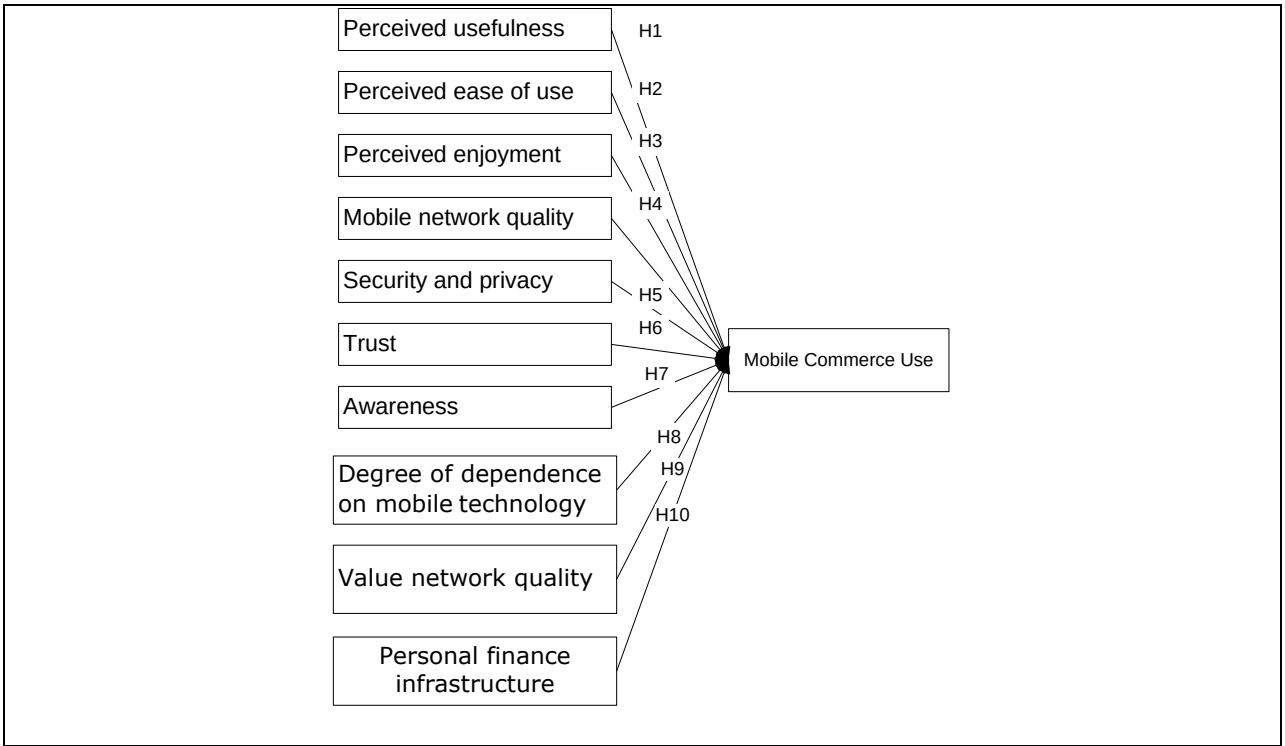

Figure 1: Mobile Banking Use Framework

Perceived enjoyment (PE) is perceived fun and perceived playfulness, and an intrinsic motivation to use information systems (Pikkarainen et al. 2004). Tan and Teo (2000) noted that PE correlates positively with frequency of Internet usage and daily Internet usage. By applying this into mBanking context the following hypothesis is formulated:

H3: Perceived enjoyment (PE) has a positive relation with consumer acceptance of mBanking.

Decent Internet connection and its quality was one of important factor to use Internet Banking (Pikkarainen et al. 2004). Hoffman and colleagues (1996) find that there is a significant correlation between download speed and user satisfaction. Thereby we propose that:

H4: The quality of the connection to the mobile network that affords access to mBanking services has a positive effect on consumer acceptance of mBanking.

Privacy and security were found to be significant obstacles to the adoption of Internet Banking (Sathye 1999). mBanking will not be adopted unless customer considered it is safe and secure. These findings and observations lead to the following hypothesis:

H5: Security and privacy have a positive effect on consumer acceptance of mBanking.

Trust is a willingness to be vulnerable to the actions of another person or people or part. This is based on expectations that the other person or part will act in a responsible manner (Pavlou 2003). Internet trust enables favorable expectations that the internet is reliable and predictable and that no harmful consequences will occur if the online consumer uses the internet as a transaction medium for his/her financial transactions (Suh and Han 2002). Therefore, we propose that:

H6. mBanking trust positively influences the consumer's attitude toward internet banking.

The adoption of Internet Banking is determined by the consumers awareness about the availability of such a product and explain how it adds value relative to other products of its own or that of the competitors (Sathye 1999). If a consumer has enough information about the availability of the service and its value, there would be high possibility of mBanking acceptance. Hence the following hypothesis is proposed.

H7: Awareness about mBanking has a positive effect on consumer acceptance of mBanking.

Degree of dependence on mobile technology: Users in low-income countries experience poor physical telecommunications infrastructure as well as low access to traditional financial services (Claessens, 2006; Oyelaran-Oyeyinka, and Lal, 2005; Mutula, 2003; Nulens, and Audenhove, 1999; and De Roy 1997). Thus, the mobile phone is being experienced as a 'savior' (Brown, et al., 2003; Ferrer-Roca, et al., 2004). To this end, the technology is heavily depended upon.

H8: High dependence on mobile technology in the past has a positive effect on consumer adoption of mobile device for commerce.

The value network comprising of banks, mobile operators, credit card companies, telecommunications operators and retailers has also been found to influence user adoption behavior (Kim et al. 2009). These components must interoperate in a symbiotic fashion to make financial transactions functional and acceptable to consumers. Therefore, we hypothesize as follows:

H9: The quality of the mBanking value network has a positive effect on consumer adoption of mBanking.

By and large, the economies of low-income countries are cash-based. High-income countries, in contrast, primary maintain credit-based economies. The predominant feature of financial transaction for mobile devices is prepaid. The nature of prepaid commerce (i.e. debit cards or prepaid cards) complements a cash-based economy while it creates resistance for a credit-based economy. High bank fees and limited access keeps most rural and some urban dwellers away from holding bank accounts (Comminos et al. 2008). The absence of local money transfer services has led to the growth of airtime transfer as a compliment to cash. To make airtime a form of transaction commodity, mimicking cash in limiting fees to zero or as close to zero as possible is needed (Comminos et al. 2008) and mobile operators have come to the aid of subscribers by providing micro-airtime cards which cost the equivalent of 2-3 minutes of air-time (Sey 2009). Financial transactions using mobile devices are mostly prepaid services, hence we hypothesize as follows:

H10: Users where cash-based economy is predominant use of mobile devices for commerce increases.

RESULTS AND DISCUSSION

We conducted a pilot survey using college students in the US. We had a total of 84 responses. Respondent demographics are provided in Table 2.

Table 2. Demographics Data

Age:	Under 18 = none 18-22 = 32 23-29 = 20 30-39 = 19 40-49 = 9 Over 50 = 4		**Gender:**	Female = 29 Male = 52 Missing values = 3
			Source of data:	Graduate classes = 23 Facebook = 23 Undergraduate classes = 38
Student/work status:	Full-time student only = 30 Full-time student & full-time employed = 9 Full-time student & part-time employed = 17 Part-time student & full-time employed = 13 Par-time student & part-time employed = 2 None student & full-time employed = 10 Missing values = 3			

The causal effects theorized in our model is assessed using Partial Least Squares (PLS), a structural modeling technique (Chin, 1998; Gefen et al., 2003; Wixom and Watson, 2001) as implemented in Smart PLS software (Ringle, et al., 2005). We used PLS and the bootstrap resampling method (200 resamples) to assess the causal effects as theorized in the figure 1. Our samples were made up of 84 subjects. PLS is similar to regression in that it is a components-based structural equations modeling technique. However, it differs from regression analysis in two fundamental ways. First, it simultaneously models the structural paths (i.e., theoretical relationships among latent variables) termed the structural model - and measurement paths (i.e., relationships between a latent variable and its indicators) – termed the measurement model. Second, the PLS algorithm allows each indicator to vary in how much it contributes to the

composite score of the latent variable rather than assume equal weights for all indicators of a scale. This means that indicators with weaker relationships to related indicators and to the latent construct are given lower weightings (Chin et al., 1996; Lohmoller, 1989; Wold, 1989).

Analysis of the Measurement Model

The internal consistency reliability, convergent validity and discriminant validity of the measurement model was assessed by the quantitative strength of each of the paths in the measurement model (Chin, 1998; Wixom and Watson, 2001).

Internal consistency reliability is given by the cronbach alpa values as presented in Table 3. All reliability measures were above the recommended level of 0.70 for exploratory research (Nunnally, 1967; Wixom and Watson, 2001), except for the latent variable termed "mobile network quality. On the whole, internal validity of the survey instrument is confirmed.

TA BLE 3: Results of Reliability Tests for the Research Model (Measurement Model Assessment)

CONSTRUCT	*CRONBACH ALPHA*	*AVERAGE VARIANCE EXTRACTED (AVE)*	*COMPOSITE RELIABILITY*
Awareness	0.76511	0.802764	0.89033
Degree of Dependence on Mobile ICT	0.849385	0.6179	0.888681
Mobile Network Quality	0.519342	0.645441	0.777012
Perceived Enjoyment	0.916278	0.799452	0.940959
Perceived Ease of Use	0.850877	0.565347	0.885848
Personal Finance Infrastructure	0.76625	0.635724	0.83803
Perceived Usefulness	0.880316	0.739337	0.918563
Security and Privacy	0.714518	0.593704	0.809271
Trust	0.942238	0.852447	0.958494
Use of Mobile ICT	0.942134	0.815396	0.956476
Value Network Quality	0.962961	0.794592	0.968656

Convergent validity is considered adequate when constructs have an average variance extracted (AVE) of at least 0.5 (Fornell and Bookstein, 1982). The AVE of each construct as presented in Table 3 is greater than 0.5. Convergent Validity is also confirmed when items load highly (greater than 0.5) to their respective reflective constructs (Fornell and Bookstein, 1982). Due to space constraints we do not report individual factor loadings for each item on its associated construct. However, all items have loadings that are greater than 0.6. Therefore convergent validity is satisfied.

For satisfactory discriminant validity, the square root of the AVE for each construct should be greater than the variance shared between the construct and other constructs in the model (Fornell and Bookstein, 1982; Gefen et al., 2003; Wixom and Watson, 2001). Table 4 juxtaposes the square root of each AVE score alongside the correlations among the constructs. It is evident that these square roots are greater than the respective correlations of a latent variable to the other latent variables in the study. Therefore, all constructs satisfied the conditions for discriminant validity.

TABLE 4: Latent Variable Correlations between Construct and Square Root of AVE Scores for Each Construct*

	SQUARE ROOT OF AVE	A	DDMT	MNQ	PE	PEOU	PFI	PU	S&P	T	UMC	VNQ
A	0.896	1.000										
DDMT	0.786	0.815	1.000									
MNQ	0.803	0.487	0.371	1.000								
PE	0.894	0.603	0.496	0.564	1.000							
PEOU	0.752	0.267	0.127	0.545	0.337	1.000						
PFI	0.797	0.440	0.551	0.017	0.042	-0.180	1.000					
PU	0.860	0.621	0.520	0.470	0.814	0.443	0.064	1.000				
S&T	0.771	0.645	0.680	0.468	0.641	0.118	0.329	0.536	1.000			
T	0.923	0.765	0.746	0.427	0.646	0.158	0.420	0.540	0.839	1.000		
UMC	0.903	0.567	0.415	0.499	0.717	0.541	-0.106	0.806	0.483	0.475	1.000	
VNQ	0.891	0.760	0.836	0.392	0.523	0.083	0.598	0.507	0.624	0.695	0.370	1.000

A=Awareness, DDMT=Degree of Dependence on Mobile Technology, MNQ=Mobile Network Quality, PE=Perceived Enjoyment, PEOU=Perceived Ease of Use, PFI=Personal Finance Infrastructure, PU=Perceived Usefulness, S&P=Security and Privacy, T=Trust, UMC=Use of Mobile Commerce, VNQ=Value Network Quality

Composite reliability is a measure of scale reliability that assesses the internal consistency of a latent variable (Fornell & Larcker, 1981). It corresponds to the conventional notion of reliability in terms of classical test theory and is deemed satisfactory if measures for the latent variables are above the 0.70 threshold (Hair et al. (1998). As reflected in Table 3, all the latent variables in this study reflected composite reliability scores above 0.7.

Analysis of the Structural Model

The structural model is depicted in Figure 2 with all the constructs in the theoretical model. The PLS structural equation modeling technique allows us to analyze the structural model of a study's latent variables by providing statistics on the strength of the relationships among related constructs – the path coefficients, and also the extent to which independent constructs explain the variance in a dependent construct – the R^2 values. Concerning the explanatory power of the model as measured by R^2 values, the model explains 77% of the variance in Mobile Commerce Use.

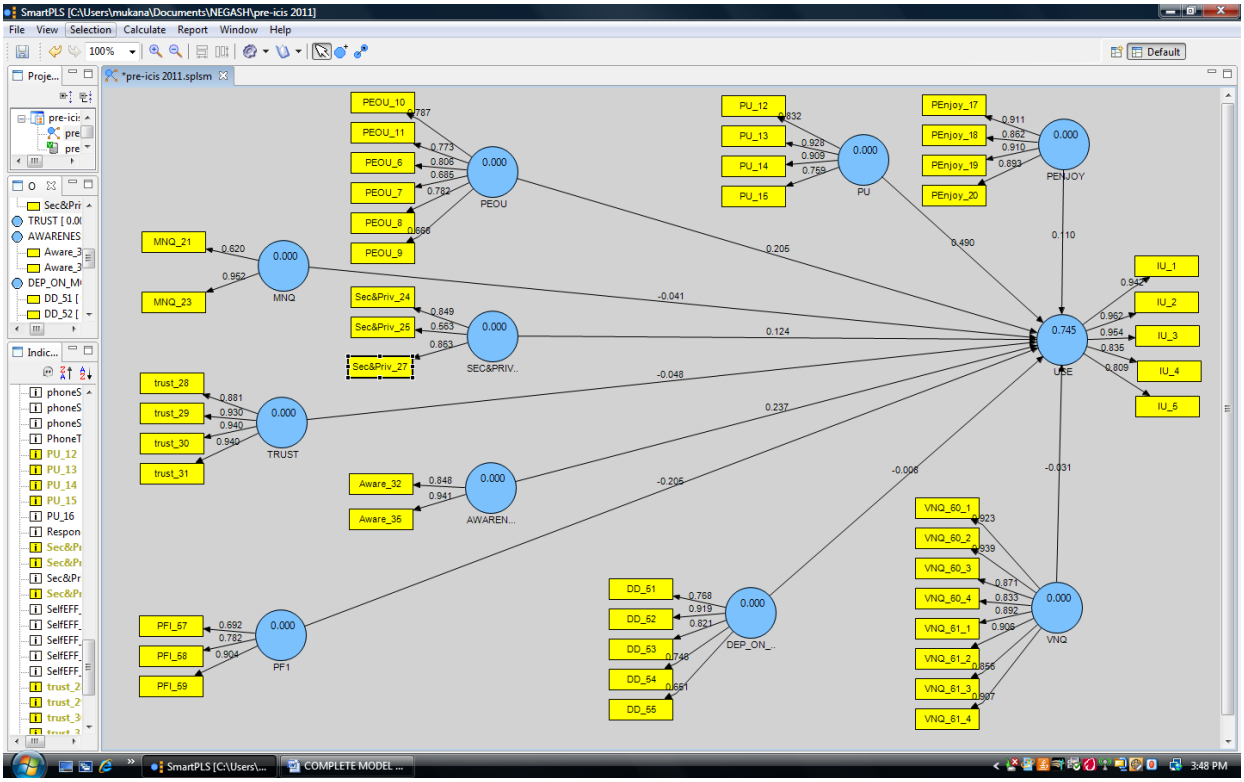

Figure 2: Structural model for mobile banking use framework

Table 5 presents the path coefficients for the key theorized relationships as well as their p-values. The results indicate that, at a level of confidence of 95% (p-value less than 0.05 or T value greater than 1.96 for a 2-tail test for statistical significance), some of the theorized relationships hold. At the fundamental level, perceived ease of use and perceived usefulness impact user's intention to use mobile commerce. Further the independent variables named "personal finance infrastructure" also impacts intention to use mobile commerce. The impact of awareness on

intention to use is partially supported. It is significant at 90% level of confidence but not at the 95% level of confidence. The rest of the relationships are not supported.

TABLE 5: Path Coefficient and T-Statistic for Each Construct's Impact on the Dependent Construct – Mobile Commerce Use

INDEPENDENT CONSTRUCT	*DEPENDENT CONSTRUCT*	*PATH COEFFICIENT*	*T-VALUE*
Awareness	Use	0.237	1.625
Degree of Dependence on Mobile Technology	Use	-0.006	0.053
Mobile Network Quality	Use	-0.041	0.320
Perceived Enjoyment	Use	0.110	0.837
Perceived Ease of Use	Use	0.205	2.121
Personal Finance Infrastructure	Use	-0.205	1.937
Perceived Usefulness	Use	0.490	4.100
Security and Privacy	Use	0.124	0.950
Trust	Use	-0.048	0.378
Value Network Quality	Use	-0.031	0.277

Consequently several of the hypotheses in our model were not supported. That in a way confirms our motivation for the study. Our study is based on the premise that the US users are different from users in low-income countries. Our pilot data is collected from the US. We are still collecting the comparative data from low-income countries; we may still find support for our hypothesis when running the data from low-income countries.

Perceived enjoyment, trust, and security and privacy were not supported as indicated in the path coefficients and t-values in Table 5. Two-thirds of our respondents were born in the 1990s; they may view mobile phones not as an enjoyment tool but as a required communication device to perform daily routines. The reason trust and security and privacy were not supported may be because the younger generation grew up with the mobile technology and may consider the prevailing trust and security and privacy issues as normal. We did not evaluate the age construct in this study; further analysis on the generation gap is needed.

Value network quality, degree of dependence, and mobile network quality were not supported as shown by the path coefficients and t-values in Table 5. We believe this is because these constructs are not issues for US user groups. For example one of the value network quality questions stated "Without effective partnership among mobile device provider, bank, credit card companies, and retailers I will not be able to perform my routine tasks smoothly." While we expect this to be the case in a low-income country it is not the case in the US; in a low-income country without partnership among the different groups none would be able to provide the necessary services. Another question for the degree of dependence construct stated "If my mobile device does not work I have other alternatives to call my co-workers." We expect this to be true for consumers in the US. However, users from a low-income country may have little or no alternative.

CONCLUSIONS

At the fundamental level, perceived ease of use and perceived usefulness impact user's intention to use mobile commerce. Both perceived ease of use and perceived usefulness were supported in our study confirming prior research on intention to use.

The independent variable named "personal finance infrastructure" that represents the difference in a cash-based dominated economy in low-income countries and the credit-based economy in the US had impact on intention to use mobile commerce. This fining was surprising to us and we shall be investigating this further to try and get a better theory-based understanding. The impact of awareness on intention to use is partially supported. It is significant at 90% level of confidence but not at the 95% level of confidence. We expected awareness to have stronger impact; we shall further investigate this in the full study.

Perceived enjoyment, trust, and security and privacy, constructs that are found to impact use in other technologies were not supported. This may be because majority of our participants were youth that grew up with the mobile technology; we did not evaluate the age construct in this study; further analysis on the generation gap is needed. The remaining three constructs value network quality, degree of dependence, and mobile network quality were not supported. We did not expect these constructs to be supported in a US study; in fact we expected these construct to differentiate users of US and low-income countries, supported in the latter case but not in the former. For the most part, these results conform to what we expected to get. We look forward to

the results from the Sub-Saharan sample, data collection from that region is still ongoing, to see if indeed these factors are perceived to impact mobile commerce use. We expect that they will.

The study seems to be providing preliminary evidence about the interconnectedness and interdependence of mobile telephony infrastructure and credit finance infrastructure for effective mobile commerce uptake - if this is the case, one wonders of the infancy of the credit finance infrastructure in Sub-Saharan Africa impedes mobile commerce, or if the emergent mobile-banking and mobile-phone cash payment infrastructure presently developing in that region will substitute for the credit-finance infrastructure. In which case we expect to see a different type of mobile commerce model develop in Sub-Saharan Africa—different from the one in the western world which is heavily credit-finance-infrastructure dependent.

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