

# KEY FACTORS AFFECTING MOBILE BANKING ADOPTION AMONG BANKS' CUSTOMERS IN SUDAN

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## **Abstract**

*The accelerated advancement in technology resulted to the appearance of Self Service Technology (SST). Different forms of SST are presented in the banking Sector. This study aimed to identify the main factors that influence the adoption of Mobile Banking (M-banking) service in Sudan, we mainly focused on integrated Technology Acceptance Model (TAM) constructs, which are perceived usefulness, perceived ease of use, perceived risk and perceived trust. 181 bank's customers in Sudan were sampled for responding, all of them were M-banking service users. Factor analysis and regression technique were employed to investigate the relationship among variables. Our results revealed that customers' intention to use M-banking in Sudan is influenced strongly by perceived trust, perceived ease of use and perceived risk. Perceived usefulness was found to be with no influence on the intention to use M-banking service among customers of Sudanese banks.*

**Keywords:** Mobile banking, TAM, Risk, Trust, Sudan

## **1. Introduction**

The technology holds great promise of future simplification and automation. Self-service technology continues to grow across a wide variety of retail markets. Many businesses are using self-service technologies as a delivery channel to improve sales, and enhance the overall customer experience. With self-service technology, customers do not have to wait for employees to assist them. Nowadays, the electronic technology is playing a major role for the world of business especially in banking activities. The internet and the mobile phone; that two technological advancements have profoundly affected all of us in the last decade resulting products of this association that are mobile data services. Using a variety of platforms, services are

being created to enable mobile devices to perform many activities of the traditional internet, although in a reduced format for mobile devices. Mobile phones have provided an opportunity for banking institutions to introduce new services to the public. The latest service, which is now available in Sudanese banking institutions, is the mobile banking (M-banking) service. It is one of the newest approaches to the establishment of financial services through information computer technology (ICT), made possible by the widespread adoption of mobile phones even in low income countries, (Anderson, 2010). As per the Central Bank of Sudan (CBOS) information; there are only 2 banks among 37 operating banks in Sudan that provide the mobile banking service. Thus; it is expected that in the upcoming period of time this service will spread gradually in the banking sector in Sudan. Mobile banking (m-banking) is defined as “a channel whereby the consumer interacts with a bank via a mobile device, such as a mobile phone or personal digital assistant. In that sense; it can be seen as a subset of electronic banking and an extension of internet banking with its own unique characteristics” (Laukkanen and Passanen, 2008, p. 87).

M-banking is of conjoint benefit for both banks and customers; whence it benefits the bank in wise of many facets, as to have competitive advantage over those banks which are not providing this service, reaching additional segments of individual/corporate customers utilizing the mobile innovation expansion, and reduce cost of staff, courier, communication, paperwork ....., etc. (Pousttchi and Martin Schurig, 2004). Whereas; from the prospect of the customer mobile banking is simply an application to be downloaded in the mobile phone to enable customers to bank anywhere, anytime using handheld movable device. It is useful for the customer in many aspects, for instance transactions like checking account balances or transferring money from one account to another could be done without the need of going physically to the bank premises, eliminating the limitations of the space and time because customers merely can check out their accounts details, get their bank statements, perform transactions like transferring money to other accounts and pay their bills sitting in the comfort of their homes and offices, Mishra &Sahoo (2013). Moreover; from the prospect of the customer; mobile banking is beneficial even more than the internet banking in terms of no need even to login to a computer terminal to look after their banking transactions.

In Sudan; M-banking could be considered as an innovation due to its recency and the very limited number of banks providing the service. Up to March 2014, and as per the Central Bank of Sudan (CBOS) information; there are 37 operating banks in Sudan and only 2 banks of them provide the mobile banking service. Thus; it is expected that in the upcoming period of time this service will spread gradually in the banking sector in Sudan. Mobile banking (m-banking) is defined as “a channel whereby the consumer interacts with a bank via a mobile device, such as a mobile phone or personal digital assistant. In that sense; it can be seen as a subset of electronic banking and an extension of internet banking with its own unique characteristics” (Laukkanen and Passanen, 2008, p. 87).

As a typical new technology provided in a developing country; some constraints face its adoption among customers, for example many customers are reluctant to use m-banking. Others; simply don't like the technology at all, and others have the fear of that their computer will garble their accounts, The purpose of this paper is to empirically investigate the adoption of m-banking among customers of banks in Sudan, utilizing the integrated technology acceptance model (TAM).

The Technology Acceptance Model (TAM) is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. It successfully explored the behavioral intentions as “The degree to which a person has formulated conscious plans to perform or not perform some specified future behavior”(Davis 1989). The original TAM includes two main independent variables which are Perceived Usefulness and Perceived Ease of Use that influence the intention to use as a dependent variable, nonetheless; it was found that they are not sufficient to capture key opinions for

adopting new technology, and that's why many previous studies have integrated more variables to TAM such as Perceived Risk and Perceived trust ( Lee & Seok & Ki, 2007, Ghalandari & Ghahremanpour & Hasanluei 2013, Amin 2008, Kesharwani & Bisht, 2011, Rehman & Esichaikul, 2011).

## **1. Literature review and hypothesis development**

### **1.1 Perceived usefulness (PU)**

Perceived usefulness (PU) is one of the main constructs of the technology acceptance model TAM in which it 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, p. 320) specified that it the effectiveness at work, productivity understood as time saving and the relative importance of the system for the individual's work. Applying this definition to m-banking adoption; perceived usefulness is the perception of users that m-banking will enhance their means of getting the bank services. It has been noticed that extensive amount of studies about acceptance of new technologies; (Tong, 2010) found that perceived usefulness has an expressive influence on the intention to shop online. Also; (Chen & Barnes, 2007) found that Perceived usefulness is among the very important dimensions that impact consumers' online. Moreover; researches about adoption to electronic banking in other different nations were consistent with the results that Perceived usefulness has a significant effect on the users' intention towards using electronic banking, (Amin 2009, ...Alda's-Manzano & Lassala-Navarre & Ruiz-Mafe & Sanz-Blas, 2008, Chong & Ooi & Lin & Tan 2010). Moreover; many previous literature was resulted to that PU has an influence on m-banking adoption (Ghalandari & Ghahremanpour & Hasanluei, 2013, Kazi & Mannan, 2013, Aboelmaged & Gebba & Tobbin, 2012). Accordingly; it is hypothesized that:

*H1: PU has a significant influence on the m-banking adoption in Sudan.*

### **2.3 Perceived ease of use (PEOU)**

Perceived ease of use (PEOU) is a critical construct in TAM, defined as "The degree of ease associated with the use of the system". It provides the leverage to create favorable perceptions, encouraging users to accept and use new systems, (Zacharis, 2012). Most of previous literatures about behavioral decision making demonstrated that individuals attempt to minimize efforts in their behaviors. Also; extensive empirical literature demonstrated that perceived ease of use directly and positively influences behavioral intention to use. Fagan, Kilmon and Pandey (2012) explored the adoption of a virtual reality simulation; and found that PEOU of virtual reality crash cart simulation had a positive influence on the behavioural intention to use simulation. Roca, Garcí'a and VegaGreat (2008) found that perceived ease of use is very critical for the success of an online trading system. Moreover; (Choraria, 2012) considered ease of use is important for the online community users involved in both information search and contribution. PEOU in case of e-banking is considered as the degree to which e-banking is perceived to be easy to access and use. Literatures in this area that investigated factors influencing e-banking adoption found that PEOU is influencing intention towards using electronic banking (Chong & Ooi & Lin & Tan 2010, Amin, 2009, Alda's-Manzano & Lassala-Navarre & Ruiz-Mafe & Sanz-Blas, 2008'). Based on those results the following hypothesis was developed

*H2: PEOU has an influence on m-banking adoption in Sudan.*

### **2.4 Perceived Trust (PT):**

Trust is being normally defined as belief that someone or something is reliable, good, honest, effective, etc. In case of m-banking trust is found to be the extent to which an individual believes that using mobile banking is secured and has no privacy threats (Chong & Ooi & Lin & Tan 2010) who mentioned that when it comes to electronic banking; trust is found to be crucial and complex as customers should trust the online transaction of the bank to complete the usage transaction. Trust in the internet and in the government was

found to be a critical factor to adopte-Government services in Pakistani society (Rehman & Esichaiku 2011). Warwick and Goode (2010) found that trust in the website is greatly influencing the purchasing intention to purchase online. Xin, Techatassanasoontorn and Tan, (2012) specified trust to directly influence the adoption intention towards mobile payment adoption. Additionally; many previous researches that considered the drivers of adoption to e-banking have appointed trust to play a major role in determining the intention towards using e-banking (Juwaheer & Pudaruth&Ramdin 2012, Kesharwani & Bisht 2011, Amin2009). Additionally; Ali and Dhaha 2013, and Tobbin, 2012, agreed on the obtainable influence of trust on the m-banking adoption, that granted us to specify the below hypothesis

*H3: PT is significantly affecting m-banking adoption in Sudan.*

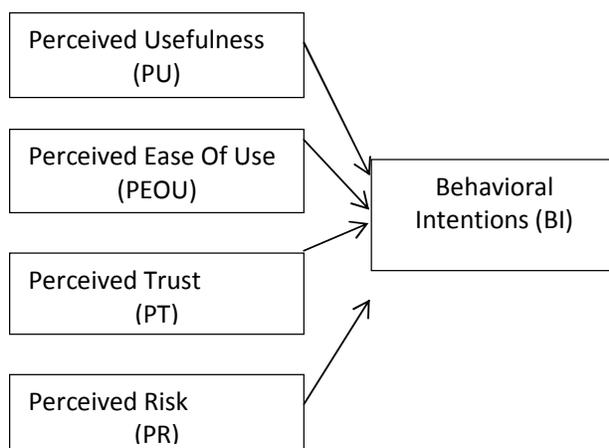
### 2.5 Perceived Risk (PR)

Generally; risk can be defined as the intentional interaction with uncertainty. Risk perception is the subjective judgment people make about the severity of a risk. Conducting electronic transaction is a risk that faces consumers, as it does not have any kind of physical contact, which subsequently; affects the adoption to internet technology, (Cheng & Tsai& Cheng&Chen2011). In this study Risk is associated with possible losses from m-banking transaction because it concerns a virtual environment with no interaction –with employees-, not a traditional environment, (Alda’s-Manzano & Lassala-Navarre’ & Ruiz-Mafe’ & Sanz-Blas, 2008). Broekhuiz and Huizingh (2009) considered the perceived risk to be one of the determinants of the online purchase and they found that it affects the inquirers’ purchase to a great extent. Moreover; enough number of literatures about electronic banking adoption in many countries employed risk as one of the key factors influencing adoption to it, (Kesharwani & Bisht 2011, Juwaheer & Pudaruth&Ramdin 2012, Nasri, 2011). Moreover; adequate amount of literature considered the risk as a basic influential in adopting m-banking in different nations (KaziMannan, 2013&Ghalandari, Ghahremanpour&Hasanluei, 2013). In consequence; we developed the following hypothesis:

*H4: PR is significantly affecting m-banking adoption in Sudan.*

Based on the above; the model of the study was constructed as illustrated in figure (1).

**Figure (1)**



### **3. Methodology:**

A cross-sectional survey was used to collect the data that took place in March 2014. This study focused on the intention of customers to use mobile banking, as mobile banking is a relatively new phenomenon in

Sudan. The survey questionnaire was distributed to the population of this study that confined 181 respondents who were customers of banks providing m-banking service. The used questionnaire consisted of two parts. The first section captured demographic information about respondents that includes personal information about them and their experience with banking services and mobile applications. The second section questioned the respondent's perceptions of each variable in the model using five-point Likert scales from 1 "strongly disagree" to 5 "strongly agree".

Items of the questionnaire were mostly espoused from relevant previous researches with needed authentication and changes in wording tailor-made to mobile banking TAM (Lu et.al (2008), Lin (2011), Foon, Fah (2011), Yu (2012), Teng, Lu, Yu (2009)). Intention to use m-banking (Lu et.al (2008)).

Collected data was entered to the Statistical Package for Social sciences (SPSS) version 17.0. Using Descriptive statistics to describe the respondents' characteristics, factor analysis to assure the goodness of measurements, Cronbach alpha for reliability to measure the internal consistency of the main variables of the study, Pearson correlation: is to see the degree of correlation between main variables and regression analysis to test the hypothesis of the study.

## 4. Findings

### 4.1 Demographic information

Table (1) abridged the demographic data about the 181 respondents who contributed in the survey. 62.6% of the respondents were males and the rest were female. 48.5% of the respondents were aged between 26 and 35 years old. Almost 60% of them were holding Bachelors. 52% of the respondents were employees while others were mixed occupation status. Singles were 52% and others were of different marital status. Majority of the respondents were using the service for less than 6 month (42.3%) which makes sense due to the recency of the service in Sudan. 46.7% of the respondents were using the service from 1 to 3 times a week.

**Table (1)**

<u>Variable</u>	<u>Classification</u>	<u>Frequency</u>	<u>percentage</u>
Gender	Male	114	62.6
	Female	67	36.8
Age:	Below 25	54	29.7
	26 – 35	88	48.4
	36 – 45	23	12.6
	46 or above	16	8.8
Educational level	High school or below	31	17.0
	Bachelor's degree	107	58.8
	Master's degree or above	41	22.5
Occupation	Business (enterprise)	31	17.0
	Governmental officer	43	23.6
	Employee	95	52.2
	Student	12	6.6
Marital status	Single	96	52.7
	Married	65	35.7
	Divorced	13	7.1
	Widow	6	3.3
Experience with M-banking (Months)	Less than 6	77	42.3

	7 – 12	60	33.0
	13 – 18	22	12.1
	19 or more	20	11.0
Frequency of using M-banking (times per week)	Less than 1	78	42.9
	1 to 3	85	46.7
	4 to 6	11	6.0
	7 to 9	7	3.8

#### 4.2 Reliability and validity of the measures:

Cronbach's alpha was used to test the reliability and the internal consistency of the items. The variable is considered reliable and internally consistent when alpha is .70 or above (Hair Black, Rabin, & Anderson, 2010). Our results showed that all alpha scores were greater than .70. The highest alpha was obtained by perceived risk ( $\alpha=.872$ ), followed by behavioral intention ( $\alpha=.847$ ), Perceived trust ( $\alpha=.822$ ). Perceived ease of use ( $\alpha=.739$ ), The lowest alpha was for Perceived usefulness ( $\alpha=.716$ ).

##### 4.2.1 Validity of TAM constructs (independent variables)

To ensure the validity of the used measures; we used the principle components analysis (PCA) with varimax rotation as it is the widely used especially when the researcher is concerned about data reduction (Hair, Black, Babin& Anderson, 2010). Prior to performing the (PCA); data was assessed for suitability to be analyzed revealing the presence of many coefficients of .3 and above in the correlation matrix. The Kaiser-Meyer-Olkin value was .817, exceeding the recommended value of .6 (Kaiser 1970, 1974) and Barlett's Test of Sphericity (Barlett 1954) reached statistical significance. That supports the factorability of the correlation matrix. Table (2) shows that all 21 items of the Technology Acceptance model (independent variable) were exposed to (PCA) that illustrated the presence of four components with eigen values exceeding 1 explaining 22.76%, 16.82%, 16.60% and 14.38% of the variance respectively. Two items were extracted from the analysis as they were loaded less than .5 (PU6& PEU5). Also; 6 items were extracted because they were followed in other factors (Two items of perceived usefulness were followed in the factor of Perceived ease of use, two items of perceived trust were followed in factors of perceived risk and perceived ease of use and one item of perceived ease of use was followed in the factor of perceived trust).

**Table (2)**

factor name	Items	F1	F2	F3	F4
Factor1: Perceived Risk (PR)					
	<i>I believe that the current M-BANKING services are not yet complete;</i>	<b>.893</b>	.048	.035	.037
	<i>I believe that the quality of the current M-BANKING is not yet stable;</i>	<b>.885</b>	-.003	.124	-.049
	<i>I believe that the Telecom company which provides M-Banking, has no enough experts;</i>	<b>.826</b>	.076	-.042	.068
	<i>I believe that the current M-BANKING technology is not yet mature;</i>	<b>.809</b>	-.089	.109	.100
Factor2: Perceived Trust (PT)					
	<i>Using M-Banking, I believe my transactions are secured;</i>	.042	<b>.877</b>	.061	.152
	<i>Using M-Banking, I believe my privacy is secured;</i>	.039	<b>.863</b>	.175	.039
	<i>Using M-Banking, I believe my information is kept</i>	-.088	<b>.712</b>	.400	.062

	<i>confidential;</i>				
Factor3:	<i>Learning to operate M-Banking is easy for me;</i>	.036	.139	<b>.796</b>	.071
Perceived Ease of Use (PEU)	<i>Using M-Banking I can easily send and receive money;</i>	.077	.121	<b>.790</b>	.231
	<i>It is easy to adopt M-Banking to accomplish banking transactions;</i>	.121	.304	<b>.646</b>	.165
Factor 4: Perceived Usefulness (PU)	<i>M-Banking can increase the quality of output for same amount of effort;</i>	.080	.097	-.051	<b>.822</b>
	<i>Use M-Banking can significantly increase the quality or output of my life;</i>	.022	.103	.272	<b>.742</b>
	<i>Use of M-Banking can increase the effectiveness of my performance;</i>	.034	.043	.427	<b>.715</b>
	Percentage variance explained	22.76	16.82	16.60	14.38
	Eigen values	3.83	2.77	1.52	1.05
	Reliability	.872	.822	.739	.716

#### 4.2.2 Validity of Intention to use mobile banking

Before performing the (PCA); data was assessed for suitability to be analyzed revealing the presence of many coefficients of .3 and above in the correlation matrix. The Kaiser-Meyer-Olkin value was .882, exceeding the recommended value of .6 (Kaiser 1970, 1974) and Barlett's Test of Sphericity (Barlett 1954) reached statistical significance. That supports the factorability of the correlation matrix. Table (3) shows that all 5 items of the intention to use m-banking (dependent variable) were exposed to (PCA) that illustrated the presence of one component with eigenvalue exceeding 1 explaining 62.70% of the variance

**Table (3)**

Factor:	<i>I intend to recommend for my friends to use M-Banking;</i>	<b>.856</b>
Behavioral Intention (BI)	<i>I intend to recommend for my family members to use M-Banking;</i>	<b>.816</b>
	<i>I intend to continue using M-Banking;</i>	<b>.806</b>
	<i>Given that I have access to M-Banking, I believe that I would use it;</i>	<b>.768</b>
	<i>Assuming I have access to M-Banking, I intend to use it frequently;</i>	<b>.706</b>
	Percentage variance explained	62.704
	Eigen values	3.135
	Reliability	.847

#### 4.3 Correlation:

Table (4) shows the correlation between variables that illustrates that the dependent variable (Behavior intention to use m-banking) is considerable and positively correlated with three independent variables that are perceived trust ( $r=.421$ ,  $p=.000$ ), Perceived ease of use ( $r=.421$ ,  $p=.000$ ) and usefulness ( $r=.296$ ,  $p=.000$ ), also it was not correlated to perceived risk ( $r=.039$ ,  $p=.648$ ).

**Table (4)**

No.		Perceived Risk	Perceived Trust	Perceived Ease of use	Perceived Usefulness	Behavioral Intention	Mean	Standard deviation
1	Perceived Risk	1					3.0224	1.09448
2	Perceived Trust	.068	1				3.9253	.75829
3	Perceived Ease of Use	.212**	.453**	1			3.9521	.72090
4	Perceived Usefulness	.115	.273**	.472**	1		3.9736	.67579
5	Behavioral Intention to use	.039	.421**	.407**	.296**	1	3.9354	.74519

Note: \*\*  $p < 0.01$

#### 4.4 Hypothesis test

Table (5) is a summary of the regression analysis using SPSS 17 that is normally used to examine the associations between a set of independent variables and a single dependent variable (Hair et al., 2005). We have been resulted to that the hypothesis H1: *PU has a significant influence on the m-banking adoption in Sudan*, was rejected ( $t = 1.319$ ,  $p = .189$ ). The second hypothesis H2: *PEOU has an influence on m-banking adoption in Sudan* was supported ( $t = 2.503$ ,  $p = .014$ ). Also; the third hypothesis H3: *PT is significantly affecting m-banking adoption in Sudan* was supported ( $t = 3.427$ ,  $p = .001$ ). Finally the fourth hypothesis H4: *Risk is significantly affecting m-banking adoption in Sudan* was rejected ( $t = -.564$ ,  $p = .574$ )

**Table (5)**

<u>Hypothesis</u>	<u>Beta</u>	<u>t</u>	<u>Sig.</u>	<u>Result</u>
H1:	.112	1.319	.189	Rejected
H2	.233	2.503	.014	Supported
H3	.288	3.427	.001	Supported
H4	-.043	-.564	.574	Rejected
R square	.333			
Adjusted R	.310			

#### 5. Discussion:

The purpose of this study was to investigate the influence of Perceived usefulness, Perceived ease of use, trust and risk on the behavioral intentions to use mobile banking service. Our results showed that perceived ease of use and perceived trust have an influence on the intention to use mobile banking while perceived usefulness and perceived risk were found with no influence.

The statistical analysis implied rejection for the first hypothesis H1: perceived usefulness has an influence on m-banking services adoption in Sudan. Our findings were contrary with previous studies related to mobile banking adoption in other countries (Ghalandari, Ghahremanpour, Hasanluei, 2013, Kazi, Mannan, 2013). But they were consistent with other studies such as (Aboelmaged, Gebba, 2013, ) This indicates the pragmatic-free dimension in mobile banking adoption decision which based on Perceived ease of use and trustworthy rather than being useful and beneficial.

Besides; our results supported the second hypothesis Perceived Ease of Use has an influence on m-banking adoption in Sudan. Same results were illustrated in many previous studies about the same topic (Ali, Dhaha, 2013, Tobbin, 2012, Kazi, Mannan, 2013). It shows that if the application of m-banking is user friendly, and it doesn't acquire advance skills; customers will be more likely to adopt the service.

Also; the third hypothesis *Trust is significantly affecting m-banking adoption in Sudan* was found to have the most significant impact on m-banking adoption. This was in line with many previous studies that investigated technology adoption (Rehman, Esichaikul, Kamal 2011, Juwaheer, Pudaruth and Ramdin 2012, Kesharwani, Bisht 2011, Amin 2009). It entails that if the bank provides the sensation of transparency, confidentiality and safety of environment it will encourage customers to adopt the service.

Finally; the fourth hypothesis Risk is significantly affecting m-banking adoption in Sudan was rejected. This result was in contrary with many previous studies such as (Lee, Lee, Kim, 2007, Kazi, Mannan, 2013), and in consistent with others (Ghalandari, Ghahremanpour, Hasanluei, 2013, Lee, Lee, Kim, 2007) indicating that risk or uncertainty is not influencing adopting m-banking in Sudan.

## 6. Conclusion:

The scope of this study was to find out the key determinants that influence adopting m-banking among customers of Sudanese banks. The model of the study was built on the integrated technology acceptance model. The results illustrated that customers of banks in Sudan will be more likely to adopt m-banking service if they find it easy to be used with no much required efforts. Also; they will intend to use the service if the bank was trustable and provides them confidentiality and protection for their information. The results of this study provide different managerial implications for banks that provide the m-banking service and those who are aiming to provide it. Making the service easy to be used by enhancing the application interface and update it with sufficient data and information.

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