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Adoption of Mobile Money Service in Ghana, Navrongo Municipality as a Case Study

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Abstract

The adaptation of mobile phones and the widespread use of mobile money transfer in emerging markets have brought about diverse opportunities in the financial service. However, mobile money transfer services have diver's adoption stages in emerging markets. The main purpose of this study is to identify the factors that influence Ghanaian customers to adopt to the usage of mobile money transfer services. The study employed a set of questionnaire to gather information on the demographics and perception that Ghanaians have about the mobile money transfer service. These questionnaires were distributed conveniently to 208 Ghanaian customers, and the data gathered were then analyzed using factor analysis. Findings from the research revealed that, perceived usefulness, perceived ease of use, perceived trust, perceived risk and social influence were the main factors that accounts to Ghanaians adoption to the service. MTN mobile money service was found to be the dominant service provider of mobile money among all the networks. It is recommended that, the service procedures should be made easier, meet the needs of the customers as well as be made secure and trustworthy, so as to increase its usage and encourage its general acceptance.

Keywords: Adoption, Mobile Money Service, Navrongo Municipality, Ghana

INTRODUCTION

The introduction of prepaid cards and the fallen prices of mobile handsets have led to a rapid spread of mobile phones in the developing countries (Orozco et al., 2007). This has opened up diverse opportunities for it to be used over and above voice communication. At the center of this experience which comes from the convergence of advanced mobile communication technologies and the ability to use it for data services is mobile money.

The use of a mobile phone to conduct payment and banking transactions (M- banking) is at an early stage in a number of developing countries. Because mobile banking uses the existing rapidly expanding mobile phone infrastructure, it has the potential to be deployed rapidly and affordably to expand access to financial services among unbanked people.

The mobile money transfer (MMT) service is an aspect of a broader concept emerging in the electronic payment and banking industry referred to as Mobile Money. Even though mobile money has not been well defined in literature it can be said to include all the various initiatives (long-distance remittance, micro-payments, and informal air-time topping schemes) aimed at bringing financial services to the unbanked using mobile technology. However, Mobile Money can be defined as money that can be accessed and used via mobile phone (Jenkins, 2008).

Many business transactions including cross country transactions are being conducted on mobile phone daily. The two fundamental attributes of the mobile phone which has led to its flourished usage are mobility and immediate access (Leung and Wei, 2000). It was believed that electronic money will displace paper money and face-to-face transaction. Will mobile money replace the need for cash? To answer this question we will need to understand the extent to which users are prepared to accept the electronic money as a means of exchange (Mas and Kumar, 2008). Most of the emerging markets operate a cash economy with over 70% unbanked (Jenkins, 2008). Mobile phones ability to store value and be used as a means of exchange will depend on users' adoption of the technology. According to a World Bank report, over 2.5 billion adults do not have a formal bank account, and yet about 6 billion people have access to mobile phones (86 percent penetration rate). There are currently over 2 billion mobile phone users and thus exceeding the number of banked people in the developing countries (Hughes and Lonie, 2007). This is to tell the fact that mobile money service is not really serving its purpose since thought people still own mobile phones, there is a huge percentage of unbanked operating a cash economy in developing countries. FinAccess (2007) and FinScope (2009) research conducted argued that the unique combination of various conditions enabled Safaricom to effectively deploy the M-PESA scheme, and has encouraged millions of users to rapidly adopt the service. This indicates that the exceptional growth rate of M-PESA in Kenya is a unique phenomenon that may not be repeated in another country. Meanwhile, emerging economies adopting the mobile money transfer imports the M-pesa template. Could this be the result of its slow adoption rate in Ghana? This research

will further look to find out why and rather seek to develop dimensions that fit the unique needs of the Ghanaian users.

The specific objective are:

1. To identify the factors that influence customer's to adopt to the use of mobile money services in Ghana.
2. To determine the benefits derived from using mobile money.
3. To determine the challenges of mobile money.

METHODOLOGY

Research Design

Research design is defined as the procedure(s) for collecting, analyzing, interpreting and reporting data in research study (Creswell & Plano Clark, 2007). Broadly, research design could be divided into two groups; exploratory design and conclusive design. Whereas exploratory design can either be quantitative or qualitative in nature, conclusive research design constitutes either a descriptive or causal research.

Based on the realist's philosophical position, this study adopted the survey strategy because the study is cross-sectional in nature and previous cross-sectional studies have mainly employed the survey strategy (such as Easterby-Smith et. al., 2002; Robson, 2002; Holt, 2006; Bughin et al., 2010). The suitability of using the survey strategy in this study is to help the researcher identify and explain statistically, the factors that explain customer adoption to mobile money services in Ghana. The research problem was formulated based on existing theory, and the intention is to create more knowledge about specific factors.

Population under Study

A population or universe of investigation may be considered as the total number of units of the phenomena to be investigated that exist in the area of investigation, which is all possible observations of the same kind that a sample is acquired from Kumejor (2002); Bryman & Bell (2007). Kasena Nankana East municipal with a population of 109,944 was chosen for conducting the research. The Municipality has a male population with 53,676 which constitute 48.8% and females are 56,268 which constitute 51.2% of the total population. The rationale behind the choice of location was proximity or convenience to the selected sample as compared to conducting the research outside the Upper East Region.

Data Collection Method

Data collection is a very significant aspect of every research study and if data is gathered inaccurately, could lead to an invalid result. Data was collected in Navrongo town, questionnaires were administered by personally approaching consumers made up of students, businessmen and women at various agents' points who came to transfer money. For the illiterate, the questionnaire was translated from English to Kasem (a native language). Since the study is mixed method

approach, both self-administered questionnaires and personal interviews were deemed appropriate for data collection.

Reliability and Validity

Reliability can be conceived as the assessment of the degree of consistency between multiple measurements of a construct (Hair et al., 2006). Reliability in essence is referred to as a measure of the stability of the proposed measure(s) to be used for a given research (Ghauri & Gronhaug, 2005). Validity and reliability are two fundamental elements in the evaluation of a measurement instrument. It is possible to objectively measure the reliability of an instrument and in this study we explain the meaning of Cronbach's alpha, the most widely used objective measure of reliability. Cronbach's alpha values fall between 0 and 1, however the generally accepted lower limit is 0.7. This study therefore employed both Cronbach's alpha and composite reliability as indicators of the internal consistency of the measurement scales for the quantitative side of the research.

Statistical Analysis Procedure

Factor Analysis

Factor analysis is a statistical technique used to identify a relatively small number of underlying dimensions, or factors, which can be used to represent relationships among interrelated variables. The emphasis in factor analysis is the identification of underlying "factors" that might explain the dimensions associated with data variability. Factor analysis provides a geometrical representation that allows for a visual portrayal of behavioral relationships.

The factor analysis model can be written algebraically as follows. If you have p variables X_1, X_2, \dots, X_p measured on a sample of n subjects, then variable i can be written as a linear combination of m factors F_1, F_2, \dots, F_m where, as explained above $m < p$. Thus,

$$X_i = a_{i1}F_1 + a_{i2}F_2 + \dots + a_{im}F_m + e_i \quad (1)$$

Where the a_i s are the factor loadings (or scores) for variable I and e_i is the part of variable X_i that cannot be 'explained' by the factors.

RESULTS AND DISCUSSIONS

Preliminary Analysis

Out of the total 208 respondents, 113 (54.3%) were males and 95 (45.7%) were females. Thus majority of the customers sampled were males. Furthermore, the age distribution results indicate that most people who use mobile money are mostly the youth. Generally, majority of respondents who use mobile money had attained secondary level of schooling. About 51.4% of the respondents earn more than GHC200 per month. According to the income and educational levels,

the majority of the respondents appear to belong to the lower middle class of the Ghanaian Society.

Table 1: Demographic profile of respondents

Variables		Frequency	Percentage
GENDER	Male	113	54.3
	Female	95	45.7
AGE	18- 25	106	51
	26- 30	75	36.1
	31-40	24	11.5
	41-50	3	1.4
	Over 50	0	0
OCCUPATION	Self employed	106	51
	Employed and student	39	18.8
	Employed	41	19.7
	Student	13	6.2
	Not employed	9	4.3
	INCOME	Less than 200	43
	200-500	107	51.4
	501-1000	30	14.4
	More than 1000	28	13.5
EDUCATION LEVEL	Masters	7	3.4
	Bachelor degree	92	44.2
	Diploma	24	11.5
	SHS	76	36.5
	JHS	1	0.5
	No formal education	8	3.8

Further Analysis

In this part of the analysis, we performed Factor Analysis to determine the major factors that influence customers to adopt money. The analysis under this chapter has been grouped under sub headings such as correlation analysis, total variance explained, rotated component matrix etc.

The correlation matrix

The correlation matrix is made up of the Pearson correlation and the one-tailed significance table. The top half of this table is the Pearson correlation coefficient table which shows the correlation coefficient between all the pairs of questions whereas the bottom shows the one-tailed significance of the coefficients. The correlation coefficient of a variable and itself is always 1. There is a moderate correlation among the independent variables with the highest positive correlation being 0.46 and the lowest negative correlation being -0.264.

The determinant of the correlation matrix was 0.04 which is greater than 0.001 therefore multicollinearity is not a problem. Since none of the correlation coefficients are particularly large there is no need to consider eliminating any questions at this stage.

Table 2: Kaiser-Meyer-Olkin and Bartlett's test

Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling	.749
	Approx. Chi-Square	7564.895
Bartlett's Test of Sphericity	Df	210
	Sig.	.000

The Kaiser-Meyer-Olkin and Bartlett's test measures the strength of relationship among the variables. The KMO measures the sampling adequacy the values vary between 0 and 1 a value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, hence, factor analysis is likely to be inappropriate. A value closer to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. The KMO as displayed in Table 2 is 0.749. Since the KMO is greater than 0.5, the sample is satisfactory for factor analysis to proceed as recommended by Kaiser (1947).

From Table 2, the Bartlett's test of sphericity is significant with a significant value of 0.00. This is significant less than 0.05. The Bartlett's measures the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to work, we need some relationship between the variables. This test has shown that factor analysis is appropriate.

Factor Extraction**Table 3 Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total Variance	% of	Cumulative	Total Variance	% of	Cumulative	Total Variance	% of	Cumulative
		%	%		%	%			
1	4.257	20.273	20.273	4.257	20.273	20.273	3.706	17.647	17.647
2	1.655	7.882	28.155	1.655	7.882	28.155	1.893	9.013	26.659
3	1.403	6.681	34.835	1.403	6.681	34.835	1.398	6.656	33.316
4	1.325	6.311	41.147	1.325	6.311	41.147	1.369	6.517	39.833
5	1.247	5.940	47.087	1.247	5.940	47.087	1.326	6.312	46.145
6	1.219	5.807	52.894	1.219	5.807	52.894	1.284	6.117	52.262
7	1.141	5.431	58.325	1.141	5.431	58.325	1.273	6.063	58.325
8	1.103	5.252	63.577						
9	1.019	4.852	68.429						
10	.888	4.230	72.659						
11	.867	4.127	76.785						
12	.772	3.674	80.460						
13	.750	3.573	84.032						
14	.634	3.020	87.052						
15	.551	2.624	89.676						
16	.530	2.524	92.200						
17	.458	2.180	94.380						
18	.430	2.046	96.427						
19	.391	1.860	98.287						
20	.248	1.182	99.468						
21	.112	.532	100.000						

Extraction Method: Principal Component Analysis.

Table 3 list the eigenvalues associated with each linear component (factor) before extraction, after extraction and rotation. Before extraction, 21 linear components within the data sets were identified. The eigenvalues associated with each factor represents the variance explained by the

particular linear component this is displayed in terms of percentages of variance explained. Here, Factor 1 explains 20.273% of total variance followed by 7.882%, 6.681%, 6.311%, 5.940%, 5.807%, 5.431%, for Factor2, Factor3, Factor4, Factor5, Factor6 and 7 respectively. The cumulative percentage column gives the percentage of variance accounted for by the first 7 components. The cumulative percentage of the first 7 components is 58.325%.

Under the initial eigenvalues column, all the components were represented showing the percentage of variance each contributes to the total variance. Seven factors were extracted because the analysis requested components with eigenvalues greater than 1. the eigenvalues associated with these factors are displayed in the column labeled Extraction sum of least squared loadings. The values in this part of the table are the same as the values before extraction, except that the values for the discarded factors are ignored. In the final part of the table (rotation sum of squared loadings), the eigenvalues of the factors after rotation are displayed. Rotation has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the seven factors is equalized. Before rotation, Factor 1 accounts for considerably more variance than the remaining that is 20.273% compared to 7.882, 6.681, 6.311, 5.940, 5.807 and 5.431% respectively. However, after rotation, it accounts for only 17.64% of variance compared to the remaining.

Correlation Analysis

Table 4: Component Matrix^a

Obs.	Component						
	1	2	3	4	5	6	7
Q8	.822						
Q7	.819						
Q4	.482	-.465					
Q6	.625						
Q2	.724						
Q1	.401		-.515				
Q10	.652						
Q5		-.519					
Q3	.718						
Q12	.576						
Q17					.442	.441	
Q11				.569			
Q 20		-.411				-.445	
Q15					.551		
Q16			.433				-.512
Q21				.524			.430
Q13							
Q18		.449	.467				
Q9		.424		.491			
Q14					-.540		
Q19				-.479		.602	

Extraction Method: Principal Component Analysis.

a. 7 components extracted.

The next stage is to extract factors from these components. The principal component analysis extraction method was used for the extraction of Factors and their loadings. Table 4 above shows the component matrix before rotation. This matrix contains the loadings of each variable into each factor. All loadings less than 0.4 have been suppressed in the output, hence, the blank spaces found in the table. At this stage, 7 factors have been extracted from the overall components.

Table 5: Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
I find mobile money service easy to use	.743						
Sending SMS to recipients is easy	.727	.429					
My friends are on a mobile money service		.748					
The interface with mobile money is user friendly	.672						
It is easy for me to become skillful at using mobile money	.770						
Mobile money process is easy to remember	.641						
There are many mobile money agents in my neighborhood	.451	.462					
My family are on mobile money service		.658					
The transaction process is easy	.657						
I trust mobile money to send money correctly to recipients	.521				.708		-
Using mobile money for my transactions is not expensive					-		.433
I receive the exact money when it is sent to me					.683		
Mobile money helps me save time					.768		-
							.405
If I lose my mobile phone, I will not lose my money							.743
If there is network problem, my transaction will be affected							.623
Mobile money keeps proper records of all transactions							.654
It is difficult for my money to be stolen if using mobile money							.492
I find mobile money as a useful way of payment							.568
My finances are safe with mobile money							.556
Mobile money helps me save time and transportation cost							.624

Table 5 above shows the rotated component Matrix where Varimax with Kaiser Normalization rotation method was used to rotate the components after extraction, because the factor are presumed to be theoretically independent that is, they are unrelated to each other. The idea of rotation is to reduce the number of factors of which the variables under investigation have high loadings. Rotation does not actually change anything but makes the interpretation of the analysis easier.

Table 6 Reliability Measures

Factor	Alpha coefficient	N of items
Factor 1	0.714	6
Factor 2	0.329	3
Factor 3	0.706	3
Factor 4	-0.247	2
Factor 5	0.731	4
Factor 6	-0.482	2
Factor 7	-	1

Table 6 shows that factor 1, factor 3 and factor 5 had Cronbach's alpha value greater than 0.7 that is 0.714, 0.706, and 0.731 respectively. The Cronbach's alpha value of this test shows an acceptable internal consistency. Furthermore, factor 2, factor 4, and factor 6 had an alpha coefficient that was below 0.7 hence indicating that these factors are not reliable. Factor 7 had only one item and hence cannot be tested.

DISCUSSION OF RESULTS AND FINDINGS

From the results in Table 5, that is the rotated component matrix, seven factors were extracted. The next step is to look at the content of the questions that load into a factor to try to identify common themes. If mathematical factor produced by the analysis represents some real-world constructs, then common themes among highly loading questions can help us identify what the construct might be.

The questions that loaded highly on factor 1 seem to all relate to the ease of use of mobile money transfer service. I find mobile money services easy to use, the interface with mobile money is user friendly, it is easy for me to become skillful at using mobile money are the kind of questions that loaded highly on Factor1. It is important that MMT is less complex for use by all, making it easy for all ages within the population profile to adopt to it especially in emerging markets like Ghana where remittances is high. Eriksson et al. (2008) & Cruz and Laukkanen (2010) in their literature confirm that complexity had a significant influence to adoption. Perceived ease of use is one of

the characteristics of innovation adoption most widely used in ICT context Wan et al., (2005). In relation to this, Factor 1 will be called "Perceived Ease of Use".

Questions that were loaded on factor 2 are questions that relates to the environment and society. My friends are on mobile money services, my family are on mobile money services there are many mobile money agents in my neighbourhood are the questions that were loaded on Factor 2. Venkatesh et al. (2003) defined social influence as the degree to which an individual perceives that important others believe he/she should use the technology. These questions have a link with the society and its influence. Hence factor 2 is named "Social influence".

Factor3, according to our findings has, if I lose my mobile phone, I will not lose my money, if there is network problem, my transaction will be affected, it is difficult for my money to be stolen if I am on mobile money as questions loading to it. The questions are related to how risky the customer's presumes mobile money may be. Tobbin (2011) defined risk as a consumer's belief about a potential uncertain negative outcome from the use of the service. Consumers would want to take minimal risk with their choices. For a service to be adopted, providers of the service must take into consideration the security and privacy of the service Gerrard et al., (2006) so for instance, in the Ghanaian context, how consumers see MMT in terms of its secureness and confidentiality will determine whether to adopt or not. In view of this, Factor 3 would be called "Perceived risk". Mobile money helps me save time and transportation cost and Using mobile money for my transactions is not expensive are the questions that were loaded on Factor 4. These questions are related to transactional cost. Factor4 would be called "cost". The cost associated with using a service is one of the key drivers of a user's intention to adopt mobile money. Individuals are likely to adopt mobile money services if they perceive that the cost is acceptable compared to other existing alternatives of the service (Luarn and Lin, 2004; Tobbin, 2012, 82; Dass& Pal, 2011).

Factor 5 has questions that were related to trust issues. I trust mobile money to send money correctly to recipients, I receive the exact money when it is sent to me, Mobile money keeps proper records of all transactions and my finance are safe with mobile money where the questions that were loaded on Factor 5. To become a viable unit of doing business MM transfer should overcome user distrust (Siau et al, 2003). Previous studies have found perceived trust as a significant determinant influencing consumers' behaviour intention towards conduct electronic commerce transactions; Tobbin, (2010). With reference to this, factor 5 will be named" perceived risk".

Factor 6 is related to usefulness of mobile money transfer service. The ultimate reason people exploit MM transfer is that they find them useful (Luarn& Lin, 2005). Factor 4 would be called "perceived usefulness".

The main objective of the study is to identify the major factors that influence Ghanaian customers to adopt to the use of mobile money transfer service. It was revealed that MTN mobile money was the dominating mobile money service provider. All respondents were mobile money users.

All the respondents (100%) claimed to have heard about mobile money in Ghana (MTN, Tigo and Airtel). It is worth mentioning that, MTN mobile money was dominant with 70% usage by the respondents, followed by Vodafone cash and Airtel cash. Few people were tigo cash users. This is as a result of their huge advertisement campaign across the country. In spite of the awareness, only 47% claimed to use the service weekly and 17% uses mobile money transfer daily with 37% using it daily implying that as the knowledge of the service was not reflective of its usage. Most of the respondents have used the service for over 4 years, the minimum was a year. The main mode of utilization of mobile money recorded was through agents and retail shops.

Out of 208 respondents, 89% of the respondents had challenges with the use of mobile money transfer. Unstable network was a major challenge, followed by inadequate funds for agents, not enough agents and inability of some customers to operate service personally. Almost all the respondents had a benefit he or she enjoys for using mobile money transfer. Some of the benefits included, withdraw and receive money on any day and time, bonus airtime, receiving interest monthly on the balance in one's account.

SUMMARY

The results show that the Ghanaian customers are willing to adopt mobile money. The results indicate that perceived usefulness, perceived ease of use, perceived trust, perceived risk and social influence were found to be factors that positively influence customer's adoption to mobile money. Perceived ease of use, perceived risk and perceived trust were found to be reliable. From the research, majority of the users of mobile money were the youth. The results of the study also highlighted that most of the respondents from the study area use MTN mobile money and few patronizing other networks. This is due to the fact there is a high awareness of MTN mobile money and a high rate of MTN network usage compared to other networks. Hence advertisement on mobile money services on other networks should be made by the network providers in order to increase awareness.

The study revealed that erratic network problem was the major challenge face or encounter by users of mobile money which needs to be addressed by the service providers to enhance better satisfaction from using such technology. Again it also revealed that the major benefit respondents get from using mobile money services is that respondents are able to withdraw and receive money on any day and at good time range. It also saves time and provides interest to customers on the number of transactions made.

CONCLUSIONS

From the research work it can be concluded that perceived usefulness, perceived ease of use, perceived trust, perceived risk, cost and social influence are the factors that influence Ghanaian

to adopt to mobile money services. Perceive ease of use, perceived risk and perceived trust were found to be reliable factors that influence the use of mobile money.

Most respondents using mobile money are under the subscription of MTN mobile money and few are under the subscription of other networks because of the unawareness of mobile services on the other networks. Hence almost all the challenges and benefits are coming from a single service provider this was a challenge on its own. Also the major challenge of using mobile money by respondents was erratic network problem, inadequate funds for mobile money agents and inadequate funds for agents, not enough agents and inability of some customers to operate service personally. Almost all the respondents had a benefit he or she enjoys for using mobile money transfer. Some of the benefits included, withdraw and receive money on any day and time, bonus airtime, receiving interest monthly on the balance in one's account

RECOMMENDATIONS

Other service providers which include Tigo, Vodafone and Airtel should also target the study area and provide them with a variety of mobile money services. This will allow much competition in the service and hence push them to provide better services rather than a monopolized market.

Also the major challenge impeding the smooth flow of the service was network problem which should be addressed by the service providers. This will create a platform for both non-users and users to use mobile money rapidly. While the potential for mobile money in Ghana is huge, there is much room for improvement if it is really drive ongoing efforts to integrate the millions of Ghanaians with a stable, secure and structured means of carrying out financial transaction. Network providers should inculcate other packages like giving out credit/loans to users for their businesses and also an easy way for those who cannot read figures and letters to also operate the service personally.

The policy makers, ministry of finance, ministry of labor and human resource development and mobile service providers should educate the masses more about the benefits of integrating and using mobile technologies to enhance small businesses and also the need to enhance technical capabilities of Ghanaian folks to allow widespread use of emerging technologies.

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