ENHANCED SECURE TRANSACTION FOR MOBILE MONEY SERVICES

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ABSTRACT

The printing of currency notes and minting of coins takes a heavy toll on every government's expenditure. Citizens are also exposed to armed robberies as they carry cash from one place to the other. The numerous queues that exist at banks, supermarkets etc. when people want to make transactions are few challenges confronting the people. Efforts are therefore being strongly made by the Bank of Ghana to promote electronic payments in Ghana and reduce the over reliance on physical cash for transactions. The use of mobile money will help push this agenda. This paper aims at evaluating the Mobile Money in Ghana as the country drive towards a cashless economy. This was done by critically assessing its current use and investigating the challenges of using Mobile Money. It also established the level of preference for Mobile Money as compared to bank transactions or ATM and e–ZWICH. The study was based on a survey conducted through the administration of questionnaires to users of Mobile Money in the Ashanti Region. The study showed that single females between the ages of 18 and 25 years use mobile money more often than men. It also identified network instability and unavailability and delay in reversal of wrong transactions as the greatest challenges to the operation of Mobile Money services in Ghana. The findings show that despite these challenges, most users have resolved to continue using the services and they have also resolved to recommend it to other people. The study was conducted on the mobile money service of a telecommunication company in Ghana (called Company A)

Introduction

Communication has become a very vital tool for human existence in the modern times. Mobile phones have become part and parcel of life such that many people do not feel comfortable when they do not use their mobile phones for a single day. With this great attachment to mobile phones, it will be an interesting phenomenon to have people carry only their mobile phones in their pocket without any wallet or purse; such that all the money that they need can be accessed on their phones. This feature is what is presented as Mobile Money.

"The use of mobile money services is gradually becoming part of people's day-to-day transactions and is safe to say that it is making money transfer services quite easier and at cheaper cost. In Ghana for example, one can deposit money into his/her mobile money wallet and transfer this to either mobile money subscribers or non-mobile money subscribers. This reduces the time spent in travelling long distances, queuing at the bank before making a deposit or using unsafe methods such as sending money through bus services for recipients in other towns and

villages. Mobile money transfers can be made by pressing few keys on the mobile phone and recipient receives money almost instantly." (Afanu &Mamattah, 2013; (Sharma & Sharma, 2019). The mobile money industry continues to grow and is now expanding across more regions. With 219 services in 84 countries at the end of 2013, mobile money is now available in most developing and emerging markets. While most services remain in Sub-Saharan Africa, mobile money has significantly expanded outside of the region in 2013. The question is no longer whether mobile money services are available, but how to ensure that the industry continues to grow sustainably. (Pénicaud & Katakam, 2013; Shaikh & Karjaluoto 2015).

According to the National Communications Authority (NCA), Mobile Voice market trends for the country as at the end of February 2015, indicated an increase of 398,649 (1.3%) subscriptions from January's figures to end February 2015 with 31,028,253 subscriptions. Ccompany A's subscription increased by 173,496 from January's figure of 13,939,936 to end February 2015 with a figure of 14,113,432. Mobile phone penetration as at February 2015 stood at 115.40%. (NCA, 2015)

These statistics indicate that the use of mobile phones in Ghana is very high with an estimation that averagely every single individual owns a mobile handset. This makes mobile money a tool that can be exploited (Shareef, Baabdullah, Dutta, Kumar &Dwivedi, 2018), given the high mobile phone penetration in Ghana. In Ghana, company have the highest market share of subscribers (14,113,432) which constitute 45.49% of the market.

1.1 Problem Statement

Various transactions take place with money as the focal point in the form of cash. People spend hours in queues at most banks to be able to withdraw cash for transactions or deposit cash after transactions. This hampers productivity as productive working hours are spent in banks for these cash transactions. Queues are not only experienced in banks. People also queue when they want to pay water and electricity bills, make payments in stores etc. This makes such transactions cumbersome and a very tiring process for people; not forgetting the time delays that come with it. Armed robbers are also on the loose, waiting to pounce on innocent people to rid them of their cash. With the increasing spate of highway robberies, traders are also at a high risk since they carry large sums of money on them as they travel to purchase their goods. The government is also burdened with the task of printing new Ghana cedi notes and minting coins to be circulated into the economy as and when it becomes necessary. It has therefore become necessary to encourage more non–cash transactions in the society to make life quite easy so that people will not be moving about with much money on them; and government will also be able to make some savings since there will be a reduction in printing of new Ghana cedi notes and minting coins. Therefore, the problem the researcher intends to investigate into is to identify the role of Mobile Money in Ghana as we drive towards a cashless economy.

2.0 Related work

Jenkins (2008) defined Mobile Money as money that can be accessed and used via mobile phone which can be used to perform transactions such as remittances, bill payment, payroll deposit, loan receipt and repayment, and purchases of goods and services such as prepaid airtime, groceries and bus tickets.

Aker and Mbiti (2010) also defined Mobile Money as a product that allows clients to use text messages to store value in an account that is accessible by the handset, with the ability to convert cash in and out of the account, and transfer money between users.

Afanu & Mamattah (2013) further added that Mobile Money allows subscribers to bank directly from their mobile phones without physically being in a financial institution. Transactions such as payment of bills and receiving money can be done through a virtual account (known as mobile wallet) on the mobile phone.

The use of mobile money drives a cashless economy, Omotunde et al. (2013) defined a cashless economy as one where transactions can be done without necessarily using physical cash as a means of exchange of transaction but rather with the use of credit or debit card payment for goods and services. They argued that it is not the complete absence of cash but an economic setting where goods and services are purchased through electronic means. Okoye and Ezejiofor (2013) also agreed that a cashless economy does not imply the complete absence of cash transactions but rather, a setting in which there is a reduction in cash based transactions.

A cashless economy can therefore be defined as an economy that offers the opportunity for people to perform most of their transactions through electronic media thereby reducing the use of actual cash.Appiah et al. (2014) undertook a study on customer's perception and usage of e–payments in Ghana. They identified five types of e–payment systems in Ghana: Debit Cards, Credit Cards, Charge Cards, Stored Value Cards, ATMs and Mobile Payment Systems (Mehrad&Mohammadi, 2017; (Sharma & Sharma, 2019)

In terms of awareness, they established that 92% of their respondents were aware of ATM cards, 88% were aware of mobile banking, 84% were aware of e–ZWICH, 88% were aware of credit cards and 52% were aware of debit cards. They established that most of their respondents were aware of the e–payment methods, but the awareness was skewed towards ATMs. In terms of willingness to use e–payment systems, most of the respondents agreed that e–payments were convenient in making transactions since it allowed customers, in the convenience of their homes and offices, to access and make transactions on their accounts without any difficulty. In terms of ease of use, the respondents agreed that e–payments are easy to be used and user friendly. In terms of affordability, they agreed that the charges were affordable (Klein &Jakopin, 2014).

3.0 Methodology

The methodology highlights the design of the study, the sources of data, the population and sampling method used, as well as data collection instrument and data analysis technique used. It also gives a profile of the case study organization.

The paperevaluated the current use of Mobile Money, used a descriptive statistic to conduct analyses and then discussed the challenges that affect of the use mobile moneyand how to eliminate most cash transactions from the economy; to establish the level of preference for Mobile Money as compared to bank transactions or ATM and e–ZWICH. Thus, the descriptive statistics design was employed in this study. Primary data was collected from users of MTN Mobile Money through questionnaires. The questionnaires were administered to prospective respondents found in Kumasi, Obuasi, Bekwai, Offinso, Mampong, Ejisu and Konongo, all in the Ashanti Region.

The population of interest for this study were users of Mobile Money. Information gathered from Company A revealed that the users can move within regions thus it becomes very difficult to know the exact number in a particular region. It was however estimated that subscribers of mobile money in the region span beyond three million (3,000,000).

Since it is impossible to survey the entire population of users of the mobile money services considering the huge numbers, a sample of the population was used. A sample of two hundred and sixty–five (265) was used as the study's sample size. This constituted 10% of the total number of merchants. Hence, it was assumed that each merchant would serve one user/customer. The sampling technique used was the simple random method.

The questionnaires were designed and distributed to obtain primary data for the paper, thus, to solicit information from users/customers of Mobile Money. The questions were based on the objectives of the study. The responses ranged from dimensions of "Yes" or "No", 5 points likert scale responses and open-ended questions. The questionnaires were administered in person through the help of family and friends, users in selected cities in Ashanti Region were randomly selected and given questionnaire to answer.

The data collected was analysed using the SPSS software and Microsoft Excel. In using the SPSS, questions with options to be selected (Yes or No, Likert scale etc) were coded and the responses were manually enteredin the software. The data was then manipulated using the software to obtain tables which required further interpretation.

Responses from the open-ended questions were entered into Excel sheets to make sorting and other analysis easy. Values from the tables generated by the SPSS were also tested in Excel using formulas.

According to Saunders et al (2009), research validity means the accuracy and truth of the data of the research as well as the findings that are produced; and research reliability is the consistency and dependability of a measuring instrument, that is, the extent to which similar responses are given over time and among comparable groups regardless of who dispenses it.

To ensure that the responses were valid and reliable, the researcher made initial contact with key personnel involved in the administration of the Mobile Money service. This informed the researcher on the nature of questions to develop to get the desired outcomes. Again, the questionnaires were fully examined by the researcher, the supervisor and friends in terms of its content in relation to the research objectives.

As a test of reliability, the questionnaires were evenly distributed to the various locations. Each location had a minimum of 30 questionnaires to ensure that the responses were consistent from a particular area and a particular set of respondents.

Profile of Mobile Money in Ghana

Mobile Money is a product that was developed and launched in Ghana in July 2009 by company A, in partnership with 9 banks. Currently more than 15 banks are involved in the mobile money business in Ghana. Mobile Money provides a fast, simple, convenient, secure and affordable way of transferring money, making payments (electricity bill, DSTv fees etc), topping up airtime using a mobile phone and other mobile money interoperability service.

There are two categories of people when it comes to mobile money: the user/subscriber and the merchant. The user/subscriber is the wallet holder and can use the service without opening or having a bank account. All one needs is to be an mobile money subscriber (or obtain a SIM card from a mobile network operator if not a subscriber) and register with a valid national photo ID for a wallet to becreated. The user would need a 4–digit PIN to be able to access the mobile money menu on his/her phone. This code is to be kept secret by the user. The user can be able to directly load the wallet (i.e. make deposits into the wallet) or cash out from the wallet (i.e. make withdrawals from the wallet)(Baabdullah, Alalwan, Rana, Kizgin & Patil 2019).

However, there is a provision for those who are not subscribers of company A butwant to transfer money (Klein & Jakopin, 2014) using Mobile Money service of company A. Such users do not have access to the mobile money menu but can only send or receive money through the "token" service. The sender pays the money to the merchant who generates a code, known as token, and gives to the sender. The sender then gives the code to the receiver who goes to any merchant and does a withdrawal using the token.

Response rate

The study sampled a total of 265 users (respondents)to provide answers to the questionnaire. These respondents were randomly selected across the Ashanti Region. Out of the total number of questionnaires administered, 242 responses were received from the users representing a response rate of 91.32%.

Demographic characteristics of respondents

The study examined the demographic characteristics of the users of Mobile Money. The demographic characteristics discussed include gender, age, marital status and educational level of users. This gives an overview of the characteristics of the sampled respondents.

Table 1 Age of user

		Frequency	Percentage	Valid Percentage
Valid	Below 18 years	18	7.4	7.4
	18 to 25 years	109	45.0	45.0
	26 to 30 years	47	19.4	19.4
	31 to 40 years	48	19.8	19.8
	Above 40 years	20	8.3	8.3
	Total	242	100.0	100.0

Source: Field Data (2015)

The age of the respondents as displayed in table 1indicate that 7.4% of the users were below the age of 18 years whereas 45.0% were within 18 to 25 years. It was further found that users within the ages of 26 to 30 years formed 19.4% while users between 31 to 40 years formed 19.8%. Finally, just 8.3% were above 40 years of age.

Therefore, 71.9% of the users of Mobile Money were found to be either 30 years old or younger, out of which 62.6% fall within the ages of 18 to 25 years. This further confirms the earlier assertion that the youth are the most users of Mobile Money and goes on to establish the fact that singles within the ages of 18 to 25 years use the mobile money services most.

Table 2*Level of education of users*

		Frequency	Percentage	Valid Percentage
Valid	Basic	5	2.1	2.1
	JHS	42	17.4	17.4
	SHS	85	35.1	35.3
	Tertiary	97	40.1	40.2
	None	12	5.0	5.0
	Total	241	99.6	100.0
Missing	System	1	0.4	
Total		242	100.0	

Source: Field Data (2015)

The level of education of users of Mobile Money has been displayed in the table 2. It could be seen that just 2.1% of the users have only basic education while 17.4% have been educated up to the JHS level. The number of users with education up to SHS was 35.3% whereas 40.2% have tertiary level education. It is only 5% of users that do not have any level of formal education. Therefore, it could be inferred that majority of the users are literates with the number of tertiary level users making up the greatest percentage of users. Thus, it is safe to conclude that educated people are more likely to embrace mobile technology services like the Mobile Money than uneducated ones.

Table 3*PIN sharing*

		Frequency	Percentage	Valid Percentage
Valid	Yes	26	10.7	11.2
	No	207	85.5	88.8
	Total	233	96.3	100.0
Missing	System	9	3.7	
Total		242	100.0	

Source: Field Data (2015)

Users were asked whether they share their PIN with others or not. This was to establish the assertion made by Afanu&Mamattah (2013) that PIN sharing is a security threat to the use of mobile money in Ghana. It was realized from table 3 that only 11.2% of respondents share their PIN with others whiles 88.8% do not share their PIN. This goes to show that the security risk related to PIN sharing as asserted by Afanu&Mamattah (2013) is low with regards to Mobile Money. This can be attributed to the high number of literates who patronize the service.

Table 4 *Sex of respondents vs. PIN sharing Cross tabulation*

			PIN sharing		Total
			Yes	No	
Sex of respondents	Male	Count	11	125	136
		Expected Count	15.2	120.8	136.0
		% within PIN sharing	42.3%	60.4%	58.4%
	Female	Count	15	82	97
		Expected Count	10.8	86.2	97.0
		% within PIN sharing	57.7%	39.6%	41.6%
Total		Count	26	207	233
		Expected Count	26.0	207.0	233.0
		% within PIN sharing	100.0%	100.0%	100.0%

Source: Field Data (2015)

Table 5*Chi–Square Test for Sex of respondents vs. PIN sharing Cross tabulation*

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.107[a]	1	0.078		
Continuity Correction[b]	2.407	1	0.121		
Likelihood Ratio	3.057	1	0.080		
Fisher's Exact Test				0.093	0.061
Linear-by-Linear Association	3.094	1	0.079		
N of Valid Cases	233				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.82.
b. Computed only for a 2x2 table

Source: Field Data (2015)

A cross tabulation was carried out concerning demographic characteristics of respondents who are likely to share their PIN. The result from table 4 and table 5indicates that out of the 26 users who share their PIN, 11 (42.3%) are males and 15 (57.7%) are females. Thus, females are more likely to share their PIN than males. However, the chi–square statistics (Pearson Chi-Square value) indicates that this is not statistically significant (X2 = 3.107, p = 0.078), since there is a 7.8% probability that this occurred by chance.

General Assessment of mobile money services by users

The users were made to give their perception of the mobile money services by indicating their level of agreement, disagreement or otherwise with some specific statements related to their experience in using the services.

Table 6 indicate that 82.6% of users do not have any difficult in using the Mobile Money menu which may be because of the simplicity of the menu format. 3.4% were not sure of their response and 14.0% encountered difficulty. This confirms the findings of Appiah et al. (2014) that e–payment systems are easy to be used and user friendly.

In terms of affordability, 62.4% agreed that the charges are affordable with 12.0% not sure of their response and 25.6% disagreeing. This also confirms the findings of Appiah et al. (2014) that e–payment systems are affordable.

Other statements with the greatest level of agreement by users include: the safety and security of the mobile money wallet (85.8%), recommendation of the service to other people (91.5%), satisfaction with the service (81.2%) and resolve by users to continue with the service (81.7%). It could be inferred from these figures that users find the MTN Mobile Money menu easy to use and their wallets are very safe and secured. They find the service affordable and users are much satisfied with it to the extent that most of them have not only resolved to continue its use but also recommend it to other people.

Table 6*Users' Assessment of Mobile Money service*

Activity	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Ease of using MTN Mobile Money menu	17 (7.2%)	16 (6.8%)	8 (3.4%)	118 (50.0%)	77 (32.6%)
Affordability of MTN Mobile Money charges	19 (8.1%)	41 (17.5%)	28 (12.0%)	124 (53.0%)	22 (9.4%)
Safety and security of wallet	10 (4.3%)	17 (7.3%)	6 (2.6%)	133 (56.8%)	68 (29.0%)
Ease of using token	22 (9.4%)	47 (20.2%)	65 (27.9%)	79 (33.9%)	20 (8.6%)
No problems when accessing any mobile money service	25 (10.8%)	74 (31.9%)	30 (12.9%)	76 (32.8%)	27 (11.6%)
Recommendation of MTN Mobile Money to other people	2 (0.8%)	8 (3.4%)	10 (4.3%)	120 (51.3%)	94 (40.2%)
Satisfaction with services	5 (2.1%)	26 (11.1%)	13 (5.5%)	119 (50.6%)	72 (30.6%)
User will always use MTN Mobile Money	6 (2.6%)	7 (3.0%)	29 (12.6%)	110 (47.8%)	78 (33.9%)
Considering to stop using MTN Mobile Money	98 (41.9%)	116 (49.6%)	12 (5.1%)	6 (2.6%)	2 (0.8%)
User wished mobile money services had never been invented	128 (53.8%)	52 (21.8%)	14 (5.9%)	36 (15.1%)	8 (3.4%)

Source: Field Data (2015)

However, some of the statements received a stronger disagreement from users. This includes consideration to stop the use of the service (91.5%) and wishing that the mobile money service had never been invented (75.6%). Users" strong response of not considering stopping to use the mobile money services confirms the earlier submission that they have resolved to continue its use and recommend the services to others. The large number, 75.6%, who are happy that mobile money was invented shows that much will be achieved if all the challenges they face are resolved and the services run smoothly.

Two opposing views were identified concerning the likelihood of having problems when accessing the service. Users who agreed that they do not encounter any problems while using the service were 44.4% whereas 42.7% disagreed and 12.9% remained neutral. This implies that there are times when users encounter problems when accessing the service but at other times, are problem free.

Users who agreed that using a token is easy were 42.5% whiles 29.6% disagreed and 27.9% were not sure of their response. This showed that almost equal number of users disagreed just as those who were neutral. This can be attributed to the fact that only few people use the token service hence most users who have never used the service failed to comment on its status.

Table 7:*Sex of respondents vs. Frequency of using mobile money Cross tabulation*

			Frequency of using mobile money				Total
			Most Frequently	Frequently	Neutral /Not sure	Less Frequently	
Sex of respondents	Male	Count	47	63	7	17	134
		Expected Count	59.1	56.2	6.2	12.5	134.0
		% within Sex of respondents	35.1%	47.0%	5.2%	12.7%	100.0%
	Female	Count	57	36	4	5	102
		Expected Count	44.9	42.8	4.8	9.5	102.0
		% within Sex of respondents	55.9%	35.3%	3.9%	4.9%	100.0%
Total		Count	104	99	11	22	236
		Expected Count	104.0	99.0	11.0	22.0	236.0
		% within Sex of respondents	44.1%	41.9%	4.7%	9.3%	100.0%

Source: Field Data (2015)

Table 8:*Chi-Square Test for Sex of respondents vs. Frequency of using mobile money Cross tabulation*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.562[a]	3	0.009
Likelihood Ratio	11.813	3	0.008
Linear-by-Linear Association	10.021	1	0.002
N of Valid Cases	236		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.75.

Source: Field Data (2015)

A cross tabulation was done to identify the demographic characteristics of users who frequently used mobile money. Although 1 cell had less count, the chi–square in table 8clearly indicate this to be significant. ($X2 = 11.562$, $p = 0.009$) with a probability of 0.9% that it occurred by chance; therefore, it is not likely to have occurred by chance. Out of the total responses by males, 47 (35.1%) use mobile money most frequently and 63 (47.0%) use it frequently. For the females, 57 (55.9%) use mobile money most frequently and 36 (35.3%) use it frequently. Cumulatively, 110 (82.1%) of males and 93 (91.2%) of females largely use mobile money frequently as shown in table 7.

Table 9:*Chi-Square Test for Sex of respondents vs. Frequency of using mobile money vs. Marital status Cross tabulation*

Marital status		Value	df	Asymp. Sig. (2-sided)
Single	Pearson Chi-Square	16.597[b]	3	0.001
	Likelihood Ratio	17.083	3	0.001
	Linear-by-Linear Association	14.144	1	0.000
	N of Valid Cases	155		
Married	Pearson Chi-Square	2.894[c]	3	0.408
	Likelihood Ratio	2.805	3	0.423
	Linear-by-Linear Association	.323	1	0.570
	N of Valid Cases	67		
Divorced	Pearson Chi-Square	3.600[d]	2	0.165
	Likelihood Ratio	4.727	2	0.094
	Linear-by-Linear Association	2.400	1	0.121
	N of Valid Cases	9		
Total	Pearson Chi-Square	11.977[a]	3	0.007
	Likelihood Ratio	12.179	3	0.007
	Linear-by-Linear Association	9.881	1	0.002
	N of Valid Cases	231		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.76.

b. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.82.

c. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 0.94.

d. 6 cells (100.0%) have expected count less than 5. The minimum expected count is 0.44.

Source: Field Data (2015)

Further analysis show that out of the 93 females who frequently use mobile money, 69 (74.2%) are single, 18 (19.4%) are married, 4 (4.3%) are divorced and 2 (2.1%) are unknown. This indicates, as shown in table 9 that females who are single use mobile money more often than men.

Finally, out of the 69 single females who use mobile money frequently, 8 (11.6%) are less than 18 years of age, 48 (69.6%) are between 18 and 25 years, 11 (15.9%) are between 26 and 30 years, 2 (2.9%) are between 31 to 40 years and none is above 40 years.Therefore, single females between the ages of 18 and 25 years use mobile money more often than men.

Level of preference for Mobile Money as compared to bank transaction, ATM and e–ZWICH
Users were asked to indicate their level of preference between some selected transactions including mobile money to draw analysis between preferences for certain cashless transactions or even bank transactions.

Table 10Preference for cash or mobile money or both

		Frequency	Percentage	Valid Percentage
Valid	Cash	15	6.2	6.3
	Mobile Money	122	50.4	51.5
	Both	100	41.3	42.2
	Total	237	97.9	100.0
Missing	System	5	2.1	
Total		242	100.0	

Source: Field Data (2015)

In table 10, more than half of the users (51.5%) were shown to be in favour of using mobile money only as compared to physical cash or both. The table also show that 42.2% preferred having both mobile money and physical cash and only 6.3% were in favour of having physical cash over mobile money. This shows that people are gradually moving away from the dependence of only physical cash in their pocket and would rather have mobile money or both mobile money and cash rather than only cash. People therefore have high interest in using mobile money.

Table 11Level of education vs. Preference for cash or mobile money or both Cross tabulation

			Preference of cash or mobile money or both			Total
			Cash	Mobile Money	Both	
Level of education	Basic	Count	1	2	2	5
		Expected Count	0.3	2.6	2.1	5.0
		% within Level of education	20.0%	40.0%	40.0%	100.0%
	JHS	Count	5	28	9	42
		Expected Count	2.7	21.7	17.6	42.0
		% within Level of education	11.9%	66.7%	21.4%	100.0%
	SHS	Count	6	50	27	83
		Expected Count	5.3	42.9	34.8	83.0
		% within Level of education	7.2%	60.2%	32.5%	100.0%
	Tertiary	Count	3	39	52	94
		Expected Count	6.0	48.6	39.4	94.0
		% within Level of education	3.2%	41.5%	55.3%	100.0%
	None	Count	0	3	9	12
		Expected Count	0.8	6.2	5.0	12.0
		% within Level of education	0.0%	25.0%	75.0%	100.0%
Total		Count	15	122	99	236
		Expected Count	15.0	122.0	99.0	236.0
		% within Level of education	6.4%	51.7%	41.9%	100.0%

Source: Field Data (2015)

Table 12 *Chi-Square Test for Level of education vs. Preference for cash or mobile money or both Cross tabulation*

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.623[a]	8	0.001
Likelihood Ratio	26.201	8	0.001
Linear-by-Linear Association	21.187	1	0.000
N of Valid Cases	236		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is 0.32.

Source: Field Data (2015)

A cross tabulation of users" educational level versus their preference for cash, mobile money or both was further analysed. The preference for cash transactions decreased with increasing levels of educational qualification and people educated up to the JHS (66.7%) and SHS (60.2%) levels have the highest preference for only mobile money in their pocket as indicated in table 11. Users with no level of education showed the highest preference for both cash and mobile money transactions, 75.0% indicated preference for this type of transaction. This confirms the earlier assertion that educated people are more likely to embrace mobile money services. Generally, most males prefer both cash and mobile money than females since 65 (65.7%) of males as compared to 34 (34.3%) of females indicated preference for this type of transaction.

Although it is displayed that some cells have expected count less than 5, the chi–square table show this to be significant (X2 = 25.623, p = 0.001) with a probability of 0.1% that it occurred by chance; therefore, it is not likely to have occurred by chance. Further analysis, as presented in Table 12 show that out of the 28 (66.7%) with JHS level, 11 (39.3%) are males and 17 (60.7%) are females. Out of the 50 (60.2%) with SHS level, 23 (46.0%) are males and 27 (54.0%) are females. This clearly indicates that females with secondary school level of education tend to prefer only mobile money in their pocket(Rodrigo, Malaquias & Hwang, 2019).

The chi–square test as presented in Table 13 below indicates that this is statistically significant although it displayed that some cells have expected count less than 5. For the males (X2 = 26.621, p = 0.001) and for the females (X2 = 16.363, p = 0.037), thus a probability of 0.1% and 3.7% respectively, that it occurred by chance, which is statistically significant.

Table 13 *Chi-Square Test for Level of education vs. Preference for cash or mobile money or both vs. Sex of respondents' Cross tabulation*

Sex of respondents		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	26.621[b]	8	0.001
	Likelihood Ratio	22.057	8	0.005
	Linear-by-Linear Association	15.380	1	0.000
	N of Valid Cases	137		
Female	Pearson Chi-Square	16.363[c]	8	0.037
	Likelihood Ratio	18.782	8	0.016
	Linear-by-Linear Association	5.723	1	0.017
	N of Valid Cases	99		
Total	Pearson Chi-Square	25.623[a]	8	0.001
	Likelihood Ratio	26.201	8	0.001
	Linear-by-Linear Association	21.187	1	0.000
	N of Valid Cases	236		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .32.

b. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .09.

c. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .08.

Source: Field Data (2015)

Correlation tests between MTN Mobile Money and other transactions

To fully examine the level of preference for Mobile Money as compared to bank transactions or other cashless transactions (ATM and e–ZWICH), various correlation tests were done.

Table 14*Pearson correlation between preference for Mobile Money & ATM*

		Preference for ATM	Preference for MTN Mobile Money
Preference for ATM	Pearson Correlation	1	-0.240[**]
	Sig. (2-tailed)		0.001
	N	206	204
Preference for MTN Mobile Money	Pearson Correlation	-0.240[**]	1
	Sig. (2-tailed)	0.001	
	N	204	238

[**]. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data (2015)

From the correlation test as indicated in table 14, the Pearson Correlation between preference for Mobile Money and ATM is -0.240 which is statistically significant at the 0.001 level and therefore unlikely to have occurred by chance. Thus, there is a weak negative correlation between the two variables (r = -0.240, p = 0.001, r2 = 0.0576 or 5.76%). This implies that a high preference for ATM service leads to a low preference for Mobile Money and vice versa. However, it is only 5.76% of the variance that is related to the use of ATM. Other factors also account for this variance.

Table 15 *Pearson correlation between preference for Mobile Money & bank transactions*

		Preference for MTN Mobile Money	Preference for bank transaction
Preference for MTN Mobile Money	Pearson Correlation	1	-0.225[**]
	Sig. (2-tailed)		0.001
	N	238	207
Preference for bank transaction	Pearson Correlation	-0.225[**]	1
	Sig. (2-tailed)	0.001	
	N	207	207

[**]. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data (2015)

Table 15 provides the correlation between the preference for Mobile Money service and physically going to the bank for transactions. The Pearson Correlation value is given as -0.225 and statistically significant at the 0.001 level, thus, unlikely to have occurred by chance. There is a weak negative correlation between the two variables (r = -0.225, p = 0.001, r2 = 0.050625 or 5.06%). Thus, as preference for going to the bank for transactions increase, the preference for MTN Mobile decreases and vice versa but only 5.06% of the variance is related to preference for bank transactions.

Proposed further uses by users

Both the users were given the opportunity to list other transactions they would like to be able to use the Mobile Money to do. It must be stated that such services must be added to the payment of bills service on the mobile money menu. Analysis show that 168 (69.4%) users failed to state any new uses. This indicated that they are

content with thecurrent services of Mobile Money and do not have any other services in mind that can be added to the platform.

The high rate of users who failed to suggest new services can also be attributed to the fact that most of them never use the payment of bill service on the menu, so they have no idea that mobile money can be used to pay for certain services. It was earlier established that 76.0% of users claimed to have never used the payment of bills service. However, 74 (30.6%) of users made suggestions which have been tabulated below.

Table 16*Users' suggested new services*

New uses/services
Pay for transport fares
To pay national service personnel's
Purchase airline ticket
Use for international money transfer
Online shopping
To use in supermarkets
To pay hospital bills
To purchase fuel
To buy things at the roadside
To buy things at the market place
To make deposits into bank account
To pay school fees
Pay water bill
Buy internet bundles
Send money to other networks
Buy food
Purchase items from factories and big companies
Buy internet bundles

Some of the suggested new services in table 16 conform to the proposed framework of Mensah et al. (2012) for the improvement of Mobile Money payment systems in Ghana. They expected that other services such as paying bills, taxes, school fees, purchasing items, contracting loans, checking account balances, depositing money and insuring property should be added to the mobile money services. Some of these services have been suggested by respondents in this study three years down the line(Lee, Ryu & Lee, 2019).

Suggested services such as payment of transport fares, fuel, food and foodstuffs from the market, if implemented will go a long way to reduce the dependence of cash for such transactions. A lot of education must be done in this regard to make it a success.

Discussion

The demographic information of the users showed that there is a good balance of both males and females who patronize the Mobile Money service. Although males dominate, it is by just 14.8%. It was revealed that majority of the users are young and educated people mostly to the SHS and tertiary level. Users below 30 years and female singles between the ages of 18 to 25 years were found to use the services most since 91.2% of females frequently use mobile money, out of which 74.2% are single and out of that, 69.6% are between 18 and 25 years.

The study revealed that 95.5% of the users aresubscribersof company A, out of which 94.8% have their own mobile money wallet. Thus, only 5.2% of users of company A network do not have a mobile money wallet but still send and receive money through mobile money using the token service.

A total of 94.8% and 96.9% of users frequently or most frequently patronize the money transfer and cash out services respectively. No user was found to have never used the money transfer service. This gives an indication that users of Mobile Money mostly use it to send and receive money. The general assessment of the mobile money

service by the users further revealed that 82.6% of users find the Mobile Money menu easy to use, 62.4% agreed that the charges are affordable and 85.8% agreed that their mobile wallets are safe and secured.

Most users are very excited about the Mobile Money service and much satisfied with it to the extent that they have not only resolved to continue its use but also recommend it to other people. The level of satisfaction stood at 81.2% of users while 81.7% resolved to continue using it. However, 44.4% agreed to facing problems when using Mobile Money whiles 42.7% disagreed. This is an indication that there are some challenges that must be solved to sustain the satisfaction level of all users. On the issue of token use, the findings showed that only few people use the token service hence most users who have never used the service failed to comment on its status. The respondents were asked to rank and agree or disagree with specific challenges that hinder their use of the MTN Mobile Money service and the results were (i) *Network instability and unavailability* (*ii) Cash out limit (iii) PIN Security (iv) High charges*

5.2 Conclusion

Mobile money is a service that is gradually spreading across Africa. In Ghana, three mobile network operators, thus, MTN, AirtelTigo and Vodafone are currently offering the service. The prospects of using mobile money is high due to the high mobile penetration in Ghana. Mobile phone penetration as at February 2015 stood at 115.40%. The study assessed the current use of Mobile Money and investigated the challenges that affect its use in Ghana.

The findings established that the greatest challenge to mobile money's survival is network instability and availability and the long delay of reversal of wrong transactions. Users also complained that the cash out limit per day is too small and must be increased. Users were found to use mobile money to mostly send and receive money which threatens to take away the deposit and withdrawal services offered by the banks.

On a whole, mobile money is still growing in Ghana and all efforts must be made to sustain it and add various services to make the economy more cashless and reduce the burden of printing new currency notes and minting coins every now and then. The study showed that services such as payment of national service personnel's, hospital bills, fuel, airline ticket, food, transport fares and purchases in the market place, among others, can be added to the Mobile Money services. Based on the various findings in the study, the researcher recommends the following: It is recommended that the mobile network operators put in strong measures to ensure that the network is always stable and available since one of the greatest challenges from users is network instability and unavailability. In order to avoid the numerous wrong transactions, it is recommended that a confirmation displaying the name of the user/recipient must appear before any transaction is completed. It is recommended that since users mostly use the mobile money to send and receive money, much education of users must be done, which should be focused on other services especially the payment of bills service. Since most users never change their PIN, it is recommended that the mobile network operators sends reminder promptly to users quarterly to encourage them to change their PIN. A system can even be created whereby the PIN will expire after a particular period (e.g. quarterly) and users will be forced to change it.

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