DETERMINANTS OF SMALLHOLDER FARMERS' ACCESS TO MOBILE PHONE BASED MONEY TRANSFER SERVICES – EVIDENCE FROM VOLTA REGION OF GHANA

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ABSTRACT

Objective: Smallholder farmers' access to Mobile Phone Based Money Transfer Services in Akatsi North District of Volta Region of Ghana under the Planting for Food and Jobs Programme.

Methods: Primary data were collected from 300 farmers in beneficiary districts while secondary data were gathered from literatures and various actors. A multi-stage sampling technique was used in selecting respondents for the study. The first stage involved selecting ten communities that benefited from the planting for food and jobs program in the Akatsi North district, while the second stage considered randomly selecting 30 beneficiary farmers in each community. Obtained data were analyzed using Statistical Package for the Social Sciences and STATA-11 software. Results were presented in the form of descriptive statistics, cross tabulation, and Logit regression model.

Results: Majority of respondents (74%) do not use Mobile Phone Based Money Transfer platform for any agricultural transaction. Is only 26% of the respondents that use the mobile money platform for their agribusiness activities. Out of the nine explanatory variables included in the Logit regression model, six of them were significant at p<0.01, p<0.05, and p<0.1. Significant factors include: Educational level of households, age, major occupation, accessibility of mobile money service provider, convenience to respondent, trust of the system, and availability of mobile money service.

Conclusions: The availability and accessibility of Mobile Phone Based Money financial services among smallholder farmers is key to achieving competitive global business.

Keyword: Agricultural financial service, Ghana, Mobile money, Smallholder farmers, Logit model, Agricultural Information and Communication Technology, Coronavirus disease-19.

INTRODUCTION

Ghana's agriculture sector contribution to Gross domestic product over the past decade has been between 10% and 35% [1]. The sector's contribution to employment in Ghana is the largest (45%), as compared to the Service (41%) and Industry (14%) sectors and this makes the sector to remain the main source of livelihood for the people of Ghana [2]. As global food demand is rising, the vast majority of agribusinesses (70%) directly procure their raw produce from smallholder farmers. Therefore, having an easier way of making financial transactions with smallholder farmers becomes relevant in this competitive global business era more especially in this time of COVID-19 pandemic era [3].

In response to these constraints, there has been proliferation of initiatives by the government and private investors in Ghana to expand access to financial services in these underserved markets through activities of microfinances and other mobile banking agents. This approach to deepening financial inclusion has helped over the years but has not completely addressed the barriers faced by rural poor farmers [4]. This is because, some literatures revealed that microfinance institutions especially the mobile bankers are mostly not regular, unfaithful and do wrong daily recordings for farmers knowing well that most of them are illiterates. The worse one is that, most of the mobile banking agents bolt farmers' monies away. These unprofessional attitudes and bitter experiences recorded by farmers make them not to trust operations of microfinance institutions and have confidence in their operations [5].

In recent time, the telecommunication (telecos) industry has experienced rapid growth in using digital and mobile phones to save money, trade, and market products and services to catch up with the ever increasing globalization trend which reduces cost, provides compelling, innovative, and irresistible experiences to customers [6]. One such technological approach that has gained so much global recognition in recent time is the Mobile Money Transfer (MMT) system which considers the poor as a viable customer's in spite of their small transaction sizes. MMT is an electronic mobile device which enables people to use their mobile telephones to manipulate their bank accounts, store value in an account linked to their handsets, and transfer funds; buy products, make payments or even access credit or insurance products [7]. Money Transfer services in Ghana have contributed greatly toward economic growth as enterprises have increased revenues, employment and innovation in the society [8]. The MMT system has been considered to be an efficient, reliable, and affordable system of saving money, sending or receiving money for payment of salaries, facilitating trade, simplify payment/settlement of business transactions, and payment of remittances from family members which can be deposited in one location and withdrawn in another location.

Literature reviewed show that though there have been few studies in Ghana on the effect of MMT service on employment, adoption of MMT, impact of mobile money on the payment system in Ghana, impact of MMT service on the socio-economic status of mobile money vendors, factors influencing the adoption of MMT, or mobile banking service no empirical studies exist on smallholder farmers' access to Mobile Phone Based Money Transfer Services in Volta Region of Ghana [9]. This

Amedi and Woledzi

Innovare Journal of Agri. Sci, Vol 9, Issue 3, 2021, 12-16

aroused the author's inquisition to carry out the research to fill in the knowledge gap by answering the following questions to aid in effective policy formulation and implementation. The findings of the study will help in rapid uptake and modernization of mobile money services toward globalization.

Rationale and novelty of study

Few studies exist in Ghana on the effect of MMT service on employment, adoption of MMT, impact of mobile money on the payment system, impact of MMT service on the socio-economic status of mobile money vendors, factors influencing the adoption of MMT, mobile banking services however no empirical studies exist on smallholder farmers' access to Mobile Phone Based Money Transfer Services in Volta Region of Ghana.

The study is important as global food demand is rising,and the vast majority of agribusinesses (70%) directly procure their raw produce from smallholder farmers. Therefore, having an easier way of making financial transactions with smallholder farmers becomes relevant in this competitive global business era more especially in this time of COVID-19 pandemic era. Above and beyond, this study adds to the paucity of research in agribusiness and Agricultural Finance in Ghana and serves as a framework for agricultural globalization.

Research questions

1. What proportion of small holder farmers use mobile money platform in their agricultural activities?
2. What are the determining factors which influence smallholder farmers use of MMT platform?

Research objective

The main objective of the study is to assess smallholder farmers' access to Mobile Phone Based Money Transfer Services in Volta Region, Ghana with specific objectives as;

The specific objectives

1. To analyze the proportion of small holder farmers that use mobile money platform in their agricultural activities
2. To identify and estimate the determining factors which influence smallholder farmers' use of MMT.

METHODS

The study used a mixed research approach by combining both qualitative with a quantitative research design. The use of the mixed research design allowed to cross validate the research findings. A multi-staged sampling technique was used for the study. During the first stage, ten communities that benefited from the planting for food and jobs program in the Akatsi North District were randomly generated. The second step involved selecting 30 beneficiary farmers in each community randomly. In all, a total of 300 beneficiary farmers were used for this study. The data for this study were collected by trained extension officers who understand the terrain and can speak the local dialect.

The survey was conducted between Februarys and May 2020. Interviews were collected using structured questionnaire in the gathering the requisite data. Open- and close-ended questions were used. The data were processed with Statistical Packages for the Social Sciences (SPSS) and STATA -11 software.

To estimate the proportion of small scaled farmers in Akatsi North Districts that used mobile money platform in their agricultural activities, descriptive statistics was used. Percentages and cross-tabulation were used to describe the results.

To estimate the factors that influence smallholder farmers' use of mobile money, Logit Regression Model was used. In general, farmers would decide to use mobile money based platform at any given point when the combined effects of the factors assumed to influence farmers' decision to use the mobile money platform exceed the reaction threshold.

Farmers' decision to use mobile phone money transfer system assumes a binary choice model hence dichotomous. The choice of the logit model is based on argument by Long [10] that when a continuous dependent variables are included in the model, logit model is well suited for explaining and testing the hypothesis about the relationships between a categorical outcome variable and one or more categorical or continuous variable. It is also worth noting that the use of the logit model for this analysis is consistent with the literatures found in similar works (Akudugu *et al.* [11]; Kudugu [12]; Ololade and Olagunju [13]).

Study area

The study area as described in Fig. 1 is Akatsi North District, which happens to be one of the 260 Metropolitan, Municipal and District Assemblies in Ghana, and forms part of the 18 of Municipalities and Districts in the Volta Region. In 2012, Akatsi North District Assembly was carved out of the Akatsi District by Legislative Instrument (L.I 2161) 2016 with its capital named Ave Dakpa for the purpose of ensuring decision-making and development at the local level [1]. The district lies between latitude S 6° and 7° N and longitude 0 W – 1 E and south of the dry savannah and north of the forest zones. It covers an area of about 324 sq km. It is located in the southeastern part of the Volta region. The District shares boundaries with Akatsi South District to the south, to the north with Adaklu District, to the west with Central Tongu District, and to the east with the Republic of Togo. The population of the District according to 2010 population and housing census stands at 33,035 with 15,126 males and 17,909 females. The total dependency ratio for the District is 56.4 and is higher for the males (94.6) than that of females (82.1). Akatsi North is entirely rural populated or a rural settlement.

The district's economy consists of agricultural, commercial, industrial, and service sectors. According to 2010 Population and Housing Census, the agricultural sector employs 67.3% of the economically active population. The main agricultural activities are crop production and livestock rearing. Farming is done on small scale and among crops cultivated include; maize, cassava, sweet potatoes, pineapples, and vegetables, such as, tomatoes, pepper, garden eggs, and okra. Despite the dominance of agriculture in the district, there are a lot of untapped potentials, such as, vast arable lands, dams, and dugouts. Livestock reared are mainly cattle, goats, sheep, and poultry. The industrial sector of the district comprises mainly agro-based activities.

RESULTS AND DISCUSSION

Socio-demographic characteristics of respondents

Sex

Results in Table 1 shows that 65% of respondents were males while females constitute (35%). This implies that male farmers participated more in the planting for food and jobs program in Akatsi North District as compared to women. This conforms to the findings of Dzadze *et al.* [14] who reported that subsistence farming activity is male dominated as most activities are tedious and labor intensive.

Age (years)

The age distribution of the respondents from Table 1 shows that 39% were aged 40–49 years and 34% were above 50 years. Results show that only 4% of respondents were below 29 years of age. The economically active labor force between 30 and 39 years were only 23%. This shows that majority of respondents were middle-aged implying that most young ones are not into agriculture which agrees with findings from Ministry of Foreign Affairs [15] that the youth is not interested in farming. However, with the high numbers being aged, acceptance of technology could be a hindrance.

Educational level

The result from Table 1 indicates that respondents had low educational profile, 40% schooled up to primary level while 32% had no formal education. Results again show 23% of respondents attaining secondary level while only 4% was able to attain tertiary level. Inference could

Amedi and Woledzi

Innovare Journal of Agri. Sci, Vol 9, Issue 3, 2021, 12-16

Table 1: Socio-demographic characteristics of respondents (n=300)

Variables	Frequency	Totals (%)
Sex		
Male	196	65
Female	104	35
Age (years)		
≤29	11	4
30–39	69	23
40–49	118	39
≥50	102	34
Marital status		
Married	240	80
Never married	50	17
Divorced	10	3
Educational status		
None	96	32
Primary	121	40
Secondary	70	23
Tertiary	13	4
Major occupation		
Farming	231	77
Trading	46	15
Artisan	20	7
Government worker	3	1
Farming experience (years)		
≤5	22	7
6–11	26	9
12–17	68	23
18–23	136	45
≥24	48	16
Farm size (Ha)		
<2.0	136	45
2.1–4.0	96	32
4.1–6.0	43	14
>6	25	8
Monthly income (GHS)		
<100	123	41
100–500	98	33
501–1000	49	16
>1000	30	10

Source: Field Survey, 2020

be drawn from the study that majority of respondents dropped out of school and seriously into farming. This level of education has influence on adoption of mobile money technology adoption by respondents.

Marital status
Results in Table 1 shows that 80% were married and 3% were divorced. This indicates that the majority of the people were married and have children. Findings conform to [16] which states that majority of farmers in rural areas get married before the age of 40 years.

Major occupation
Majority (77%) of the respondents from Table 1 were farmers while 22% were engaged in trade, artisan, government work, and other types of occupation. This conforms to the assertion of Duncombe [17] that less government work exist in rural areas hence majority of them are farmers.

Annual income (general household survey [GHS])
Results from Table 1 indicates that 41% of respondents earn monthly income lesser than 100 GHS/month. Finding show 33% of respondents earn between 100 and 500 GHS in a month. This shows that due to the subsistence nature of respondents' activities they do not earn much.

Table 2: Ownership of mobile phone and use of mobile money platform by respondents

Sex	Do you have your own mobile phone?		Mobile money platform use		Total
	Yes	**No**	**Yes**	**No**	
Male	189 (63%)	7 (3%)	60 (20%)	136 (45%)	196
Female	100 (33%)	4 (1%)	17 (6%)	87 (29%)	104
Total	289 (96%)	11 (4%)	77 (26%)	223 (74%)	300

Source: Field Survey, 2020

Ownership of mobile phone and use of mobile money platform
The result from Table 2 shows that, 96% of respondents have mobile phone while 4% do not have phone. Finding from the table revealed 74% of respondents do not use mobile money platform for any transaction in Akatsi North District of Ghana for their agricultural activities. Is only 26% of the respondents that use mobile money platform for their agribusiness activities. This phenomenon is typical of rural households where majority spend greater portion of their time in farming activities [18]

Factors influencing smallholder farmers use of MMT platform
The Logit regression model assumes a random variable which predicts the probability of smallholder farmers' use of MMT platform. The model is based on cumulative logistic probability functions. For estimation purposes, the Logit regression model is specified as:

$$Y_i = \ln (P_i) = \beta 0 + \beta i X_i + \varepsilon_i (1-Pi) \qquad (1)$$

Where;
Y_i = Dependent variable;
$\ln (P_i)$ = Denotes the log odds of the probability that the farmer will invest in mobile money device $(1-Pi)$;
Pi = Denotes the probability of using MMT platform;
$(1-pi)$ = Denotes the probability of not using of MMT platform;
β_i = Denote the coefficients of the explanatory variables;
X_i = The explanatory variables;
ε_i = The error terms.

The choice of variables for this study is based on literature (GSMA [19], Hinson [20], Davis and Venkatesh [21], Jack and Suri [22], Banstola [23]).

The descriptions of variables are presented below and the empirical model is specified in equation (2)

The a priori expectation for each variable is either negative or positive. The positive a priori expectation means that with an increase in the variable on the use of mobile money platform is expected to increase; vice versa for the negative. Nine variables were modeled as a function of farmer-specific socioeconomic, demographic characteristics, and external variables. STATA 11 software was used to estimate the parameters. The expected signs of their coefficients were predicted (*a priori*) based on past studies and economic theories.

$$MMPU= \beta 0+ \beta 1EDU+ \beta 2AGE + \beta 3MOCCU + \beta 4\ MINCO + \beta 5ACCESS + \beta 6CONVENIECE + \beta 7\ TRUST + \beta 8AVAIL + \beta 9USEFUL + \varepsilon i \qquad (2)$$

Factors influencing farmers to use mobile money platform in their agricultural activities
Results in Table 3 shows the factors that influence smallholder farmers use of MMT platform in the Akatsi North District of Volta Region. The direction of the coefficient of all the explanatory variables conforms to their a priori expectations. A total number of 300 farmers were used for the analysis. The McFadden R^2 value of 0.8296 means that about 82.96% of variations in the dependent variable was explained by the independent variables, indicating relatively high explanatory power of the model. The F-value (Prob>F) of 0.0037 implies that the model is significant at 1% or is significantly different from the critical value of F at 9 and 111 degrees

Amedi and Woledzi

Innovare Journal of Agri. Sci, Vol 9, Issue 3, 2021, 12-16

of freedom for numerator and denominator, respectively, at significance level of <1%. Six of the variables were significant whiles the rest three were not significant. The significant variables include: Educational level of households, age, major occupation, accessibility of mobile money service provider, convenience to respondent, trust of the system, and availability of mobile money service.

Educational level (EDU)

The marginal effect of educational level of respondents (EDU) which is −0.017 means that, an additional level in educational level of respondents will increase the willingness of respondents' to use mobile money platform by 1.7%. This affirms findings from Table 1 that about 72% of the respondents schooled up to primary level. If respondent's educational level was to be a bit higher, the use of the mobile money platform would have increased. This confirms the conclusion made by Gencer [16] in his study that less educated people are more reluctant they are to use technology. The level of education has a high influence on the willingness to adapt something new compared to traditional values of the customers Bank of Ghana [3] also pointed out that consumers' knowledge of a service has a significantly positive effect on their perceived ease to use. Farmers knowledge can help identify what mobile payment can do for them, and why the services are important to them. Customers will use mobile payments easily and efficiently if they have high level of knowledge.

Age (AGE)

Also has an inverse relationship with respondents' willingness to use the mobile money platform. The marginal effect of −0.560 means that, the older the respondent the more likely it is to decrease the willingness to use any of the mobile money platform by 56%. This is in line with the socio-economic results which identified the modal ages to fall within 40–49 years and above 50 years. This is supported argument made by Duncombe [17] in their study of "a risk perception on the use of electronic payment systems by young adult in Malaysia" where 97% of the respondents are below the age of 50 years.

Table 3: Logit regression result of factors influencing farmers to use mobile money platform in their agricultural activities

Dependent Variable: Mobile Money Platform use (MMPU)

Variables	Coefficient	Std. error	p-value	Marginal effect
Edu	0.08137**	0.03393	0.04154	0.017
Age	−0.01033*	0.00268	0.06723	−0.560
Moccu	−0.01013***	0.00614	0.00013	−0.384
Minco	0.07702*	0.04153	0.07863	0.269
Access	−0.00002 **	0.04006	0.04356	−0.083
Convenience	0.01181	0.09017	0.10564	0.009
Trust	0.06526	0.6080	0.11451	0.866
Avail	−0.01666*	0.5194	0.08473	−0.421
Useful	0.01754	0.08053	0.21372	0.072

Number of obs=300, Mc Fadden R^2=0.8296. Prob>F=0.0037, ***p<0.01, **p<0.05and * p<0.1. Source: Field Survey, 2020

Major occupation (Moccu)

Respondents having different occupations apart from farming will have higher intention of using mobile money payment platforms for remittances. However, from the study, 77% of respondents were farmers hence recorded an inverse relationship with a marginal effect of −0.384 meaning that engaging in farming activities will lead to a decrease in the willingness to use mobile money platform by 38%

Monthly income (Minco)

The results from logistic regression of factors influencing farmers use of mobile money platform in agricultural activities recorded a marginal effect of 0.269 meaning that if respondents are able to increase income it will result in 27% increase of respondents willing to use the mobile money platform. Results from the study might be attributed to the fact that 41% of respondents earn monthly income lesser than 100 GHS/month and 33% between 100 and 500 GHS in a month. Results could also further be explained from seasonal nature of agricultural activities resulting in irregular cash flow from their faming activities.

Accessibility of vendors (Access)

Customer's feeling is key about the accessibility of a new service to provide many benefits for them and to help improve their job performance when using the service [3]. For farmer's to be able to use mobile money platform for their farming transactions, accessibility of
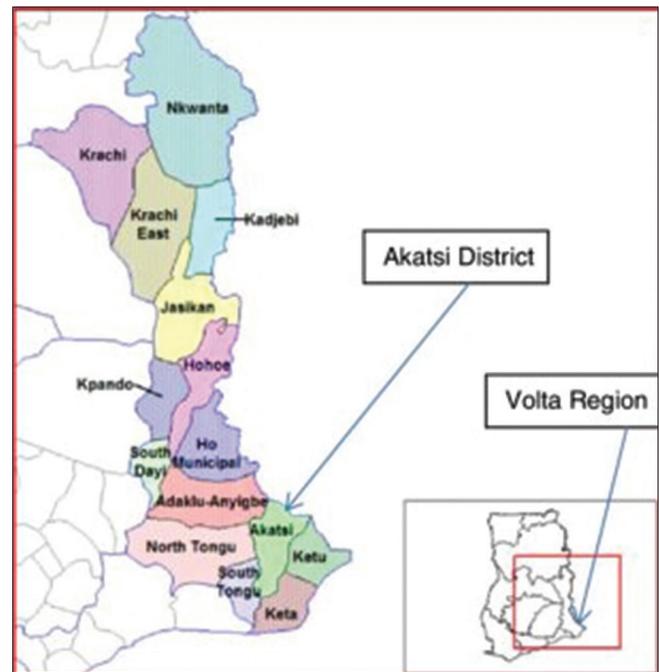

Fig. 1: Map of Akatsi North District. Source: Ghana Statistical Service, 2020

Table 4: Description of the variables used in the regression model

Variables	Description	Measurements	A-piori expectation
MMPU	Mobile Money Platform Use	Either (0 or 1)	±
EDU	Formal educational level attained	Years	±
AGE	Age of beneficiaries	Years	+
MOCCU	Major Occupation of respondent	1=farming 0=otherwise	±
MINCO	Monthly income	GHS	+
ACCESS	access to mobile money vendors	1=Yes; 0=otherwise	±
CONVENIECE	ease and the comfort of use	1=Yes; 0=otherwise	±
TRUST	use of new service with a sense of comfort, safety, and risk acceptance	1=Yes; 0=otherwise	±
AVAIL	availability of mobile money service provider	1=Yes; 0=otherwise	±
USEFUL	Usefulness of the new services	1=Yes; 0=otherwise	±

Amedi and Woledzi

Innovare Journal of Agri. Sci, Vol 9, Issue 3, 2021, 12-16

vendors becomes important if farmers themselves do not have access to phone. The result from Table 4 shows that 96% of respondents have mobile phone while 4% do not have phone. The results further indicates that though some have phones, 74% of respondents do not use mobile money platform for any transaction in their farming transactions. Farmer's indicated during our focus group discussion that that, the services are not closer to them and some of them also admitted their challenge in using their phones for such services. The findings are in agreement with the study by [7]. Accessibility from the study had inverse relationship with the willingness of farmers to use the mobile money platform. The marginal effect of accessibility which is −0.083 means that, most respondents are not able to locate vendors within their vicinity hence a further increase in the number of respondents who are not able to locate. A further challenge in accessing the vendors in the district will result in 8% decrease in farmers' willingness to use the mobile money platform

Availability of vendors (Avail)

Many vendors have to be available to enable farmers use the mobile money platform for their farming transactions. The marginal effect of availability which is −0.421 means that, limited vendors exist in Akatsi North District to bridge financial inclusion gap. A further increase in unavailability of vendors in the district will result in 42% decrease in farmers' willingness to use the mobile money platform

CONCLUSION

The availability and accessibility of financial services among smallholder farmers have suffered setback since the past decade. However, the revolution of MMT services in Ghana has brought an opportunity to ease the constraint of access to agricultural financial services in this competitive global business era.

The study examined Smallholder farmers' access to Mobile Phone Based Money Transfer Services in Akatsi North district of Volta Region of Ghana under the planting for food and jobs program. Findings of the study revealed that, out of the 300 farmers interviewed, 74% of them do not use mobile money platform for any agricultural transaction. Is only 26% of the respondents that use mobile money platform for their agribusiness activities.

Out of the nine variables modeled to determine the factors that influencing farmers to use mobile money platform in their agricultural activities Six of the variables were significant whiles the remaining three were not significant. The significant variables include: Educational level of households, age, major occupation, accessibility of mobile money service provider, convenience to respondent, trust of the system, and availability of mobile money service

Based on the findings from the study, the following recommendations are therefore suggested;

Because farmer's rate of usage of the mobile money platform is still low, aggressive awareness and financial literacy training programs must be deployed by the government to the populace and the benefits of the systems as a superior alternative to cash payment systems must be emphasized.

Since most active users of the platform are below the age of 39 years, the government should rely on this section of the population to drive the use of mobile money platform in Ghana.

Since occupation, educational level, availability, and accessibility of vendors have been recognized to influence the use of the mobile money platform, government need to as a matter of urgency take the campaign for the diffusion of mobile money systems into agricultural activities considering the numerous benefits it brings farmers.

Government and financial institutions in Ghana should continue to leverage on the significant socio-economic (education, age, and occupation) factors to drive mobile money platform usage.

It is also recommended that government and Fintech companies should investment in technological infrastructure support across the country to help farmers who mostly located in rural and remote areas. This will align with policymakers' agenda to increase financial outreach and improve financial inclusion by using mobile technologies

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