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DETERMINANTS OF USE OF ELECTRONIC WALLET SCHEME BY FARMERS IN IMO STATE, NIGERIA

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ABSTRACT: *The study investigated determinants of use of e-wallet scheme among farmers in Imo State, Nigeria. It specifically identified the farmers' sources of information on e-wallet, determined the inputs supplied through e-wallet, ascertained the farmers' perceived effects of e-wallet and determined constraints to the use of e-wallet. Data were collected from a sample of 240 farmers with the aid of structure questionnaire and were analyzed using mean statistic, percentages and bar chart. The hypothesis was tested using ordinary least square regression analysis. Results showed that radio (100%), mobile phones (100%) and newspapers (66.7%) were the major sources of information on e-wallet; inputs supplied through e-wallet included fertilizers (X = 2.9), maize seeds (X = 2.5), cassava cuttings (X = 2.3), fingerlings (X = 2.1) and agrochemicals (X = 2.0); perceived effects of use of e-wallet included increased income (90.00%), exposure to more agricultural enterprises (85.00%), increase productivity (85.42%) and timely access to inputs (64.56%). It was further revealed that high cost of inputs (89.58%), poor transportation network (87.50%) and bureaucratic bottlenecks were the major constraints facing the scheme. It was recommended that innovative strategies for financing agricultural projects be introduced so that farmers could afford required quantities of inputs. Also, the input distribution system should be decentralized to reduce bureaucratic bottlenecks.*

KEYWORDS: Determinants of Farmers Use, Agricultural Transformation Agenda, Electronic Wallet Scheme, Nigeria

INTRODUCTION

Agriculture has been the principal source of livelihood of the majority of rural populace in Nigeria. Nigeria was the leading producer of many agricultural commodities in the world before the discovery of petroleum in commercial quantities. According to the Federal Ministry of Agriculture and Rural Development (FMARD) (2011) Nigeria was the leading exporter of groundnut, contributing 42% i.e. 502, 000 metric tons of the world's shelled groundnut; it also had a total share of 27% (176 metric tons) of the world's palm oil exports, 18% (187 metric tons) of world's cocoa exports and 1.4% of the world's cotton export all in 1961. However, the country has recorded stagnation in the production of these commodities in recent times. It is estimated to have lost US$10 Billion (1.6 Trillion Naira) annual export opportunity from the four agricultural commodities alone due to continuous decline and stagnation in the exports of the four crops (FMARD, 2011).

In spite of the poor performance of the Nigerian agricultural sector, the wellbeing of her economy still depends largely on the sector. It is the largest contributor to gross domestic product (GDP), about 40.08% in 2016 (National Bureau for Statistics, NBS, 2016). It provides employment to about 65% of the adult labour force (Bola, 2007) and the food and fiber needs of a large and increasing population and agro-industrial enterprises depend on it for raw

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materials while 88% of the non-oil exports earning come from the sector; it has also remained the major source of income for the majority (90%) of the rural population (Oji-Okoro, 2011)).

In terms of the pace of the sector's development and contribution to industrialization recently, Sulaimon (2014) observed that it lags behind compared to many other countries because of its failure to supply sufficient food to the teeming Nigerian population, produce marketable surplus for foreign exchange earnings and provide the inputs required for the industrial development of the nation. Several factors have been pointed out to be contributing to this situation. Snapp et al. (2014) reported the low use of fertilizers in Nigeria, between 8kg and 9kg per hectare which is far below the world average of 100kg/hectare and 150kg/hectare for Asia. Only 5% of farmers are reported as being able to access improved seeds in Nigeria compared to 25% in East Africa and 60% in Asia. In terms of mechanization intensity, Nigeria could only record 10 tractors per 100 hectares compared to Indonesia with 241 tractors/hectare (FMARD, 2011).

An analysis of yield per hectare between Nigeria and four leading agricultural countries (Malaysia, Thailand, Indonesia and Brazil) over years revealed that productivity increases was highest for Malaysia and lowest for Nigeria. Nigeria's yield per hectare is 20% to 50% of that obtained in similar developing countries. Meanwhile in 1961, Indonesia's yields were lower than that of Nigeria but rose three times in 20 years (FMARD, 2011). This situation is worrisome considering the huge human and natural resources the country is endowed with and the need to feed its increasing population. This has exposed the country to severe food insecurity and a heavy reliance on food importation (Famoriyo, 1998; Adebayo, 2010).

Several agricultural programmes, schemes and initiatives have been introduced in Nigeria by various governments to remedy this situation (Jibowo, 2005) yet access to agricultural inputs at the right time and quantity remains elusive and consequently rendering the agricultural development drive of the country unattainable.

The growth enhancement support scheme (GESS) is a component of agricultural transformation agenda (ATA) introduced in Nigeria in 2011. According to Adesina (2012) GESS is an indispensable platform that was adopted for farmers to connect with government to receive relevant information particularly in the areas of agricultural innovations, technology and input distribution through the utilization of electronic wallet (e-wallet). E-wallet is a distribution channel which provides an efficient and transparent system for the purchase and distribution of agricultural inputs based on a voucher system sent to farmers' mobile phones. GESS is aimed at delivering government subsidized major agricultural inputs like fertilizer and improved seeds via e-wallet (Businessday, 2013). The objectives of GESS include i) to provide subsidized agricultural inputs like fertilizer, hybrid seeds and agro-chemicals to farmers; ii) to remove the usual complexities associated with fertilizer distribution; iii) to encourage critical actors in fertilizer value chain to work together to improve productivity; iv) to enhance farmers' income and promote food security; v) to increase farmers' production and productivity; and vi) to promote public-private partnership in improved efficiency and effectiveness in the purchase and distribution of inputs (Afolabi, 2015).

GESS has been in operation in all the 36 states of the Federation including the FCT since its inception in 2011. As an innovation targeting agricultural development in Nigeria, determining its effectiveness is imperative as it will make way for the upscaling or otherwise of the initiative. Many studies have focused on GESS scheme in Nigeria (Alabi et al., 2016; Nwaobiala & Ubor, 2016; Nwalieji et al., 2015; Ojoko, 2014). However, there is need for more

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studies to corroborate or otherwise the findings of previous studies. It is against this backdrop that the study seeks to analyze the use of e-wallet among farmers in Imo State, Nigeria.

Objectives of the study

The broad objective of the study is to analyze the use of e-wallet by farmers in Imo State, Nigeria. The specific objectives include to:

1. identify farmers' sources of information about e-wallet;

2. determine the inputs provided through e-wallet,

3. ascertain the perceived effects of use of e-wallet among the farmers; and

4. determine constraints to the use of e-wallet by the farmers.

Hypothesis

There is no significant relationship between the socioeconomic characteristics of the farmers and their use of e-wallet.

METHODOLOGY

The study was carried out in Imo State. Imo State is among the five states in the southeast geopolitical zone of Nigeria. The state lies within latitudes 4°45'N and 7°15'N, and longitude 6°50'E and 7°25'E with an area of around 5,100 square kilometer (https://en.wikipedia.org/wiki/Imo_State). Imo State is bordered by Abia State on the East, River Niger and Delta State to the West, Anambra State on the North and Rivers State to the South (Ebi, 2015). Imo State has two main seasons – rainy and dry. Rainy season begins in April and lasts until October with annual rainfall varying from 1, 500 mm to 2, 200 mm (60 – 80 inches) (Ebi, 2015). An average annual temperature above 20 °C creates an annual relative humidity of 75%. With humidity reaching 90% in the rainy season. The dry season experiences two months of Harmattan from late December to late February. Agriculture is the major occupation of the people, palm oil, cassava, cocoyam, yam and maize are the major crops grown by the people while the major livestock reared include goat, sheep and local fowls (Umunakwe, 2011). Agricultural technologies are disseminated in the state by the agricultural development programme (ADP) and private extension outfits (oil companies) in oil producing communities in the state.

The population for the study included all GESS registered farmers in the state. Multistage sampling procedure was used to select the sample for the study. The first stage was the purposive selection of all the GESS farmers in the three agricultural zones of the state – Owerri (44,848), Orlu (106) and Okigwe (47) which totaled 123,690 farmers according to information obtained from the Imo State Ministry of Agriculture. This was done to ensure representativeness of the sample. The second stage was the selection of 0.194% of GESS farmers in each zone with the use of proportionate and systematic sampling techniques thus having 87 farmers in Owerri zone, 106 farmers in Orlu Zone and 47 in Okigwe zone thus making a total of 240 farmers.

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Sources of information on e-wallet was measured by listing all the possible ways of obtaining information about it and asking the farmers to indicate the ones applicable to them. The use of e-wallet was measured by listing all the inputs supplied via e-wallet and asking the farmers to indicate the ones they used and thier responses were recorded on a 3-point Likert-type scale of Highly Used = 3, Used = 2 and Not Used = 1. The mean of the scale was determined by adding the values assigned to the scales and dividing by the number of scales to obtain a value of 2.0. Therefore, any item with a mean score $\geq$ 2.0 was taken as used by the farmers. Effects of e-wallet was measured by listing all the possible changes observed by the farmers in their enterprise and housholds as a result of the use of e-wallet. Constraints to the use of GESS was measured by providing a list of all the possible constraints to the use of GESS. Their responses were recorded on 5-point Likert-type scale of Strongly Agreed = 5, Agreed = 4, Disagreed = 3, Strongly Disagreed = 2 and Undecided = 1. The mean of the scale was determined by summing the values attached to the scale and dividing by the number of scale to obtain a value of 3.0. Any item with a mean $\geq$ 3.0 is regarded as being a constraint.

Data obtained from objectives 1 and 2 were analyzed using percentages while those from objectives 3 and 4 were analyzed using mean statistic. The hypothesis was tested using ordinary least square regression analysis expressed mathematically as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, e)$ where

Y = Dependent variable (Use of e-wallet measured on a 3-point Likert type scale of Used = 3, Not Used = 2, Undecided = 1)

X_1 = Sex of the farmer (Dummy Variable: Male = 1, Female = 2)

X_2 = Age of the farmers (Years)

X_3 = Educational level (Number of Years spent in school)

X_4 = Occupation (Dummy Variable: Farming = 1, Otherwise = 0)

X_5 = Farm size = (Hectare)

X_6 = Monthly income (Naira)

X_7 = Farming experience (Years)

X_8 = Extension visit (Number of visit in a month)

X_9 = Social organization membership (Dummy variable: Yes = 1, No = 0)

e = error term

RESULTS AND DISCUSSION

Socioeconomic characteristics of farmers

Table 2 shows that a majority (56.7%) of the farmers was female while the remaining 43.3% was male; a majority (47.9%) was between the age range of 41 – 60 years with a mean age of 48.0 years; about 68.0% acquired secondary education with secondary school (11.1 years) as

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the mean educational level attained by the farmers and a greater proportion (47.9%) had farming as their major occupation. Furthermore, the result reveals that a greater proportion (33.7%) of the farmers had a farm size of 2 – 3 hectares with a mean farm size of 1.7 hectares; a majority (55.8%) had a monthly income of less than 25,000 Naira and a mean monthly income of 35,000 Naira; a majority (73.3%) of the farmers was not visited by extension agents and a majority (72.1%) of the farmers were not members of social organizations.

The dominance of women in farming in the area attests the significant role women play in agriculture in developing countries. Ani (2004) reported that women play such roles as processing of agricultural produce and cultivation of crops such as cassava in southeastern Nigeria. The result also indicate that the study area is dominated by farmers who are still in their economically active ages. Younger farmers are known to have a higher propensity for innovation adoption (Agbamu, 2006). The result also suggests the acquisition of formal education by the farmers which however is minimal. This acquisition of formal education might enhance decision making abilities of the farmers. The dominance of farming as a major occupation in the area could facilitate the adoption of any innovation that appears promising since it will boost farmers' productivity. However, the dominance of farmers with farm size less than five hectares implies that they are majorly smallholders which reflects the limited access to land by female farmers in developing countries. Again, the indication by a majority (72.1%) of the farmers of not being visited by extension agents points to the declining efficiency of agricultural extension services in Nigeria. Madukwe (2008) reported the decreasing number of agricultural extension agents in Nigeria far below the recommended number by FAO which he attributes to the under-funding of the agency.

Table 1: Distribution of respondents according to socioeconomic characteristics

Socioeconomic characteristic	%	$\bar{X}$
Sex		
Male	43.3	
Female	56.7	
Age (Years)		
≤ 20	3.3	
21 – 40	33.3	48.0
41 – 60	47.9	
> 60	15.4	
Educational attainment (No. of years spent in		
0	5.4	
1 – 12	68.0	11.1
> 12	26.6	
Primary Occupation		
Farming	47.9	
Trading	26.3	
Civil service	17.0	
Artisan	8.8	
Farm Size (Ha)		
< 1.0	27.5	
1.0 – 2.0	30.5	1.7
2.0 – 3.0	33.7	

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> 3.0	8.4	
Monthly income (Naira)		
< 25,000	55.8	
25,000 – 100,000	31.3	35,000
101,000 – 176,000	12.9	
> 177,000		
Extension visit (No. of visits/month)		
No visit	73.3	
Once	19.6	
Twice	7.1	
Membership of social organizations		
Yes	27.9	
No	72.1	

Source: Field Survey Data, 2017

Sources of information on e-wallet

Figure 2 shows that radio (100%) and mobile phones (100%) were the major sources of information on e-wallet in the study area. Other important sources included newspapers (66.7%) and fellow farmers (57.9%). This result implies that the farmers in the study area used mass media channels. The effectiveness of e-wallet scheme is built upon mass media and the access to them by farmers in the study area will enhance input distribution and dissemination of agricultural information. The dominance of these sources could be linked to their relative advantages such as lower cost, fastness and ability to overcome geographical barriers. Studies by Ogunniyi and Ojebuyi (2016) and Nwalieji et al. (2015) reported the use of mobile phones by farmers in Nigeria.

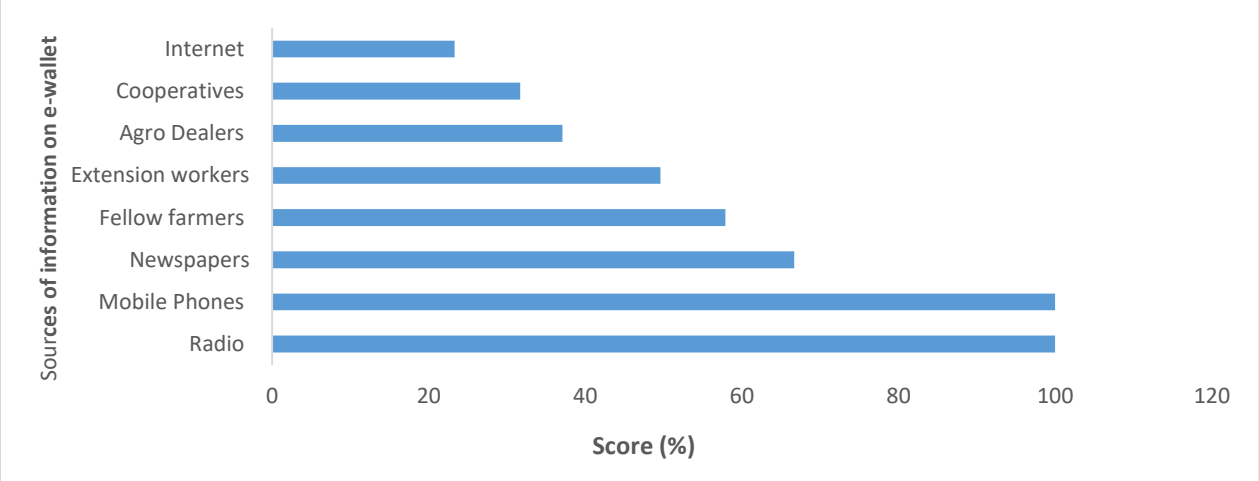

Figure 3: Bar chart showing sources of information about e-wallet.

Various inputs used by the farmers

Data in Table 2 reveal that the farmers used fertilizers ($\bar{X}$ = 2.9), maize seeds ($\bar{X}$ = 2.5), cassava cuttings ($\bar{X}$ = 2.3), fingerlings ($\bar{X}$ = 2.1) and agrochemicals ($\bar{X}$ = 2.0). It could be inferred from the result that did not use all the inputs supposed to be supplied through e-wallet. This could

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be attributed to sharp practices common in such initiatives in Nigeria. Nwalieji et al. (2015) reported that diversion of rice seeds prevented timely and adequate access to these seeds among GESS farmers in Anambra State, Nigeria.

Inputs	**X**	**S.D**
Fertilizer	2.9	0.1
Maize seeds	2.5	0.2
Cassava cuttings	2.3	0.3
Fingerlings	2.1	0.3
Agro-chemicals	2.0	0.2
Rice seeds	1.4	0.3
Fish feeds	1.3	0.2

Source: Field Survey Data, 2017

Perceived effects of the use of e-wallet

Result in Table 2 reveals that the farmers indicated that e-wallet has several effects on them and dominant among which included increased farm income (90.00%), increased output level (85.42%), exposure to more agricultural entreprises (85.00%) and better knowledge on the use of agricultural inputs (76.25%). However, the scheme was found to be ineffective in the timely delivery of agricultural information (20.76%). This could be attributed to certain bottlenecks that hinder the timely transmission of agricultural information to target recipients in developing countries. However, the scheme could be adjudged from the result as promoting agricultural development in the area. A study by Ahmed et al. (2016) found that e-wallet raised the income level and output of rural farmers in Adamawa State, Nigeria.

Table 2: Distribution of farmers according to the perceived effects of e-wallet

Perceived effects of e-wallet	%
Exposure to more agricultural enterprises	85.00
Increase in output level	85.42
Enhanced timely access to improved agricultural inputs	64.58
Improved food availability	63.33
It Increased farm income	90.00
Reduced difficulties in obtaining agricultural inputs	64.17
Improved access to agricultural information	38.33
Reduced profiteering among agro-dealers	43.75
Reduced the cost of agricultural inputs	68.33
Better knowledge on use of agricultural inputs	76.25
Timely delivery of agricultural information	20.76

Source: Field Survey Data, 2017.

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Constraints to the use of e-wallet by farmers

Result in Table 3 shows that the major barriers to the effectiveness of e-wallet in the study area were high cost of inputs (89.58%), poor transportation network (87.50%), bureaucratic bottlenecks (85.41%), high cost of mobile phones (83.33%), poor ability of farmers to perform operations related to e-wallet (82.91%), inadequate knowledge of the use of mobile phone (82.50%), profiteering (79.19%) and difficulty in the redemption of inputs (78.33%). High cost of inputs could limit farmers from accessing inputs at the right quantity and time. Liverpool-Tasie et al. (2016) reported that Nigerian farmers face very high transportation costs travelling to procure fertilizers from agro-dealers or markets, largely because of poor rural infrastructure and far distances.

Following the rise in exchange rate against the Naira, the price of mobile phones has tremendously risen, placing them beyond the reach of resource-poor farmers. Several empirical evidence have shown that resource-poor farmers have a highly limited access to credit (Salifullahi & Haruna, 2012; Okojie et al., 2010) which could restrict their access to mobile phones and other tehcnologies. In the case of GESS, high cost of mobile phones could hinder the transmission of information among the participants. Poor state of infrastructure has remained a feature of many rural areas in Nigeria (Ekong, 2013). Poor road networks have marred the movement of goods and humans in these areas and consequently have produced adverse effects on agricultural production. Digital literacy is low in Africa especially among the aged who dominate agricultural production in this region. Since many of them are not conversant with the use of mobile phones especially smart phones which have flooded the Nigerian markets, their use may be hampered. The Nigerian power sector is described as ailing and this has led to erratic and often no power supply in most rural areas. Many of these farmers may not afford the cost of alternative power supply due to their financial status and hence will have their phones not powered always. This could lead to late receipt and response to useful and urgent agricultural information.

It has been observed that most of the messages on agrochemicals in particular received by the farmers do not come with directions on use. As chemicals they are, failure to use them in the recommended way may produce counter effects. The assumption is always that farmers can use them which may not be true. Empirical evidence abounds on the misuse of agro-chemicals by farmers in developing countries.

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Table 3: Distribution of GESS farmers according to constraints to use of e-wallet

Constraints	% (*)
High cost of inputs	89.58
Poor transportation network	87.50
Bureaucratic bottlenecks	85.41
High cost of mobile phones	83.33
Poor ability of farmers to perform operations related to e-wallet	82.91
Inadequate knowledge of the use of mobile phones	82.50
Profiteering	79.19
Difficulty in the redemption of inputs	78.33
Erratic power supply	71.25
Poor communication network	70.41
Inadequate supply of inputs (type and quantity)	65.41
Inadequate information on the use of inputs	50.00
Far distance from redemption centers	45.83
Language barrier	36.67
Late arrival of inputs	34.58
Non-receipt of e-wallet alert on farmers' phones	24.16
Unpleasant attitude of agro-dealers and GESS staff	22.08
Diversion of inputs	10.41

Source: Field Survey Data, 2017; * Multiple Response

Test of hypothesis

The four functional forms of linear, exponential, double-log and semi-linear functions were tested. The linear function was taken as the lead equation because it had the highest number of significant variables, the largest F-value and adjusted R^2 value. The regression result in Table 4 shows that there were statistically significant relationships ($F = 39.44$) at $P \leq 0.05$ between the use of e-wallet and the socioeconomic characteristics of the farmers. The R^2 value shows that the socioeconomic characteristics of the farmers accounted for about 69% in the variation of the use of e-wallet by the farmers. The significant variables were age ($t = 3.170$), educational level ($t = 2.812$), farm size ($t = 3.020$), monthly income ($t = 4.721$), farming experience ($t = 4.115$), extension visit ($t = 2.326$) and social organization membership ($t = 1.991$).

Age has a positive relationship with the use of e-wallet implying that older farmers are more likely to use e-wallet than younger ones. This could be attributed to the dominance of older farmers in the farming business as a result of the out-migration of younger ones to cities. FAO (2010) noted that this will affect the availability of agricultural labour in rural areas. Educational level also has a positive relationship with the use of e-wallet. Literate farmers are more likely to adopt agricultural innovations perhaps due to their innovativeness and cosmopoliteness. Besides, they have access to wide array of sources of information on agricultural innovations. Abebe et al. (2013) found that agricultural knowledge influenced the adoption of improved potato varieties in Ethiopia. Large farm size may encourage the adoption of innovations since the farmers can afford the cost of the innovations. Mariano et al. (2012) stressed the importance of farm size in the adoption of modern rice technologies and good management practices in the Philippines. Often, adoption of agricultural innovations is a function of access to finance on the side of the farmer. So, farmers' monthly income will go a

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long way in encouraging them to adopt technologies. Extension visit is another useful variable in the adoption of innovations. A study by Nmadu et al. (2015) identified contact with extension personnel and access to credit as factors influencing the adoption of innovations by cocoa farmers in Ondo State, Nigeria.

Table 4: Regression result showing the relationship between socioeconomic characteristics of the farmers and their use of e-wallet.

Exploratory variables	Linear Function	Semi-linear function	Double-log function	Exponential function
Constants	39.333	12.777	16.111	21.312
Adjusted R^2	0.67	0.54	0.50	0.51
No. of observation	240	240	240	240
F-value	39.44	33.22	30.11	34.00
Sex (X_1)	0.801(1.383)	0.004(0.173)	0.000(1.971)*	0.470(1.210)
Age (X_2)	0.004(3.170)**	0.000(6.050)**	0.002(2.211)*	0.065(7.134)
Educational Level (X_3)	0.001(2.812)**	0.242(0.442)	0.003(2.229)*	0.005(7.134)**
Occupation (X_4)	0.610(1.289)	0.001(4.095)**	0.002(2.112)	0.001(-1.211)
Farm Size (X_5)	0.003(3.020)**	0.030(0.137)	0.0413(2.164)	0.008(3.448)**
Monthly income (X_6)	0.002(4.721)**	0.000(0.468)	0.903(1.592)	0.086(2.510)*
Farming experience (X_7)	0.001(4.115)**	0.000(3.444)**	0.001(3.000)*	0.001(2.118)*
Extension Visit (X_8)	0.004(2.326)*	0.001(-5.012)**	0.624(1.412)	0.000(1.013)
Social Organization membership (X_9)	0.003(1.991)*	0.401(-1.224)	0.700(1.300)	0.330(1.85)

Source: Field Survey Data, 2017 * = t significant at 5%, ** t significant at 10%

CONCLUSION AND RECOMMENDATION

Introduction of e-wallet scheme has improved the distribution of agricultural inputs in Nigeria and has thus contributed meaningfully to agricultural development. In Imo State as the findings revealed, it has succeeded in the effective distribution of some farm inputs mainly crop-related. It offered the farmers the opportunity of diversifying their enterprises and increasing their farm productivity and hence income. However, the success was impaired by some constraints. From these findings, it was therefore recommended that:

1. Innovative strategies for supplying farmers with farm inputs should be tried. Example is giving farmers inputs ahead of growing season on credit and allowing them to pay after harvest. This will enable farmers to obtain an adequate supply of inputs and on time too.

2. Loan and credit schemes should be revitalized. This includes revamping the moribund agricultural banks and extending them to rural areas. Also, stringent conditions attached to obtaining loans should be reviewed.

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3. Communication infrastructure should be made available in the rural area. Public communication infrastructure should be provided in these areas so that farmers can access the services at lower costs.

4. Digital literacy programmes should be organized regularly in rural areas to boost rural people's use of mobile phones and other related gadgets.

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