Journal of Community & Communication Research
ISSN: 2635-3318
Volume 6, Number 1, June 2021
Pp. 61-68

Socioeconomic Influence on Smallholder Crop Farmers' Use of Electronic Input Marketing and Distribution System in Imo State, Nigeria

Accessible at: https://jccr.sccdr.org.ng

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Review Process: Received: 06/06/21 Reviewed: 08/06/21 Accepted: 15/06/21

ABSTRACT

This study analyzed the influence of socioeconomic attributes of smallholder farmers to utilize electronic input marketing systems in Imo State. Data for the study were obtained from 240 farmers using structured questionnaire selected through a multi-stage sampling procedure. Frequency distribution, %age score, mean score, standard deviation and Ordinary Least Square (OLS) multiple regression model were used to analyze the collected data. The results indicated that majority (56.7%) of the farmers were males with average age of 48years and primary school education qualification (26.1%). The average farm size of the farmers was 1.7 hectares withN35,500 monthly income. The average farming experience was 18 years, while majority (73.3%) of the farmers had no contact with extension. In terms of Social Organization Membership, the result showed that 72.1% of the farmers had no membership. Furthermore, the farmers were capable of performing 3 out of 7 electronic input marketing operations understudied, namely: operations included: knowledge of Sharing android applications (M = 2.4), tuning into TV and radio channels (M = 2.3) and downloading online media contents (M = 2.2).The coefficient of age (t = 3.170), farm size (t = 3.020), educational level (t = 2.812), monthly income (t = 4.721), farming experience (t = 4.115), extension visit (t = 2.326) and social organization membership (t = 1.991) indicated that farmers' socioeconomics positively and significantly influenced the use of electronic input marketing in Imo State. The study concluded that smallholder farmers' socioeconomic attributes determine smallholder farmers' use of electronic input marketing systems in Imo State, and therefore recommended the use of local content electronic input distribution system to enable farmers relate and communicate effectively.

Keywords: Electronic input marketing system, smallholder farmers, ICT, Imo state

INTRODUCTION

The agricultural workforce in Nigeria is dominated by smallholder farmers who produce bulk of the food crops in the country (Kponmwosa, 2016). Thus, the status of the smallholder farmer directly affects food crops' productivity positively or negatively. So far, much of the empirical indicators suggest a negative influence. For instance, Nnadi and Anaeto(2013) remarked that poverty in Nigeria remains a rural phenomenon where majority of the smallholder crop farmers are domiciled. Ani (2004) observes that among the socioeconomic specifics of smallholder farmers their poverty characterization perpetually incline them to subsistence production.

Sequel to the above, smallholder farmers have been generally referred to as persons who cultivate small varieties of food crops in small piece of land. Precisely, Nyambo*et al.,(*2019) characterize them as farmers who cultivate less than 5 hectares of farm land. In terms of labour mobility, smallholder farmers deploy family labour to carry out production and management activities. In addition to limiting their access to land, capital, labour and entrepreneurial skills, poor socioeconomic disposition of smallholder farmers undermines their access to production inputs like improved seeds, seedlings, fertilizer, agrochemicals. Ani, 2004; Okoroma *et al.* 2015; Okere (2019) found the sex of smallholder farmers in Nigeria highly skewed towards the female gender, especially those within their productive age brackets. They are largely poorly educated, low income earners, poor utilizers of agricultural information and technologies. Akinwumi(2013)noted that in most cases smallholder farmers are helpless in the face of these unfavourable socioeconomic dispositions and resultantly predisposed to the use of crude production methods and low productivity; relying on rain-fed farming system; using local farm implements as well as lacking access to timely agricultural information.

Input delivery systems implemented by successive governments for procuring and distributing inputs in Nigeria had deployed different public domain frameworks with very limited success to show for it. Rabiu (2012) attributed the limited success on the failure of public input distribution system to leverage the efficiency and flexibility of electronic channels in facilitating input delivery to farmers. The e-Wallet scheme of the Growth Enhancement Support Scheme (GESS) of the Federal Government deployed to provide efficient and transparent system for the purchase and distribution of agricultural inputs based on a voucher system sent to farmer's Mobile phones was short-lived, and as such, did not provide adequate insight into the relationship between farmers' socioeconomics and utilization of electronic input distribution system.

Electronic channels potentially available for use in farm input marketing and distribution system include mobile phones, internet, television, radio, Interactive Voice Response (IVR) platforms, prerecorded audio and video contents, social media network platforms, online newspaper, audio books, blog pages, U-tube, among other electronic platforms where sellers of agricultural input meet buyers. It is expected that smallholder farmers' access to agricultural inputs using user-friendly android and or web-based applications and developed by independent application software developers will enable the farmers access cost-effective means of locating agricultural inputs, negotiating product pricing, requesting product composition, delivery channel, among other user needs. Additionally, the applications can be programmed in different languages including in local dialects thereby enabling farmers hitherto constrained by literacy to communicate and access inputs. Some of these electronic input delivery sources include radio and television advertisements. It is logical to believe that the high poverty status of smallholder farmers can undermine or limit their access to electronic channels for onward input marketing. This narrative is already changing by the increasing access to mobile phones. Ifeanyi-Obi and Ibiso (2020) observed that with the advent of mobile phones, agricultural communication is experiencing major changes, thereby increasing the potentials of deploying electronic input marketing system. The report explained that the increasing trend is moving many farmers hitherto excluded from the information space into the information cycle. Unfortunately, not much is known regarding if and how the smallholder farmers' use and limits to his access It remains Hence, the study was designed to ascertain the extent socioeconomic attributes like age, education, income level, household size, among other variables

promote or hinder smallholder farmers from obtaining information agricultural inputs for greater productivity in Imo State.

Objectives of the Study

The study broadly analyzed effects of farmers' socio-economic attributes on the use of electronic input marketing systems in Imo State. The specific objectives of the study include to:

(i) describe socio-economic characteristics of the smallholder farmers;
(ii) ascertain farmers' capabilities in the use of electronic input marketing system;
(iii) Assess the effects of farmers' socio-economic attributes on the use of electronic input marketing systems.

METHODOLOGY

The study was carried out in Imo State, Nigeria. The State is located in the rainforest agro-ecological region of Nigeria. Imo State is made up of 27 Local Government Areas (LGAs) and three (3) agricultural zones of Owerri, Okigwe and Orlu zones. The State lies within the tropical rainforest ecological zone with annual rainfall variation of 1,990mm-2,200mm; mean annual temperature above 20°C and average annual relative humidity of 75% to 90%. Agriculture constitutes the major economic activity of the people of the State, justifying the need to increase farmers' access to timely and quality input. The main crops grown in the area include cassava, cocoyam, yam, maize, melon and vegetables (green, fluted pumpkin, water-leaf, bitter leaf (Imo-ADP, 2015).

The population of the study consisted of all farmers in the State who own electronic gadgets that can access electronic information. Data for the study were obtained from 240 respondents selected through multistage sampling procedure using structured questionnaire. In the first stage, 4 LGAs were purposively selected from each of the 3 zones in the State based on their proximity to urban centers. Two communities were selected at random in the second stage to give 24 communities. In the third stage, 2 villages were purposively selected based on their access to electricity and proximity to telecommunication mast, which gives 48 villages. In the final stage, 5 crop farmers with less than 5 hectares farm size (smallholders) were purposively selected on the basis of their ownership of electronic devices that can access electronic information to give a total sample size of 240 respondents. Objective I was achieved using frequency distribution %age count. Mean score analysis and standard deviation were used to achieve objective II, while Ordinary Least Square of multiple regression (OLS) was used to achieve objective III.

The mean score was obtained by adding up the weighted values and dividing by the number of scales. The values of the Likert scale rating were added together and then divided by the number of scales to obtain the discriminating index (e.g 3+2+1/4 = 2.0). Hence the discriminating mean index was taken as 2.0 and above for affirmative response and less 2.0 for negative response.

To determine the relationship between the socioeconomic attributes of smallholder farmers and their use of electronic input marketing systems, Ordinary Least Square multiple regression analysis was performed in four functions. The lead equation was selected on the basis of having the highest value of coefficient of multiple determination (R^2), highest number of significant variables and highest F-value. The OLS model is stated implicitly as follows:

$$Y = \int(X_1, X_2, X_3. X_4, X_5, X_6, X_7, X_8, X_9, e) \quad (1)$$

Where,

Y	=	Use of electronic input marketing systems (measured as weighted mean of farmers capabilities to use electronic input marketing systems)
X_1	=	Sex (dummy; male = 1, female = 0)
X_2	=	Age (years)
X_3	=	Education (No formal education = 1, Primary education = 2, Secondary education = 3, tertiary education = 4).
X_4	=	Farm size (hectares)
X_5	=	Monthly income (Naira)
X_6	=	Farming experience (years)

X_7 = Extension contact (number of extension visit in a year)
X_8 = Membership of farmers organization (dummy; Member = 1, non-member = 0).
e = Error term

RESULTS AND DISCUSSIONS

Socioeconomic attributes of smallholder farmers

Table 1 is the distribution of farmers by their socioeconomic characteristics.

Sex: The result showed that 56.7 % of the farmers were males, suggesting that the male gender had greater access to electronic devices that can access electronic information. As such, they were more favourably disposed to utilize electronic input marketing systems than their female counterpart.

Age: The mean age of the farmers was 48years, which portrays them as persons within their productive age, who are more likely inclined to explore innovative means of procuring agricultural inputs, such as through electronic input marketing systems.

Educational Level: From the result, 26.1% representing majority of the farmers were primary school education qualification holders, thereby portraying them as literate farmers. Ani (2007)asserted that literacy increases farmers' awareness and their tendency to try out and adopt innovations. By this assertion, it is safe to say that the farmers will most likely utilize electronic input marketing system.

Farm size: The average farm size of the farmers this was 1.7 hectares which strongly describes them as smallholder farmers who cultivate less than 5 hectares of farm land. Nyambo*et al.* (2019) opined that smallholder farmers' limited use of farm inputs is capable of dissuading them from using electronic inputs marketing system.

Monthly Income: The result indicated that the average monthly earning of the farmers was ₦35,500, slightly placing them above the revised national minimum wage benchmark of ₦ 30,000. By this income status, it could be argued that smallholder farmers can afford to use electronic input marketing channels.

Farming Experience: In terms of farming experience, the result indicated that the farmers had average experience of 18 years, which portrays them as being experienced enough to make effective decision regarding the use of electronic input marketing system. This is because, experience as opined by Nnadi and Amaechi (2007) brings more knowledge and specialization that increase farmer's rationality in the use an innovation.

Extension Visit: The result revealed that majority(73.3%) of the farmers had no contact with extension. This is in agreement with Asiabaka (2012) that smallholder farmers rarely get access to extension services, and as such, may not be favourably disposed towards innovative practices disseminated by extension, such as the use of electronic input marketing system.

Social Organization Membership: From the result, 72.1% of the farmers were not members of any social organization, thereby suggesting that the farmers had poor access to social capital that could enable them garner knowledge and experiences on innovative ways of improving productivity, such as through the use of electronic input marketing channels.

Table 1: Distribution of smallholder farmers by socioeconomic characteristics

Socio economic characteristics	Frequency	%age	Mean
Sex			
Male	104	43.3	
Female	136	56.7	
Total	**240**	**100**	
Age (Years)			
20-30	19	7.9	
31-41	49	20.4	
42-52	86	35.8	48years
53-63	77	32.1	
64-74	9	3.8	
Total	**240**	**100**	
Educational attainment			
No formal education	13	5.4	
Primary school uncompleted	19	7.9	
Primary school completed	63	26.3	
Secondary school uncompleted	30	12.5	
Secondary school completed	52	21.7	
Higher institution uncompleted	17	7.0	
Higher institution completed	46	19.2	
Total	**240**	**100**	
Farm Size in hectares			
0.5 - 1.0	66	27.5	
1.1 - 1.6	39	16.3	
1.7 - 2.2	68	28.3	
2.3 - 2.8	36	15	1.7 hectare
2.9 - 3.4	20	8.3	
3.5 - 4.0	9	3.8	
4.1 and above	2	1.0	
Total	**240**	**100**	
Monthly Income(₦)			
5000 – 25000	134	55.8	
26000 – 46000	50	20.8	
47000 – 67000	25	10.4	
68000 – 88000	10	4.2	
89000 – 109,000	9	3.8	
110000 – 131000	3	1.3	N35,500
132000 – 152000	2	1	
153000 – 173000	4	1.7	
174000 – 194000	1	0.4	
195000 – 215000	2	0.8	
Total	**240**	**100**	
Farming Experience			
1 – 10	68	28.3	
11 – 20	92	38.3	
21 – 30	62	25.8	18 years
31 – 40	18	7.5	
Total	**240**	**100**	
Extension Visits			
No visit	176	73.3	
Once	47	19.6	
Twice	17	7.1	
Total	**240**	**100**	
Social organization			
Members of social organizations	67	27.9	
Non Members of social organizations	173	72.1	
Total	**240**	**100**	

Source: Field survey data, 2018

Smallholder farmers' capabilities to use electronic input marketing systems

Table 2 is the distribution of smallholder farmers by their capabilities to use electronic input marketing systems. Using a discriminating index of 2.0 and above for affirmative response and less 2.0 for negative response, the result indicated that out of the 7 electronic input marketing operations understudied, the farmers indicated capability in performing three operations. These include: knowledge of Sharing android applications (M = 2.4), tuning into TV and radio channels (M = 2.3) and downloading online media content (M = 2.2). The average mean score of 1.9 implied generally indicates that though the smallholder farmers had access to electronic devices that could access electronic information, they were not capable of using electronic input marketing system. This was reinforced by the average standard deviation of 0.3 that showed that the farmers were homogenous in their response regarding their incapability. Meanwhile, farmers' capabilities in sharing applications and downloading online media contents were consistent with the observation of Okoroma *et al.* (2015) that the advancement in ICTs is changing and improving the way and abilities of farmers to access agricultural information. These capabilities also showed the extent farmers have moved into the digital age. In the same vein, the ability to tune into TV and radio channels for input delivery information confirms the traditional role of radio and television in facilitating farmers' use of electronic channels in meeting their information needs.

Table 2 Distribution of smallholder farmers by knowledge of use of electronic input marketing system

	Electronic input marketing processes	Highly capable	Partially capable	Not capable	Mean	SD
1.	Using search engine	121	67	52	1.8	0.3
2.	Downloading online media content	102	73	65	2.2*	0.3
3.	Subscribing to online channels	70	98	72	1.9	0.2
4.	Dialing prescribed input codes	10	30	200	1.2	0.2
5.	Using ewallet payment system	31	57	152	1.5	0.4
6.	Tuning into TV and radio channels	105	110	25	2.3*	0.4
7.	Sharing android applications	132	76	32	2.4*	0.4
	Average				**1.9**	**0.3**

Source: Field survey data, 2018 M ≥2.0 (knowledgeable) M<2.0 (not knowledgeable)

Influence of socioeconomic attributes on smallholder farmer's use of electronic input marketing system

The result of the multiple regression analysis as presented in Table 3 revealed that the Linear function gave an R^2 value of 0.77 which implied that about 77.0% of variation in the use of electronic input marketing channels by smallholder farmers was accounted for by the socio-economic characteristics of farmers investigated, while 23 % must have been accounted for by factors not investigated. Further, the Linear function produced F-value of 39.444 which was significant at 1% level, indicating that the linear function gave a nice fit to the data.

The coefficient of age (t = 3.170), farm size (t = 3.020), educational level (t = 2.812), monthly income (t = 4.721) and farming experience (t = 4.115) were positive and significant at 1%. This expresses them as determinants of smallholder farmers' use of electronic input marketing system in the study area. Similarly, the coefficient of extension visit (t = 2.326) and social organization membership (t = 1.991) were positive and significant at 5%, thereby expressing them as influential variables in the use of electronic input marketing in Imo State.

Implicitly, for effective agricultural policies and intervention programmes aimed at distributing agricultural inputs to farmers through electronic means such efforts should essentially target at leveraging the age, farm size, educational level, monthly income, farming experience, extension visit and social organization membership of the farmers. For instance, Onwumere (2008) noted that productivity of farmers increases with age, reaches some mid age, peak and decreases with further age, implying that such programmes should be targeted for farmers within their mid and

peak productive age. Rather than target individual farmers, electronic input marketing system will record more impact when smallholder farmers are aggregated into co-operative societies. Besides given smallholder farmers access to social capital, farmers when they form co-operatives aggregate their hitherto negligible individual resources into a considerable strength that enables them exploit economics of scale and garner strategic business ideas for greater productivity.

Table: 3: Relationship between the socioeconomic characteristics of farmers and the level of use of e-wallet by farmers in Imo state

Variables	Linear function	Double-log Function	Semi-log function	Exponential Function
Constant	39.333	12.777	16.111	21.312
R^2	0.77	0.54	0.50	0.51
F-value	39.444	33.22.	30.11	240
Sex (X_1)	0.801(1.383)	0.004(0.173)	0.000(1.971)*	34.00
Age (X_2)	0.004(3.170)**	0.000(6.050)**	0.002(2.211)*	0.470(1.210)
Educational level (X_3)	0.001(2.812)**	0.242(0.442)	0.003(2.229)*	0.065(7.134) **
Occupation (X_4)	0.610(1.289)	0.001(4.095) **	0.002(2.112)	0.005(4.130) **
Farm size (X_5)	0.003(3.020)**	0.030(0.137)	0.413(2.164)	0.001(-1.211)
Monthly income(X_7)	0.002(4.721)**	0.000(0.468)	0.903(1.592)	0.008(3.448) **
Farming experience (X_8)	0.001(4.115) **	0.000(3.444) **	0.001(3.000)*	0.086(2.510)*
Extension visit (X_9)	0.004 (2.326)*	0.001(-5.012)**	0.624(1.412)	0.001(2.118)*
Membership of social org (X_{10})	0.003(1.991) *	0.401(-1.224)	0.700 (1.300)	0.000(1.013)

Source: Field survey data, 2018. * t – ratio significant at 5% probability level. ** t – ratio significant at 1% probability level. Figures in parenthesis are t-values

CONCLUSION AND RECOMMENDATIONS

The study concluded that more male farmers had access to electronic input marketing channels. Majority of the farmers who were favourably disposed towards electronic input marketing systems were within their productive age. The farmers were literate and lived on a monthly income that is slightly above the national minimum wage benchmark. Though the farmers had access to devices that can access electronic information, they were generally incapable of using the channels. Age, farm size, education, monthly income, farming experience, extension visits and social organization membership determined whether a smallholder farmer will use electronic input marketing system or not in Imo State. Hence, it is recommended that:

- Local contents media should be incorporated in electronic input system to enable local farmers see the medium as authentic and reliable source of input marketing , and ultimately use it.
- Extension agencies should upscale the deployment of electronic media communication channels in delivering services to farmers as it is more efficient
- Electronic input delivery system should predicate on the socioeconomic realities of the target farmers. That is, the use of bottom-top approach should be applied to the later when designing, implementing and evaluating electronic input distribution system.
- Capacity building trainings should be mounted as part of innovation dissemination programme as to enhance the technical capabilities of the farmer to adopt and use such innovation.

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