NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 52 Number 3, December 2021 Pg. 339-344
Available online at: http://www.ajol.info/index.php/naj
https://www.naj.asn.org.ng

DETERMINANTS OF USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AMONG ACTORS WITHIN THE CASSAVA VALUE CHAIN IN ANAMBRA STATE, NIGERIA

[1]Olaniyi, A.I and [2]Enwelu, I.A.
[1]National Root Crops Research Institute, Umudike
[2]Department of Agricultural Economics and Extension, Nnamdi Azikiwe University, Awka
Corresponding Author's email: abiodun.olaniyi@yahoo.com

Abstract
The study assessed influence of socio-economic characteristics of cassava value chain actors (farmers, marketers, processors, and consumers) on use of ICT in Anambra State. A multistage random sampling technique was used to select 319 respondents for the study. Data used for this study were from primary sources collected with the aid of a well structured questionnaire and interview schedule. The data collected were analyzed using descriptive statistics, mean from likert scale and multinomial logistic regression. The result indicated that majority (70.6%) of the respondents had one form of education or the other, age (72.2%) ranged between 31-50 with 46.7% married and males (60.2%). The result revealed that mobile phone, radio, television, computer and internet were the types of ICT tools often utilized by the respondents. The result also showed that major constraints to the use of ICT perceived by the actors were erratic power supply, poor networks coverage, inadequate ICT training centre, high cost of ICT facilities. The result revealed that some of the items were accepted (age, educational qualification, farming experience, cost of ICT equipment, cost of ICT maintenance and government policies) by the respondents as factors influencing use of ICT. The results of multinomial logistic regression analysis on level of use of ICT revealed that coefficients of education (X_4) were positive and significant at 5% significant level for farmers' group (1.097); marketers' group (1.112) and consumers' group (1.051) and the coefficients of farming experience (X_6) were positive and significant at 5% significant level for farmers (1.008); processors (1.07); marketers (1.033) and consumers (1.052). It implies that education and faming experience led to increase in the use of ICT in the study area. It is therefore recommended that farmers, consumers, processor and marketers should endeavor to make judicious use of the ICT tools in order to get reliable information on new innovation that will help them increase their production and income.

Keywords: ICT, socioeconomics characteristics and cassava value chain actors

Introduction

Cassava (*Manihot esculenta*) is a staple crop of choice across cultures and social divides in Nigerian households, widely eaten by all; though processed differently. The majority of the root produced is consumed locally as traditional meals, while small fraction of cassava output in the country is produced for commercial use in the livestock feed, ethanol, textile, confectionery and food industries (Droppelmann, 2018). It is the most important crop by production, second most important by consumption (Sahel, 2016) and largely cultivated by small-scaled farmers that depend on seasonal rainfall (Ganeshkumar, Pachayappam and Madanmohan, 2017). According to Mukherjee and Maity (2015), ICT is an umbrella term that includes any communication device or all communication technologies including; radio, television, cellular phones, computer and network hardware and software, satellite systems etc., with the various services and applications connected with them, such as videoconferencing and other media applications and services enabling users to access, retrieve, store, transmit, and manipulate information in a digital form. It also consists of a wide range of technologies starting from radio, television and telephone to modern technologies like mobile phone, multimedia, internet and satellite based communication systems. They consist of the "old" ICT of radio, television and telephone, and the "new" ICT consist of computer applications, satellite and wireless technology and the internet. Value chain is a set of activities that a firm performs in order to deliver a valuable product or service for the market (De Marchi *et al.,* 2018). Along the chain, value is added which give such product a competitive advantage in terms of quality and attracting a higher price at the market (Gereffi, 2018). In other words, value chain is a series of activities or processes that aims at creating and adding value to an article

(product) within it; analysing the opportunity cost of the new sequence along the product worth (Lee, Park, Shin, Sreenan, and Yoo 2018). Value chain is an enhancement of product chain from production to end-users and along the chain; value is added (Wen-Lung, Yogesh and He-Hong 2018). Cassava can be transformed into a considerable number of commodities varying from conventional and innovative food products, to livestock feedstuffs, These are some of cassava value added; cassava root fritters, cassava groquettes, cassava root doughnuts, cassava crisps, cassava pancake, cassava meat cake, cassava French fries, cassava chaps, steamed cassava with fish and groundnut, cassava relish, 100% cassava bread, composite flour bread (wheat 90% and cassava 10%), cassava meat pie, cassava sausage rolls, cassava doughnuts, cassava *chinchin*, cassava egg rolls, cassava threads, cassava fritters, cassava fingers, cassava flakes (crackers) and cassava salad cream, ethanol and starch and its many derivatives. The actors assessed are: farmers/producers, processors, marketers and consumers.

Methodology

Study area

The study was carried out in Anambra State, South-East geopolitical Zone of Nigeria. The indigenous ethnic groups in Anambra State are the Igbo (98% of population) and a small population of Igala (2%); who live mainly in the North-West part of the State. It is made up of 21 Local Government Areas, located between latitude 5º 32^{1} and 6º43^{1}N and longitude 6º43^{1}and 7º22^{1}E within the Greenwich meridian (Chukwuma, Orakwe, Anizoba and Manumehe, 2016). The area has a mean temperature of 30ºC during the hottest period (January) and 21ºC during the coldest period (July). The State has two distinct seasons; dry and rainy seasons. The annual average rainfall is between 2000mm to 2300mm and distributed through March to November. The mean annual sunshine intensity is 5.2 hours and the relative humidity is 28.2m^{3} (Nigeria Meteorological Agency (NIMET), 2016). Anambra was created on 27 August 1991 and according to National Population Commission (NPC, 2006), the population was estimated to be 4,055,038 with density of 846/km^{2} (2,200/sqm) and total land mass of 4,854km^{2} (NPC, 2006). Anambra is rich in natural gas, crude oil, bauxite, and ceramics and has an almost 100% arable soil (Anambra State, 2018). Agriculture is the State is predominantly in rural areas one of the highest producers of cassava in Nigeria (Wossen, 2017).

Sampling and Data Collection

Multistage sampling procedure was adopted; in the first stage, three agricultural zones (Aguata, Awka and Anambra Agricultural Zones) in Anambra State were selected. At the second stage, two Local Government Areas (LGAs) were randomly selected from each of the Zones: Aguata Zone-Orumba North and Orumba South; Awka-Awka North and Awka South; and Anambra-Anambra East and Anambra West. At stage three, a list of town communities in each LGA was compiled and random selection of two communities from each of the six LGAs was made. Also, with the help of contact farmers in the selected communities, a list of 20 producers; 10 processors (small and medium processors); 10 marketers and 20 consumers were compiled based on the villages/clans in the town communities. At the fourth stage; from the list, a random selection of 109 producers (farmers), 54 processors (small, medium and or large scale processors), 56 marketers and 100 consumers was performed across the selected communities. This gave rise to a sample size of three hundred and nineteen 319 respondents.

Method of Analysis

The data collected were analyzed with the use of descriptive statistics and multinomial logistic regression.

Model specification

The multinomial logistic regression equation implicitly specified as follows:

$$\Pr(Yi=j) = \frac{e^{Bixij}}{1+\sum_{m=1}^{4} e^{Bixij}} \quad J=1, 2, 3, 4.$$

$$\Pr(Y=0) = \frac{e^{Bixij}}{1+e\sum e^{Bixij}} \quad \ldots\ldots\ldots\ldots 1$$

$$\frac{\delta pj}{\delta Xi} = Pj(Bij - \sum PjBij)$$

This model can be transformed to;

$Yi = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8)$

$Yi = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_{8+} e$

Where;

(Yi=j) = Probability of a particular value chain actor.

β_i or β_0–β_8 = Vector of the estimated parameters

j = Number of available enterprise options

m = level of the available enterprises (number)

Xi = Vector of the predictor (of the ith explanatory variable)

$Y_{i=1\ldots4}$ = Cassava value chain actors output (i=farmers =1, marketers =2, processors =3 and consumers = 4

X_1 = Age (yrs)

X_2 = Sex (dummy variable; 1=male, 0=female)

X_3 = Martial status (dummy variable; 1=married, 0=otherwise)

X_4 = Educational level (yrs)

X_5 = Household Size (number of persons)

X_6 = Farming experience (yrs)

X_7 = Labour hands (number)

X_8 = Cost of equipment (naira)

β_o = intercept

β_1–β_8 = parameter estimates

e = error term

Results and Discussion

The results of the analysis of the socioeconomic characteristics of the cassava value chain actors are presented in Table 1. Table 1 shows that greater proportion of the respondents (43.3%) were within the age range of 21-40years, followed by 41-50years (29.2%), while the least were less than 21 years (4.4%),

with mean age of 38years. This analysis presents a picture of heads of farming households that are predominantly within the productive and economically viable age. This study is similar with Nuer (2018) who reports that ICT is considered to entice the youth to engage in agribusiness and make agriculture more attractive to them. Majority (60.2%) of the respondents were male-headed, while female accounted for 39.8%. This implies that male have higher access to productive resources such as land. This finding concurs with result of Machina and Lubungu (2018) who report that male-headed households have higher access to productive resources and information that increases the chances of using ICT in farming. About 46.7% of the respondents were married, followed by single (42.0%), while the least were divorced (2.2%). Economic imperatives of family responsibility may be the driving force behind married person participating in the cassava value chain production, the mass unemployment may also account for unmarried persons going into cassava production in the presence of lack of paid employment worsened by the effects of COVID-19 pandemic. This result is in line with the observation of Nwokoro and Chima (2017) that larger percentage of married persons can be attributed to the high patriarchal orientation in rural settings which tends to give married individuals an edge over unmarried ones such that unmarried men and women are denied some entitlements to rural assets like land and livestock which constitute essentials of their livelihood. Greater proportions (43.6%) of the respondents were FSLC holders followed by those with no formal education (25.4%) and the least were M.Sc/Ph.D holders (1.6%). The mean of educational attainment was 7.0. This implies that majority of the farming households have basic literacy but may not be said to be adequately educated. Education is a social capital which could impact positively on household ability to take good and informed production decisions. In addition, education is important to manage the farming business and in the utilization of ICT. This finding is similar to the findings of Gautam and Andersen (2017), Naminse and Zhuang (2018) and Igwe (2018) who reported that education and technical training appear to have a positive effect on farmers' use of ICT to boost their production and allow people to adapt more easily to both social and technical changes. Majority of the respondents spent between 1-5 years (69%) in cassava business followed by those between 6-10 years (29.5%) and the least between 11 -15 years (1.5%). The average number of years in cassava business was 5.0. It implies that the more years spent in cassava business, the more the progress. This result concurs with finding of Zhang (2016) who posit that experience in business is vital to its progress. Majority (81.2%) of the respondents had household size of between 1-5 persons, followed by those with household size of between 11-15 (12.5%), while the least was between 16-20 (0.9%). The average household size was 5.0. This is in line with Anate, Balogun, Olubodun and Adejimi (2018) who posit that the small household size could be as a result of yielding effect of awareness on family planning by rural dwellers and benefits of family planning as a valuable tool in helping to space pregnancies, reducing the risks of maternal and child deaths through the use of ICT tools.

ICT utilized by the cassava value chain actors

Table 2 shows ICT used by cassava value chain actors (farmers, processors, marketers and consumers) in the study area. The results show that mobile phone ($\bar{x}$=3.36), radio ($\bar{x}$=2.41) and television ($\bar{x}$=2.39) were the types of ICT tools often utilized by the respondents. Hence, they (ICT tools) offer the opportunity to reach often remote, dispersed and poorly serviced farmers and other actors by overcoming barriers of distance and poor road infrastructure. This finding is consistent with Baumüller (2018), Hudson (2017) and Sousa (2016) who noted that radio and television are among the most widely used media for disseminating information to rural audience across Africa, together with mobile phones, as a result of the increased ownership and widespread use among farmers.

Determinants of use of ICT by cassava value chain actors

The multinomial logistic regression model was fitted and the summary presented in Table 3. The diagnostic results which described the relationship between the dependent and independent variables were also presented. It can be observed that the chi square statistic values were 214.24 with a correspondingly probability of p-value < 0.05. This confirmed adequacy of the model and implies that at least most of the coefficients of the explanatory variables were significant. The strength of the model was also tested using McFadden. The McFadden value was 0.56 which translated into 56%. This implies that 56% of variations in the dependent variables were explained by the independent variables in the model. Cox and Snell and Nagelkerke R squares on the other hand indicate that 54% and 67% of the variation in the model is explained by the explanatory variables fitted. With regards to the selection of the reference group, farmer group was chosen as a base group. Four logit models were fitted. The results show that the coefficient of age (X_1) was positive and significant at 5% level for farmers' group (0.583). It implies that increase in age of the farmers using ICT resulted to likelihood increase of their output. This is in line Nuer (2018) who reported that ICT is considered to entice the youth to engage in agribusiness and make agriculture more attractive to them. The coefficient of sex (X_2) was positive and significant for farmers' group (1.008). It implies that male farmers are more likely to increase use of ICT and their output than their female counterparts. The coefficients of education (X_4) were positive and significant at 5% significant level for farmers' group (1.097); marketers' group (1.112) and consumers' group (1.051). It implies that with an increasing in the number of years spent in school, there is likelihood that actors (farmers' group, marketers' group and consumers' group) using ICT can translate to increase in their output. This finding is similar to the findings of Gautam and Andersen (2017), Naminse and Zhuang (2018) and Igwe (2018) who reported that education and technical training appear to have a

positive effect on farmers' use of ICT to boost their production and allow people to adapt more easily to both social and technical changes. Furthermore, the coefficients of household size (X_5) were positive and significant at 5% significant level for processors (1.078); marketers (1.024) and consumers (1.057). It implies that with an increasing in the number of household size, there is likelihood that actors (processors' group, marketers' group and consumers' group) using ICT led to increase in their output. The coefficients of farming experience (X_6) were positive and significant at 5% significant level for farmers (1.008); processors (1.07); marketers (1.033) and consumers (1.052). It implies that with an increasing number of years in business (experience), there is likelihood that actor (farmers' group; processors' group, marketers' group and consumers' group) using ICT can translate to increase in their output. . This finding is in line with results of Titilope (2017) who reported that ICT uptake in rural areas could be due to some socio-factors such as education, household size, farming experience, health status and cultural differences. The coefficients of labour (X_7) were positive and significant at 5% significant level for farmers' group (1.025); processors 'group (1.224); marketers' group (1.148) and consumers' group (1.175). It implies that with an increasing number of labour hands, there is likelihood that actors (farmers' group; processors' group, marketers' group and consumers' group) will use ICT and increase output. The coefficients of cost of equipment were negative and significant at 5% level of significant for farmers (-1.019); processors (-1.101); marketers (-1.128) and consumers (-1.099). It implies that increase in the use of ICT may result to likelihood decrease in output of actors arising from cost of equipment. This finding is in line with results of Saidu, Mohammed, Adamu and Jibo, (2017) who indicated that inadequate ICT facilities, lack of personnel, insufficient infrastructure are challenges that obstruct successful implementation and use of ICT.

Conclusion

The study assessed influence of socioeconomic characteristics of cassava value chain actors in the use of ICT in Anambra State, revealed that ICT used were mobile phone, radio, television and internet in the study area. The socioeconomic factors influencing use of these IC were education, sex, age, cassava business experience, household size, labour and cost of equipment. It is therefore recommended that farmers, consumers, processor and marketers should endeavor to make judicious use of the ICT tools in order to get reliable information on new innovation that will help them increase their production and income.

References

Anate, B.C., Balogun, M.R., Olubodun, T. and Adejimi, A.A. (2021). Knowledge and utilization of family planning among rural postpartum women in Southwest Nigeria. *Family Med Prim Care*, 10:730-7.

Baumüller, H. (2018). The Little We Know: An Exploratory Literature Review on the Utility of Mobile Phone-Enabled Services for Smallholder Farmers. *J. Int. Dev*. 30: 134–154.

Chukwuma, E.C., Orakwe, L.C., Anizoba, D.C. and Manumehe, A.I. (2016). Spartial Statistics of Poultry Production in Anambra State of Nigeria: a preliminary for bio- energy plant location Modelling. *Nigerian Journal of Technology,* 35 (4): 940-948.

De Marchi, V., Giuliani, E. and Rabellotti, R. (2018). Do global value chains offer developing countries learning and innovation opportunities. *The European Journal of Development Research,* 30 (3): 389–407.

Droppelmann, K. (2018). Cassava, the 21st century crop for smallholders? Exploring innovations along the livelihoodvalue chain nexus in Malawi. Centre for Rural Development (SLE) Berlin, SLE Publication Series: S 274.

Ganeshkumar, C., Pachayappan, M. and Madanmohan, G. (2017). Agri-food supply chain management: literature review. *Intelligent Information Management*, 9:.68–96.

Gautam, Y. and Andersen, P. (2017). Rural livelihood diversification and household well-being: Insights from Humla, Nepal. *J Rural Stud*., 44: 239–249.

Gereffi, G. (2018). A world of global value chains, in Gereffi, G., Ponte, S. and Raj-Reichert, G. (Eds.): Handbook of *Global Value Chains*, Edward Elgar.

Hudson, H.E., Leclair, M., Pelletier, B. and Sullivan, B. (2017). Using radio and interactive ICT to improve food security among smallholder farmers in Sub Saharan Africa. *Telecommunications Policy*, 41(7-8): 670–684. https://doi.org/10.1016/j.telpol.2017.05.010.

Igwe, P.A., Amaugo, A.N. and Ogundana, O.M. (2018). Factors affecting the investment climate, SMEs productivity and entrepreneurship in Nigeria. *Eur J Sust Dev.,* 7: 1–19.

Lee, K., Szapiro, M. and Mao, Z. (2018). From global value chains (GVC) to innovation systems for local value chains and knowledge creation, *The European Journal of Development Research,* 30(3): 424–441.

Machina, H. and Lubungu, M. (2018). Understanding intrahousehold gender disparities of smallholder livestock veterinary in Zambia. *Journal of Gender, Agriculture and Food Security,* 4(20):11–24. https://doi.10.19268/ JGAFS.422019.2.

Mukherjee, A. and Maity, A. (2015). Public-private partnership for convergence of extension services in Indian agriculture. *Current Science*, 109(9):1557-1563.

Naminse, E.Y. and Zhuang, J. (2018). Does farmer entrepreneurship alleviate rural poverty in China? Evidence from Guangxi Province. *PLoS ONE*, 13: 1–18.

Nuer, T. K. A. (2018). Why invest in ICTs for agriculture? (CTA Discussion Paper). CTA. Palmer, T. mAgri programme: Orange Sènèkèla midline (GSMA Report).

http://www.gsma.com/mobilefordevelopment/wp content/uploads/2015/09/ GSMA_Senekela_Midline.pdf.

Nwokoro, C.V., and Chima, F.O. (2017). Impact of Environmental Degradation on Agricultural Production and Poverty in Rural Nigeria. *Am Int J Contemp Res.,* 7: 6–14.

Saidu, A., Mohammed, A., Adamu, S. and Jibo, I. (2017). Application of ICT in Agriculture, *International Journal of Computer Science and Mathematical Theory,* 8(1):8-18.

Sousa, F., Nicolay, G. and Home, R. (2016). Information technologies as a tool for agricultural extension to farmer-to-farmer exchange: Mobilephone video use in Mali and Burkina Faso. *International Journal of Education and Development Using Information and Communication Technology*, 12(3): 19–36.

Titilope, A. O. (2017) Digital Divide and its Socio-Psychological Implications on Rural Dwellers in Nigeria, *International Journal of Innovation in the Digital Economy*, 9(1): 26–34. doi: 10.4018/ijide.2018010103.

Wen-Lung, S., Yogesh, K.D. and He-Hong, L. (2018). Examining the core knowledge on Facebook, *International Journal of Information Management,* 43: 52–63, DOI: 10.1016/j.ijinfomgt.2018.06.006.

Wossen, T., Abdoulaye, T., Alene, A., Feleke, S., Rabbi, I. and Manyong, V. (2017). Assessing the Impact of Improved Cassava Varieties on Food Security and Poverty Reduction in Nigeria. Unpublished report submitted to the Standing Panel on Impact Assessment of the ISPC.

Zhang, Y., Wang, L., and Duan, Y. (2016). Agricultural information dissemination using ICTs:A review and analysis of information dissemination models in China Information Processing in Agriculture,3(1),1729.https://doi.org/10.1016/j.inpa.2015.11. 002.

Table 1: Socioeconomic characteristics of cassava value chain actors in the study area

Variable	Frequency	Percentage	Mean ($\bar{x}$)
Age			
Less than 21years	14	4.40	38.0
21 – 30	52	16.3	
31 – 40	138	43.2	
41 – 50	93	29.2	
Above 50	22	6.90	
Total	**319**	**100**	
Sex			
Male	192	60.2	
Female	127	39.8	
Total	**319**	**100**	
Marital Status			
Married	149	46.7	
Single	134	42.0	
Separated	20	6.30	
Widowed	7	2.20	
Divorced	9	2.80	
Total	**319**	**100**	
Educational Qualification			
No formal education	81	25.4	7.0
FSLC	139	43.6	
SSCE/GCE	72	22.6	
OND/NCE	12	3.80	
B.Sc/HND	10	3.0	
M.Sc/Ph.D	5	1.60	
Total	**319**	**100**	
Household size			
1-5	259	81.2	
6-10	17	5.4	
11-15	40	12.5	
>15	3	1.0	
Total	**319**	**100**	
No of years in cassava business			
1-5	220	69.0	
6-10	83	29.5	
11-15	15	1.5	
>15	1	0.3	
Total	**319**	**100**	

Table 2: ICT utilized by cassava value chain actors

Variables (ICT Tools)	Regularly (%)	Occasionally (%)	Rarely (%)	Total	Sample Size	Mean ($\bar{x}$)
Radio	160(480)	130(260)	29(29)	769	319	2.41
Mobile phone	150(450)	135(270)	34(34)	754	319	3.36
Television	156(468)	130(260)	33(33)	761	319	2.39
Computer	80(240)	70(140)	169(169)	549	319	1.72
Internet	33(99)	100(200)	187(187)	486	319	1.52
Audio Cassette	16(48)	120(240)	183(183)	471	319	1.48
Camera	29(87)	100(200)	190(190)	477	319	1.50
Video recorder	45(135)	105(210)	169(169)	514	319	1.61
Remote sensing	19(57)	100(200)	200(200)	457	319	1.43

Source: Field survey, 2021 *Multiple responses* Cut off mean=2.00

Table 3: Socioeconomic factors influencing use of ICT by cassava value chain actors

	Farmers		Processors		Marketers		Consumers	
Variables	**Coefficient**	**P[\Z\>]**	**Coefficient**	**P[\Z\>]**	**Coefficient**	**P[\Z\>]**	**Coefficient**	**P[\Z\>]**
Age(X_1)	0.583	0.002	0.075	0.624	0.178	0.255	0.213	0.172
Sex (X_2)	1.008	0.003	0.154	0.351	0.238	0.147	0.207	1.581
Marital status(X_3)	0.004	0.164	0.042	0.79	0.206	1.809	0.133	0.382
Education (X_4)	1.097	0.002	0.065	0.506	1.112	0.002	1.051	0.006
Household(X_5)	0.005	0.977	1.078	0.006	1.024	0.004	1.057	0.006
Farming experience(X_6)	1.008	0.005	1.07	0.004	1.033	0.003	1.052	0.004
Labour(X_7)	1.025	0.024	1.224	0.006	1.148	0.005	1.175	0.006
Cost of equipment (X_8)	-1.019	0.003	-1.101	0.003	-1.128	0.001	-1.099	0.002
Multinomial logistic regression								
Number of observations		319						
LR Chi		214.24						
Prob>Chi		0.001						
Log likelihood		867.97						
McFadden		0.56						
Cox and Snell		0.54						
Nagelkerke		0.67						

Source: Computed from Field Survey (2021). [Note] *** p=0.01, ** p=0.05 and * p=0.10