



Effects of Information and Communication Technology (ICT) Usage on Cassava Production in Oturkpo Local Government Area, Benue State, Nigeria

Ajayi, O. J., Muhammed, Y., Olah, F. and Tsado, J. H.

Department of Agricultural Economic and Extension Technology, Federal University of Technology, P. M. B. 65, Minna, Niger State.

Corresponding Author's email address: mohd.yak@futminna.edu.ng

Corresponding Author Phone number: +2348036576697

Abstract

The study analyzed the effects of Information and Communication Technology (ICT) usage on cassava farmers in Oturkpo Local Government Area of Benue state, Nigeria. Primary data was collected from 120 randomly selected cassava farmers using structured questionnaire complemented with an interview schedule. Data collected were analyzed using both descriptive and inferential statistics. The results of the analysis revealed that majority (78.3%) of the farmers were in their middle age with age range of 21-50 years, while 96.8% of the respondents had one form of formal education or the other. The sources of ICT facilities readily available in the area were radio (84.2%), television (64.2%) and mobile phone (90.8%) with the latter being the most relied upon by the respondents. Most of the farmers were aware (98.3%) and had access (95.8%) to these ICT facilities with 61.7% accessing them on daily basis. The dependence on mobile phone and radio were highly relevant in cassava stem selection, land selection, marketing of produce, land preparation, cassava planting technique and processing of tubers. However, coefficient of determination (R^2) indicated an 89.1% variation in the output of cassava farmers explained by the determinant factors included in the regression model. There was a positive and significant relationship between these factors and the output. Therefore, labour, fertilizer and farm size were significant at 1% level of probability, while ICT use was significant at 10%. Further findings showed that finance (78.3%) was the major constraint associated with ICT use. Recommendations were made on strengthening the use of ICT especially contemporary ones like the computer and internet among farmers for easy information sourcing which can boost cassava production output and income.

Keywords: Information and Communication Technology (ICT), Cassava production, ICT facilities

INTRODUCTION

In Nigeria, agriculture remains the largest contributor to the economy after oil, accounting for over 38% of the non-oil foreign earnings and employing a large number of the active labour force of the population (Federal Ministry of Agriculture and Rural Development (FMARD), 2001). Nigeria produces cassava yearly ranging from 30 million to 40 million metric tonnes making her the largest producer in the world. This production output rests on small-scale farmers with farm size ranging from 0.5 to 5 hectares of land. Cassava has been noted over the years to be very important industrially, economically, and nutritionally due to the diverse uses of the roots that is rich in starch (Karim *et al.*, 2009).

The role of public agricultural extension service has traditionally been to provide the important link between agricultural research and farming communities, especially for technology transfer in support of agricultural and rural development. However, strong criticism of public agricultural extension services has circulated in recent years (FAO, 2004). According to Qamar (2002), this criticism is due to its top-down approach, which has been supply-driven, technically weak, catering only for large farmers (progressive farmers) and providing insufficient coverage of the small-scale farmers. This implies that proven agricultural technologies, which are needed to

ensure higher productivity and food security, are not able to reach the millions of small-scale farmers scattered in the rural areas.

Information is a necessary factor in agricultural practices and it is the basis of extension service delivery. It is defined by Adereti *et al.* (2006) as data that have been put into a meaningful and useful context which is communicated to recipient who uses it to make decision. Adereti *et al.* (2006) further stated that the quality of information rests solidly on three pillars which are accuracy, timeliness and relevance. Accuracy implies that information is free from bias; timeliness means that recipients can get information when they need it, while relevance implies whether the piece of information specifically answers the user's question.

The persistent food crisis have occurred in the country partly as a result of high rate of population growth over the food production level and inconsistent amounts of food crops produced (Ani, 2006). Some of the reasons behind these are; low rainfall, deforestation, environmental hazards, continuous cropping and unhindered desert encroachment. However, the use of appropriate technologies by rural farmers would reduce the associated problems. Ugwu (2008) pointed out that the cost of cassava production at farm level is on the high side in Nigeria compared to other countries. The orientation towards production and processing of the crop is mainly subsistent instead of commercial or large scale. As suggested by Erhabor and Emokaro (2007), there has to be a tremendous increase in the current cassava output in the country in order to meet the increasing demand both locally and internationally.

There have been several policy initiatives of the Federal Government manifested through extension system, but the cassava sub-sector has not recorded any significant growth to solve the prevailing food crisis in the country. Producers (cassava farmers) need information for advancement in production. The question now is, to what extent have the farmers adopted the use of improved cassava technologies with ICT? According to Nweke (2004) and Fakayode *et al.*(2008), studies have shown that cassava transformation is the greatest poverty fighter among crops in Nigeria.

There is wealth of knowledge and information on new technologies in agriculture that is yet to be tapped especially in most of the developing countries including Nigeria (Balderama, 2009). Information is vital to effective and efficient performance of tasks and recently, communication and the whole process of processing, storage and dissemination is totally computerized. There must be adequate flow of information regarding effective and efficient cassava production techniques. Therefore, ICT has a huge role to play in maintaining a stable and sustainable communication link between farmers and extension services. Constant update of information will help to keep extension workers alert on the needs of the farmers and also what current technologies have to offer for agricultural transformation.

The role of ICT to enhance food security and support rural livelihoods is increasingly recognized and was officially endorsed at the World Summit of the Information Society (WSIS) in 2005. The growing demand for agricultural products especially cassava, however, offers opportunities for producers to sustain and improve their well-being. ICT plays an important role in addressing these challenges and uplifting the livelihoods of the poor found in the rural areas (ITU, 2009).The utilization of ICT in agriculture will solve to a reasonable extent the problem of adoption since it serves as a link between knowledge base and beneficiaries (i.e. the farmers).

Hence, the effect of ICT usage on cassava production in Oturkpo Local Government Area of Benue State was studied.

The specific objectives are to:

- i. describe the socio-economic characteristics of the respondents in the study area;
- ii. assess the level of awareness and access to ICT by cassava farmers;
- iii. determine the factors influencing cassava production output in the study area; and
- iv. identify the constraints faced by the cassava farmers in ICT usage in the study area.

METHODOLOGY

The study was conducted in Benue State which lies within the lower Benue River through the middle-belt of Nigeria. It is located between longitudes $6^{\circ} 35'$ and 10° E and between latitudes $6^{\circ} 30'$ and $8^{\circ}10'N$ (BNARDA, 2005). There are 23 Local Government Areas in the State with a population of 4,219,244 people (NPC, 2006). The State has a total land mass of 34,095Km² made up of 413,159 farm families that are largely rural with scattered settlements in compounds or homesteads. An estimated 75% of this population engage in rain-fed subsistence agriculture as the major occupation in the state (BNARDA, 2005).

There are three major agro-ecological zones present in the state; zone A, zone B and zone C. It is popularly known as the “food basket” of the Nation because of its diverse land resources. Its tropical climate favours a wide range of crops (Kalu, 2003). For example cereal crops like rice, sorghum and millet are produced in abundance. Roots and tubers produced include yams, cassava, cocoyam and sweet potato. Oil seed crops include pigeon pea, soybeans and groundnuts, while tree crops include citrus, mango, oil palm, guava, cashew, cocoa and *Avengia spp.*

Multi-stage random sampling technique was used for the study. However, Oturkpo Local Government Area was purposively selected based on the fact that it is high cassava production. Structured questionnaire complemented with an interview schedule was administered on 120 cassava farmers randomly selected from 13 villages of the study to obtain the primary data. Both descriptive statistics (frequency distribution, percentage and mean) and inferential statistics (multiple regressions) were used to analyze the data collected.

Model Specification

The implicit form of the regression function used is expressed as:

$$Y=f(X_1, X_2, X_3, X_4, X_5, X_6, e)$$

Where;

Y= Cassava output of the farmers in kilograms(kg)

X₁= Farm labour (man days)

X₂=Fertilizer (kg)

X₃=Cassava stem cuttings (number of bundles)

X₄=ICT utilization (1 if usage, 0 if otherwise)

X₅=Farm size (hectare)

X₆= Education (years of schooling)

e = error term

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

As revealed in Table 1, majority (58.3%) of the respondents were within the age range of 21 – 40 years implying that the respondents were in their middle and active age for optimum agricultural production, 51.7% were males implying that males are more involved in cassava production in the area, while majority (88.3%) of the respondents had a household size of between 1 – 10 people. Both family and hired labour were mostly (73.3%) employed in farming. This result agrees with the work of Biam and Ater (2014)(2014) that family and hired labour sources constitute the major sources of farm labour supply of the roots and tubers producers in Benue State. More so, the respondents in the study area are educationally sound as majority (96.8%) had primary, secondary and tertiary education. According to Meso *et al.*(2005), more number of years spent in school positively influences one's capacity to use technology, and older people tend to be slower in adopting new technologies than younger people. The farmers had an average farm size of 1.3 hectares and farming experience of 1 – 10 years. The higher the farming experience, the higher the knowledge and technological ideas gained on how to deal with farm production problems and the higher would be his output and income (Nwaru, 2004). Over half (54.2%) of the respondents belonged to one social organisation or the other indicating high level of social participation and innovativeness among the respondents (Onu and Madukwe, 2002).

Table 1: Distribution of respondents based on their socio-economic characteristics

Variables Description	Frequency	Percentage
Age (Years)		
21-30	27	22.6
31-40	43	35.8
41-50	25	20.8
> 50	25	20.8
Gender		
Male	62	51.7
Female	58	48.3
Household size		
1-5	64	53.3
6-10	42	35.0
11-15	14	11.7
Educational level		

Primary	11	9.2
Secondary	59	49.2
Tertiary	45	37.5
Non-formal	5	4.2
Farming experience		
1-10	72	60.0
11-20	39	32.0
21-30	9	7.5
Labour		
Family	3	2.5
Hired	29	24.2
Both	88	73.3
Social Group Membership		
Cooperative	65	54.2
Cassava farmers' Association	41	34.2
Monthly/Daily contribution	12	10.0
None	2	1.7
TOTAL	120	100.0

Source: Field Survey Data, 2015

Awareness and accessibility of the respondents to ICT Facilities

Table 2 shows the respondents' awareness and accessibility to ICT facilities in the study area. The result shows that almost all respondents are aware of and accessed the ICTs identified in the area. Mobile phone, television and radio were the mostly known and accessed ICT facilities. In a rural development project involving the use of ICTs, technologies such as the radio, television, mobile phones, computer, internet, video etc is used to deliver information in different rural areas about available government programmes covering livelihood, agriculture, education and health (Reagan, 2004). However, most of the respondents attained secondary education; hence they were able to access less complex ICTs like radio, mobile phone and television.

Table 2: Distribution of Respondents by Awareness and Accessibility of ICT Facilities

ICT Facilities	Awareness		Accessibility	
	Frequency	Percentages	Frequency	Percentages
Computer	86	71.7	61	50.8
Internet	84	70.0	55	45.8
Mobile Phone	120	100.0	113	94.2
Television	117	97.5	106	88.3
Radio	119	99.2	118	98.3
Audio Cassette	78	65.0	53	44.2
Video Cassette	86	71.7	60	50.0
Print Media	78	65.0	46	38.3

Source: Field Survey Data, 2015

***Multiple Response**

More so, Table 3 revealed the extent of ICT facilities usage by the respondents. The respondents indicated high usage of mobile phone, television, radio, computer, video cassette and internet. On the other hand, audio cassette and print media had a low usage by the respondents. This means that ICT facilities greatly influenced information gathering and thus it can be said that they are effective to cassava farmers. Mobile phone, radio and television ranked 1st, 2nd and 3rd as the most effective and efficient ICT facilities used by the respondents in accessing and disseminating information in the study area.

Table 3: Distribution of Respondents by Extent of ICT Facilities Usage

ICT facilities	Weighted sum	Mean Score	Remark	Rank
Computer	388	3.23	High	4 th
Internet	363	3.03	High	6 th
Mobile Phone	530	4.42	High	1 st
Television	471	3.93	High	3 rd
Radio	505	4.21	High	2 nd
Audio cassette	346	2.88	Low	7 th
Video cassette	373	3.11	High	5 th
Print Media	329	2.74	Low	8 th

Source: Field Survey Data, 2015

Factors Influencing Cassava Production Output

Table 4 indicate the regression model used to determine the effect socio-economic characteristics on the output of cassava farmers. The value of coefficient of determination (R^2) indicated an 89.1% variation in the output of cassava farmers explained by the inputs X_1 - X_6 (labour, fertilizer, cassava stem cuttings, farm size, education and ICT utilization) indicated in the regression model. This implies that, there is a positive and significant relationship between the inputs and output. The results also indicated that labour, fertilizer and farm size were significant at 1% level of probability while ICT use was significant at 10%. Another implication is that if there is an increase in one input, keeping others constant, there will also be a corresponding increase in the output. ICT use is important for cassava production because it provides the relevant information needed for optimum production.

Table 4: Estimated Regression Coefficient of the Variables

Variables	Coefficients	t – value	Probability
Constant	-3.745	-2.77	0.007***
Labour	0.266	3.70	0.000***
Fertilizer	0.376	3.12	0.002***
Cassava Stem	0.002	0.06	0.949 ^{NS}
Farm Size	0.307	2.71	0.008***
Education	-0.091	-1.50	0.135 ^{NS}
ICT Usage	0.075	1.85	0.067*
R^2	0.891		

Source: Field Survey Data, 2015

***implies significant at 1%, *implies significant at 10% and NS implies not significant.

Constraints Faced by the Respondents in ICT usage

Table 5 indicates that majority of the respondents claimed finance (78.3%) was the major constraint to ICT access. Other constraints included lack of interest (41.7%), education (36.7%), time (20.8%) and lack of awareness (11.7%). Finance is the biggest problem faced by farmers in the area. Most persons will adopt a new idea if they have the resources and are not hampered by physical social and organizational constraints as observed by Adebayo *et al.* (2003). Also, the finding is supported by Meludu and Idio (2004), Ogunbameru, (2005) and Nenna *et al.* (2009) who observed that under-funding and down ward growth in budgetary allocation to agricultural sector as well as mismanagement and misappropriation had denied the Nigeria farmers to effectively meet with their needs and aspirations.

Table 5: Distribution of Respondents by Constraints Faced in ICT Usage

Constraints	Frequency*	Percentages
Poor Level of Education	44	36.7
Inadequate Finance	94	78.3
Lack of Interest on Yam Production	50	41.7
Inadequate awareness on Improved Yam Tech.	14	11.7
Time Consumption	25	20.8

Source: Field Survey Data, 2015

***Multiple Response**

CONCLUSION

It can be concluded that use of ICT is effective to cassava farmers because aside the inputs required for cassava production (farm size, labour, fertilizer and cassava cuttings), there are other important factors which affect the production output. These are age, farming experience, household size, education and ICT use which were all found to be significant. Also the most effective ICTs relevant to cassava production are mobile phone, television and radio.

RECOMMENDATIONS

Based on the findings, it was recommended that:

- i. There should be massive awareness on the use of ICT facilities which leads to increase in the production and income of the farmers.
- ii. Extension services offered in the area should be improved upon both in information delivery and quality of delivery to enhance cassava production.
- iii. Governmental and Non-governmental agencies should partner in funding the establishment of ICT resource centres such as public offices, e-libraries, tele-centres and cyber café to facilitate easy access to information from complex ICTs like the computer and Internet.

REFERENCES

- Adebayo, K., Anyanwu, A. C. and Dsiyale, A.O. (2003): Perception of Environmental Issues by Cassava Processors in Ogun State, Nigeria. Implications for Environmental Extension Education. *Journal of Extension System*, 19: 103 – 112.
- Adereti, F. O., Fapojuwo, O. E., and Onasanya, A. S. (2006): Information utilization on cocoa production techniques by framers in Oluyole Local Government Area of Oyo State, Nigeria. *European Journal of Social Science*, 3 (1): 1–7.
- Ani, A.O. (2006): Effect of Desertification on cassava Production Potentials in the North Eastern Nigeria. *Journal of Agricultural Research and Policies*, 1(1): 37-41.
- Balderama, O.F. (2009): The Open Academy of for Philippine Agriculture (OPAPA): Enhancing Extension Services to the Farmers to the Northern Philippines through Information and Communication Technologies (ICTs). Proceedings of World Congress of Computers in Agricultural and Natural Resources, Reno NV, USA, 22nd – 24th, June, pp 423 – 429.
- Biam, C. K. and Ater, P. I. (2014): Impact Assessment of Roots and Tubers Expansion Programme (RTEP) in Benue state, Nigeria. *Management and Administrative Sciences Review*, 3 (5): 650 – 659.

- BNARDA (2005): The impact of Benue State Agricultural and Rural Development Authority on Agriculture and Rural Development in Benue State, BNARDA, Makurdi, Nigeria.
- Erhabor, P.O. and Emokaro C.O. (2007): Relative Technical Efficiency of Cassava Farmers in the Three Agro-ecological Zones of Edo State, *Nigerian Journal of Applied Sciences*, 7(19), 2818-2823.
- Fakayode, S. B., Babatunde, R. O. and Ajao, R. (2008): Productivity Analysis of Cassava-Based Production Systems in the Guinea Savannah: Case Study of Kwara State, Nigeria. *American-Eurasian Journal of Scientific Research*: 3 (1): 33 – 39.
- FAO (2004): FAO (Food and Agricultural Organization) of United Nations, *Annual Statistics*. Rome, Italy.
- FMARD (2001): *Opportunities in Nigeria's agricultural sector*. Federal Ministry of Agriculture and Rural Development, Abuja, Nigeria. Retrieved from <http://www.nigeriabusinessinfo.com>
- ITU, (2009): ICTs and food security. ITU-T Technology Watch Report, International Telecommunication Union, Telecommunication Standardization Policy Division, ITU Telecommunication Standardization Sector. Retrieved from http://www.itu.int/dms_pub/itu-t/oth/23/01/T230100000B0001PDFE.pdf
- Kalu, B. A.(2003): Improving Benue State Economy on cassava production. A paper presented at the sensitization workshop on Cassava Production, Processing and Utilization, Makurdi, November, 24.
- Karim, O.R., Fasasi, O.S. and Oyeyinka, S.A. (2009): Gari Yield and Chemical Composition of Cassava Roots stored using Traditional Methods. *Pakistan Journal of Nutrition*, 8(12): 1830 – 1833.
- Meludu, N. T. and Idio, A.A.(2004): Option for Sustainable Funding of Agricultural Research and Extension for small-scale Farmers in a Deregulated Economy. Paper Presented at the Agricultural Extension Society of Nigeria (ESON) Conference at OAU, Ile-Ife, March 9 – 11.
- Meso, P., Musa, P., and Mbarika, V. (2005): Towards a Model of Consumer Use of Mobile Information and Communication Technology in LDCs: The case of sub-Saharan Africa. *Info Systems Journal*, 15, Blackwell Publishing, Ltd., London.
- NPC (2006): National Population Commission, Census Facts Sheet, Abuja, Nigeria.
- Nenna, M.G., Onwubuya, E.A. and Orji, E.C. (2009): Rice Production Technologies Among Farmers in Ayamelum Local Government Area of Anambra State, Nigeria. *African Journal of Research and Development*, 2 (1): 20 – 29.
- Nwaru, J.C. (2004): *Rural Credit Market and Arable Crop Production in Imo State of Nigeria*. Unpublished Ph.D Thesis, Michael Okpara University, Umudike, Nigeria 80-92.
- Nweke, F. (2004): New Challenges in the Cassava Transformation in Nigeria and Ghana, International Food Policy Research Institute, Environment and Production Technology Division. Discussion Paper No. 118. www.ifpri.org, Pp 1 – 2.
- Ogunbameru, B.O. (2005): Funding Agricultural Extension Service in Nigeria (edited) S.F. Adedoyin. *Agricultural Extension in Nigeria*. Agricultural Extension society of Nigeria, Agricultural and Rural Management Training Institute (ARMTI) Ilorin, pp 177 – 181.
- Onu, M. O. and Madukwe, M. C. (2002): Adoption Levels and Information Sources of “Brood and Sell” Poultry Operators. *Agro-Science. Journal of Tropical Agriculture, Food, Environment and Extension*: 3 (1): 63 – 67.

- Qamar, M. K. (2002): Global trends in agricultural extension: Challenges facing Asia and the Pacific Region. Paper presented at the FAO Regional Expert Consultation on Agricultural Extension, Research-Extension-Farmer Interface and Technology Transfer, held in Bangkok, 16th – 19th, July. www.fao.org/docrep/008/a0129e/
- Reagan, M.P. (2004):“Use of the internet in rural Area of Iowa State”. Business Report News, February 19th.
- Ugwu, C.C. (2008): Gender roles in Cassava Production and Processing in Enugu North Agricultural Zone of Enugu State, Nigeria. B. Agric Thesis, Department of Agricultural Extension, University of Nigeria, Nsukka.