ACCESS AND USE OF ICT (WEB TOOLS) AMONG THE CASSAVA FARMERS FOR PRODUCTIVITY IN EKITI STATE, NIGERIA.

Alabi, O., Bamigboye, S, Fanu, A., Olatunji O., Samuel, S., Ayodele, O and Akintola, O

Department of Agricultural Economics and Extension, Federal University, Oye-Ekiti, Ekiti State

Correspondence author: olajumoke.falowo@fuoye.edu.ng

Abstract
Information is an important factor in any human endeavor as it enables individuals make timely and informed decisions that would assist them in the realization of their goals. This article investigates the level of awareness, access and effectiveness of information and communication technology (web tools) among the cassava farmers in Ekiti State, Nigeria. Multi-stage random sampling technique was used in selecting the 200 respondents used for the study. A structured and tested questionnaires were administered to the identified cassava farmers. Information such as socio-economic characteristics and production operations. Other information obtained are farmer level of awareness, access and use of ICTs (web tools) on production activities. Data were analyzed by descriptive statistics, cross tabulations and multiple regression models. Webb-tools significant in ICT dissemination, these tools are Facebook (for information/dissemination), WhatsApp, Agric-webb and Tik-Tok. Hence, use of these Webb-tools enhanced farm income. Factors influencing assess to ICT on farm income of cassava farmers are source of information, member of farm organization. Livelihood sources, Cropping pattern and Education. The paper recommended that the agricultural extension services should provide intensive ICT training for the agricultural extension workers to enhance ICT incorporation into extension advisory service particularly in cassava farming.

Keywords: ICT adoption, Agricultural productivity; Digital divide, Ekiti State, Nigeria

IJAFS 2021 (10).11:1686-1698
Accepted for Publication
September, 2021

Background of the study

Information is an important factor in any human endeavor as it enables individuals make timely and informed decisions that would assist them in the realization of their production goals (Mdoda and Mdiya 2022). Agricultural information dissemination is crucial to the productivity of farmers and makes them learn about those things which they are not aware of (Banmeke and Olowu, 2005). The Information and Communication Technology (ICT) revolution is far-reaching and has turn the world into global village (Macire-Kante, *et al* ,2019). ICT tools have helped people find, explore, analyze, exchange, and present information without discrimination. ICT, if efficiently used can provide quick access to ideas and experience from wide range of people, communities and cultures. (Kwame, 2010). The efficiency of the agricultural sector has a multiplier effect on economic development. A potent agricultural sector is instrumental to self-sufficiency in food production, generation of employment, foreign exchange earnings and provision of raw materials for agro-allied industries. In Africa, agriculture accounts for more than 32% of the Gross Domestic Products (GDP) and where about 70% of African population engages in agriculture and agricultural related activities and resides in rural areas. However, despite the continent's huge potentials in agricultural production, it is worrying that most of the African countries still depend on food importation (Salami and Arawomo, 2013).

Past studies argued that, Nigeria's agricultural sector has experienced steady decline in productivity (Henri-Ukoha, *et al*, 2012). However, in recent times, indices shown that the sector have started observing a gradual growth (Oladipo, 2013). This steady growth according to past study are influenced by the intervention of agricultural innovation and technology and timely access (Henri-Ukoha *et al*., 2012). These innovations are mechanized farming-equipment, improved and high yielding varieties, seed-disease resistant varieties, integrated pest management control, post-harvest technologies, efficiency in land use, among others. The efficiency of technology generated and disseminated depends on effective communication which is the key process in information dissemination (Oladele, 1999). Hence, effective communication of technology to farmers can enhanced agricultural productivity. Past studies argued that economic information in the face of global food crisis is a veritable tool for agriculture and rural development ((Nyarko and Kozári 2021).

In Nigeria, evidence shown that cassava is a staple crop and many rural farmers are into cassava farming (Henri-Ukoha, *et al*, 2012). Hence, awareness of, access to and use of right information pertaining to cassava farming can influence cassava productivity among cassava farmers (Luqman, et al, 2019). Communicating information relevance to production such as where and how to access improved cassava cuttings, the right method of planting improved cassava cuttings, how to secure agricultural loans and access other available inputs is essential for productivity (Anh, *et al*, 2019). Past studies argued that Nigeria is endowed with some good soil rich in essentials minerals suitable for cassava production as well as reliable climatic conditions for cassava farming.

Past studies contended that Nigeria government has recognized the importance of ICT (web tools) as a good tool that can be used to improve the agricultural sector. The use of ICT (web tools) had brought out seemingly under the scheme growth enhancement scheme (GES) scheme. This scheme a product of ICT (web tools) using GSM phones to disseminate information to over 10 million farmers in other to enhance agricultural productivity (Nwafor, *et al*, 2020). This scheme recorded success as evidenced by past study that the scheme provided the participating farmers timely and affordable agricultural input like fertilizers, and hybrid seeds to farmers in order to increase their yield per hectare and make their agricultural production competitive with the world standard.

The use of Information and communication technologies is relatively new when compared to the traditional way of disseminating information. Arokoyo, (2005) argues that in many developing countries of the world it is typical to extend agricultural messages through conventional means such as the use of the local radios, town-crier, drama, and role play. However, there have been effort geared towards introducing modern technology in the process of information exchange but unfortunately these channels of exchange have not been maximally exploited (Lobo, 2007). Hence there is need to explore the effectiveness of these modern technologies in the training and diffusion of the appropriate message to the farmers.

Ozowa (2004) contended that information and communication are essential ingredients needed for effective transfer of technology designed to enhance agricultural production. Hence, for any information to be useful, it must be well communicated to the end users. The nature and form in which agricultural information are package will require some specialized skills by farmers to access. If agricultural information is package in visual form and readily made available to farmers, it will greatly influence the adoption of such farming technique irrespective of age, sex and educational level. Past study deduced that the attainment of higher level of education and professional qualification is a very good springboard for the assessment of agricultural information intake or access by farmers (Torimiro, 1997). However, it remains problematic if the end users (the farmers) cannot read nor have access to agricultural information package in print media. However, different categories of household and individual have different information needs, and their current and potential access to information sources may also be varied. For this end users to improve on their current production system to a better and more commercialized farming, they need adequate agricultural information on modern agricultural farming techniques.

Moreover, the lack of knowledge on how to add value through proper storage, processing and marketing hinders agricultural growth. However, past study argued that access to relevant and timely technology can leverage on these limitations (Mdoda and Mdiya 2022). However, the extent to which these techniques are harnessed for agricultural development depends on the level of access to these techniques by cassava farmers. This is the conceptual constructs in which this study was built. Consequently, this paper examines the extent to which cassava farmers have access to agricultural information and how access to ICT enhanced their cassava productivity.

From the foregoing, raises the following research questions in which this paper find answers to:

- What kind of information (ICT web-tools) are most necessary to the Cassava farmers?
- What kind of information is disseminated to the Cassava farmers through ICT (web tools)?
- How effective is ICT (web tools) in dissemination of information on input delivery and farm income enhancement?

Objectives of the study as follows:

1. Identify sources of relevance information and technology for cassava production in the study area.
2. Assess ICT access to cassava inputs delivery, value chain and market
3. Examine access to ICT on farm income enhancement of cassava farmers? and
4. Appraise factors influencing assess to ICT on farm income of cassava farmers

Literature review

Cassava

Cassava is well known as *Manihot esculenta* or *Manihot utilissima*. The cassava is believed to have originated in Northern Brazil and Central America (Roger, 1963). This popular crop is now grown in almost every tropical country. In Nigeria it was introduced into Warri the then Bendel State of Nigeria, by Portuguese explorer in the 16th – 17th century (Lean, 1976). The cassava crop consists of 15% peel and 85% fresh tuber flesh. The tuber consists of 20 – 30% starch, 62% water content, 2% protein, 1 – 2% fiber with trace of vitamins and minerals. As main source of carbohydrate it's noteworthy to mention here that cassava also contains 2 cyanogenic glycosides namely linamarin and lotaustralin which are highly toxic to human and animals. Therefore, it must be properly processed before it become suitable for consumption. There are many derivatives from cassava example being starch, ethanol, monosodium glutamate, paper and textiles etc.

Nutritional value of cassava

The nutritional content of cassava depends on the specific plant part (root or leaves), geographic location, variety, age of the plant and environmental conditions (FAOSTAT, 2011a). The cassava root is composed of carbohydrates and is therefore mainly a source of energy. The starch content varies between 32 to 35% of the mass of fresh roots and 80 and 90% of the mass of dried roots (Montagnac et al., 2009b). of B vitamins of cassava roots is also found to be trivial (Gil and Buitrago, 2002). The nutrient density of cassava leaves differs in quantity and quality according to cassava variety, stage of development of the shrub and the relative size of the leaves and stem (Gil and Buitrago, 2002). As can be seen from Table 1, cassava leaves contain a higher amount of protein, essential amino acids, vitamins B1, B2, and C and carotenoids than roots (Adewusi and Bradbury, 1993; Okigbo 1980; West at al., 1988) and the starch content varies from 7 to 18 g/100g (Gil and Buitrago, 2002).

They also contain more minerals such as calcium, iron, manganese, and magnesium and zinc (Webeto at al., 2006). The amount of sucrose, glucose, fructose and maltose is usually low (Tewe, 2004), however, in sweet varieties more than 17% of the root content is sucrose (Okigbo, 1980; Charles et al., 2005). Fiber content differs according to the variety and stage of development of the root. In fresh roots it is less than 1.7%, while it comprises4% of cassava flour (Gil and Buitrago, 2002). Lipid content varies between 0.1 and 0.3% of the fresh mass of cassava roots and is present as nonpolar (45%) or glycolipids (52%) (Hudson and Ogunsua, 1974). The protein content is trivial, between 1 and 3% of dry matter (Buitrago, 1990) and about 1.5 mg/100 g of fresh mass (Bradbury and Holloway, 1988). Essential amino acids are present in 1688low quantities, with the exception of arginine, glutamic acid and aspartic acid (Gil and Buitrago, 2002). The mineral content of the roots varies

Table 1. Proximate nutrient composition of cassava roots and leaves.

Variable	*Unit*	*Raw Cassava*	*Cassava roots*	*Cassava leaves*
Proximate composition 100 (g)				
Food energy	Kcal	160	110 - 149	91
Food energy	kj	667	526 - 611	209 – 251
Moisture	g	59. 68	45.9 - 85.3	64.8 - 88.6
Dry weight	g	40.32	29.8 - 39.3	19 - 28.3
Protein	g	1.36	0.3 - 3.5	1.0 - 10.0
Lipid	g	0.28	0.03 - 0.5	0.2 - 2.9
Total carbohydrate	g	3.06	25.3 - 35.7	7 - 18.3
Dietary fiber	g	1.8	0.1 - 3.7	0.5 - 10.0
Ash	g	0.62	0.4 - 1.7	0.7 - 4.5
Thiamin	mg	0.087	0.03 - 0.28	0.06 - 0.31
Vitamin A	µg	-	5.0 - 35.0	8300 - 11800e
Riboflavin	Mg	0.048	0.03-0.06	0.021-0.74
Niacin	Mg	0.854	0.6- 1.09	1.3-2.8
Ascorbic acid	mg	20.6	14.9 - 50	60 – 370
Minerals				

Calcium	Mg	16	19 – 176	34 – 708
Total phosphorus	Mg	27	6 – 152	27 – 211
Ca/P		0.6	1.6 – 5.48	2.5
Iron	Mg	0.27	0.3 – 14.0	0.4 – 8.3
Potassium	%	-	0.25 – 0.72	0.35 – 1.23
Magnesium	%	-	0.03-0.08	0.12 – 0.42

Source: Macire Kante *et al*, 2019

2.3 Information technology (IT)

Information technology (IT) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprise. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. Several industries are associated with information technology, such as computer hardware, software, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services. In a business context, the Information Technology Association of America has defined information technology as "the study, design, development, application, implementation, support or management of computer-based information systems". The responsibilities of those working in the field include network administration, software development and installation, and the planning and management of an organization's technology life cycle, by which hardware and software is maintained, upgraded, and replaced. Yekini and Lawal (2012) Sees ICT (Web tools) as: a powerful collection of elements which include computer hardware, software, telecommunication networks, workstations, robotics and smart chips, which is also at the root of information systems.

Roles of ICT (web tools) in agriculture

Since the coming of the era of information & technology, ICT (web tools) has played a great role in our society. The information communication technology revolution has brought huge changes in both social and economic development in our world. Agricultural just like other sector has benefited from ICT (web tools) revolution and the latest innovation in ICT (web tools) has expanded the development of agriculture sector in different form. In large part of the world over millions house hold own Mobile phones and Laptops which are used as the source of information to people in village and in the big cities, the use of ICT (web tools) in agriculture ranges from advanced modern technologies, such as GPS navigation, satellite communication, and wireless connectivity, to older technologies such as Facebook and Google.

However, the rural people still lack basic communication infrastructure in accessing crucial information in order to make timely decisions. The application of ICT (web tools) in agriculture generates possibilities to solve problems of rural people and also to promote the agricultural production by providing scientific information timely and directly to farmers. Here are some benefits of ICT (web tools) in agriculture

- Introduction of Web tools has brought about a tremendous change in agriculture sector resulting into dramatic improvement in the efficiency and profitability of the agriculture industry.
- The spread of Web tools services allow farmer to land their product timely and directly to the market where wholesalers are ready to purchase them without the presence of middlemen.
- ICT (web tools) has been another input in communication technology used widely by many farmers, they have been used by farmers, Entrepreneurs, and other stake holders to disseminate information on various innovation in agricultural technology.

Methodology

3.1 Study Area

The study was carried out in Ekiti State. The State is located in the South west geopolitical zone of Nigeria. Ekiti State is a state in southwestern Nigeria, bounded to the north by Kwara State, to the Northeast by Kogi State, to the South by Ondo State, and to the west by Osun State. In Ekiti state, Yoruba sub-group make up the majority of the state's population. Ekiti State was formed from a part of Ondo State in 1996 and its capital is Ado-Ekiti. The State is made up of 16 Local Government Areas, constituted into four agrarian's regions. The inhabitants are mostly farmers. Farmers who have cassava as their main crop constituted the target population of the study.

3.2 Sampling technique

Multi-stage random sampling technique was used in selecting the respondents for the study. Ekiti state has 4 agrarian zone. In the first stage one local government was randomly selected from each agrarian zone, at the second state, two communities were also randomly selected while the in the final selection, 30 cassava farmers were randomly selected in each community to give a total of 240 cassava farmers. In the final enumeration only 200 cassava farmers (83.3% response rate) were used for further analysis (Table 2). The used 40 cassava farmers contained missing information, inappropriate filling, missing questionnaire in transit among others.

Table 2: Local government and Sampling areas
Community * Local government Cross tabulation

		Local government				
		Ekiti east	Ekiti southwest	Gbonyin	Ikole	Total
Community	Isinbode	25	0	0	0	25
		25	0	0	0	25
	Igbara odo	0	25	0	0	25
		0	25	0	0	25
	Iluomoba	0	0	25	0	25
		0	0	25	0	25
	Ayebode	0	0	0	25	25
		0	0	0	25	25
Total		**50**	**50**	**50**	**50**	**200**

Source: Field survey, 2021

3.3 Method of Data Collection

A structured and tested questionnaire was administered to the identified cassava farmers in order to obtain data on their socio-economic characteristics such as occupation, age, sex, educational level and marital status among others. Other information obtained are farmer level of awareness, access and use of ICTs (web tools) and their effectiveness of ICT usage. Also information was sourced on constraints to ICT, the type of ICT used, factors influencing ICT access, input and output delivery. This study was limited mainly to the effectiveness of ICT in dissemination of agricultural information and access to the use of ICT (web tools) by respondents.

Method of data analysis

Method of data analysis used as follows, descriptive statistics, cross tabulations and multiple regression models. Descriptive statistics used were frequency counts, averages, percentages, among others, cross tabulation were used to captured the level relationship between variables, while the use of multiple regressions is to measure causal relationship between the dependent and independent variables,

Multiple Regression Model

The study adopted the use of Multiple Regression Model to examine factors influencing result of the effectiveness of using ICT (web tools) on cassava production in the identified study areas. Hence, this result was regressed against selected variables. The model is expressed as:

$$Y = a + bXi + \in \quad (1)$$

Hence, the linear form of the equation (1) stated as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_{10}X_{11} + U \quad (2)$$

where Y is the likelihood of presence of the characteristics of interest (the characteristics of interest is whether a farmer use of ICT (web tools) influence cassava productivity).
Y = result of the effectiveness of using ICT (web tools) on cassava production
a = is the intercept
b = is the slope (constant)
$b_1 – b_8$ = Coefficients
$X_1 – X_{11}$ = Independent variables
$\in$ – and is the residual (error)
U = Error term assumed to have normal distribution with zero mean, and constant variance, i.e. U ~ N (0 σ2) and E (Ui, Uj) = 0ij

Y_i = result of the effectiveness of using ICT (web tools) on cassava production
X_1 = Sex of farmer (male = 1, female = 2)
X_2 = Age of farmer (in years)
X_3 = Household size (number of adult members of the family of doing farm work)
X_4 = Educational level (years in formal school)
X_5 = Farming experience (years of cassava farming)
X_6 = Farm size in hectares (ha)
X_7 = Sources of information
X_8 = Membership of cooperative/farmers associations (member = 1, non – member – 0).
X_9 = Marital Status (married = 1, single = 0).
X_{10} = Livelihood sources
X_{11}= Cropping system
$b_1 – b_{11}$ = Unknown parameters to be estimated.

Estimation procedure
Due to the nature of the data, Ordinary Least Square (OLS) method was adopted for estimation technique. Other techniques used to reduce measurement errors are in the use of Dublin Watson test to assess multi-co linearity among the explanatory variables to avoid co linearity problem and the use of Best Linear Unbiased Estimation (BLUE) method. Data were coded into SPSS version 17 for analysis.

Analysis of quantitative data was conducted with respect to the objectives of the study using Software Package for Statistical analysis (SPSS) version 17.0 Frequencies and percentages were computed to describe various matters related to ICTs and they were presented in tables and figures to show the differences and option of respondents on which the discussions of the results were based.

RESULT AND DISCUSSION
The presentation of results and discussions was based on the socio-economics characteristics of the cassava farmers who has deploy the use of ICT (web tools) for their farm operations. This includes among others: Age, Sex, Marital status, level of Education, level of awareness and use of ICT (web tools) to influence cassava production, cost and benefit of using ICT (web tools) and the effect of the ICT (we tools) on income generation.

Socio-Economic Characteristics of Respondents
Some of the socio-economic characteristics includes Age distribution, Sex, Production experience, Marital status etc. This is done to know how the social-economic characteristics of the respondent get access to ICT (web tools) and the usage of the specified web tools. Table 3 revealed that Access and Usage of ICT (web tools) are predominantly accessed by male consequently (55%), while 45% were female. The study also revealed that those between ages 27-40 were 60.0%. Those in the category of 41-60 years were dominant age-category (40%). This study suggested that the availability of ICT (web tools) is mainly available and also used by the middle age farmer of 27-40 years, although the old age farmers were also not left out because few of the category had access the ICT (web tools) such as WhatsApp, Facebook. Most respondent of the percentage were married (60%) while those that are single are 30% and 10% are divorced (Table 3).

Table 3: Percentage Distribution of personal Socio-economic

Socioeconomic characteristics	Frequency	Percentage (%)
Sex		
Male	110	55
Female	90	45
Marital status		
Married	60	30
Single	120	60
Divorced	20	10
Family size		
3.00	30	15
4.00	20	10
5.00	50	25
6.00	40	20
7.00	30	15
8.00	10	5

9.00	10	5
10.00	10	5
Religion		
Christianity	150	75
Muslim	50	25
Level of Education		
No formal education	10	5
Primary school completed	10	5
Secondary school completed	50	25
OND/NCE	70	35
HND/B.SC	60	30
How do you acquire your present farm?		
Inherited	50	25
Caretaker	20	10
Purchased Land	70	35
Rented/lease	60	30
Member of farm organization		
Member	100	50
Not a member	100	50
Source of raw materials		
Neighborhood	100	50
Locality	100	50
Local government		
Ekiti east	50	25
Ekiti southwest	50	25
Gboyin	50	25
Ikole	50	25
Cropping System		
Sole cropping	130	65
Mixed cropping	70	35
When did you start planting?		
1-5	20	10
6-10	70	35
11-15	80	40
16-20	30	15

Source: Field survey, 2021

The study showed that high percentage of those that are married had access to ICT (web tools) and make use of it more. Majority of the respondent had OND/NCE education, specifically 30% had HND/B.SC education, while 25% had SSCE education. Moreover, 5% had Primary education and 5% had no formal education. Past study argued that ICT (web tools) access and usage does not necessarily require high level of education. The study revealed that the commonly used web tools are WHATSAPP and FACEBOOK for information dissemination and also for Social Activities (30%) (Table 4).

Table 4 Access and Use of ICT (web-tools) in Farming Operations.

WEB TOOLS	USAGE %			PURPOSE USED FOR %					
	Low	Moderate	High	Marketing	Advertising	Social Activities	Farm input Information	Source of Information For New Varieties	Customer Services
TELEGRAM	15	21	24	6	12	18	9	9	6
YOUTUBE	32.5	12.5	5	27.5	2.5	2.5	7.5	7.5	2.5
INSTAGRAM	27	21	12	24	9	6	6	12	-
TWITTER	32.5	16.25	16.25	26	9.75	19.5	3.25	3.25	3,25
FACEBOOK	20	55	25	10	25	30	20	10	5
WHATSAPP	30	45	25	5	10	20	40	15	10
SKYPE	23.75	1.25	-	18.75	1.25	-	3.75	-	1.25
TIK TOK	21.25	3.75	-	18.75	1.25	-	3,75	-	1.25
ESOKO	18	2	-	17	1	-	1	1	-
AGRIWEBB	46.75	8.25	-	33	5.5	5.5	8.25	2.75	
FIGMA	-	-	-	-	-	-	-	-	-
WIX	14.25	0.75	-	12.75	0.75	-	1.5	-	-
BOOTSTRAP	14.35	0.75	-	12.75	0.75	0.75	0.75	-	-
SNAPCHAT	34	6		24	4	12	-	-	-
ADOBE XD	15	-	-	12.75	0.75	0.75	0.75	-	-

Source: Field study, 2021

Cassava farmers engaged in other livelihood activities, the study showed that 25% engaged in Trading of manufactured goods, Civil Services, and public services respectively, while 20% were Artisans (Table 3). Majority of these respondents are Christian (70%), 15% are Muslim. The study showed that 15% of those who have access to the usage of ICT (web tools) are from Isinbode, Igbara-odo and Ayebode respectively i.e the respondents that have more access to these web tools are mainly from the Towns listed above. While others respondents are 10% and they are from Iluomoba (Table 4).

Awareness and Accessibility of ICTs (web tools)

The result of the data analysis on the existing ICTs (web tools) facilities in the study area revealed numerous ICTs (web tools) were available but the result showed few of the respondents are familiar with these web tools, while some testified to the existence and awareness of these web tools. Table 4 indicated that 60.0% had access to telegram and telegram for social activities, (50.0%) had access to You-tube Marketing purposes, 60.0% had access to Instagram and 65% had access to Twitter. Likewise, Facebook and WhatsApp had 100.0% access and used for social activities, marketing among others. Moreover, 25.0% of the respondents had access to Skype and Tiktok, 20.0% had access to Esoko, 55.0% had access to Agriwebb, 15.0% had access to Wix, Bootstrap, and Adobe XD, while 40.0% had access to snapchat. None of the respondents had access Figma which had proved to effective Webb tools facilities. It is clear that WhatsApp and Facebook are vastly due to its coverage and ease of information dissemination and also ease of exchanging information as well. The findings corroborated to the policy of FAO and International Telecommunication Union (ITU), (2016) endorsement that web tools have helped in enhancing agricultural productivity and promoting value addition.

Usage of ICTs (web tools)

Data from the table 5 revealed the purpose of using the web tools which showed that majority of the respondents uses it for Marketing and Social activities, this shows that the level of ICTs (web tools) in input delivery is low cause most of the respondents are not used to some of the web tools. This collaborates with the study of Helen *et al* (2014), that the availability of ICTs (web tools) sources does not really means its use is effective in agricultural information dissemination and exchange

Objective 2: Use of ICT (Webb-tools) to enhanced cassava inputs delivery, value chain and market analysis.

Table 5 revealed that Facebook was the major source (25%) for input delivery and value chain analysis out of which 24.7% comes from farm product advertisement. Others ICT Webb tools important for information

sourcing as follows Face book for fertilizers (13.3%). Facebook for value addition of processing (12.3%), Also, WhatsApp for value addition of processing (12.3%), Agric-webb for Farm product advertisement (15.3%). Others usage of ICT (Webb-tools) for agricultural information dissemination and exchange as follows: Facebook (24.7%), Agric. Webb (13.2%), WhatsApp (13.1%), Tik tok (9.8%), Esoko (8.3%), You-Tube (8.0%), Twitter (6.3%), Snapchat (4.9%), Instagram (4.6%), Telegrams (3.8%) and Skype (3.4%). This clearly evidence that access and use of ICT has really improved cassava operations and productivity.

Table 5: Use of ICT (web-tools) to source for/enhanced Farming Operations.

Input delivery and Value chain analysis	ICT Webb-tools											
	Tele grams	You Tube	Insta gram	Twitte r	Face book	Whats App	Skype	Tik tok	Agriw ebb	Snap chat	Esoko	Total
Fertilizers	2	24	10	5	65	41	2	10	25	5	10	199
Hybrid seed	10	4	11	10	48	26	5	21	30	10	15	190
Agric. Mech.	1	10	7	8	35	20	1	12	21	6	21	142
Credit source	15	15	5	15	51	35	6	10	28	2	25	207
Agrochemicals	8	20	4	8	63	28	10	25	24	8	18	216
Sales of farm products	10	15	6	18	48	16	14	30	35	11	31	234
Farm product advertisement	7	21	10	21	71	32	7	26	40	15	20	270
Processing	12	31	20	20	60	44	12	31	33	21	15	299
Marketing	11	18	18	19	49	19	10	30	26	19	9	228
Total	76*	158*	91*	124*	490*	261*	67*	195*	262*	97*	164*	1985*

Source: Field survey, 2021

Notes: * Multiple responses.

Objective 3: To examine access and use of ICT on farm income enhancement of cassava farmers?

The paper examines access and use of ICT (Webb-tools) to farming operations and how it has significantly contributed to farm operations, productivity and farm income (Table 7). The paper indicated mean income of cassava farmers in the production year is ₦ 34.500,00, Table 6 presented the farm income distribution among cassava respondents. Table 6 indicated that 13% made losses and this category source their information from Telegrams (20.8%), Skype (18.2%), Instagram (13.8%) and Snapchat (13.2%). Information source from here might not be relevant and helpful as the results indicated that access and use of these categories of Webb-tools does not influence positive impact on farm income rather contributed to farm losses (Table 7). Likewise, the paper also indicated that cassava farmers that made N50, 000 and above (34%) source their information from Facebook, WhatsApp, Agric. Webb and Tik-Tok and about 36% of cassava farmers who had access through these medium experienced enhanced cassava farming operations. This implies that access and the use of ICT (Webb-tools) of Facebook, WhatsApp, Agric. Webb and Tik-Tok enhanced farm income (Table 7).

Table 6: Farm Income distribution

Farm- Income categories(₦)	Frequency
-25000 – 1	26
1.01 – 10000	52
10001 – 25000	46
25001 – 50000	36
50001 – 100000	22
100001 – 250000	10
250001 – 1000000	8
Total	**200**

Source: Filed survey, 2021

\

Table 7: Use of ICT (web-tools) and Farm income

Farm- Income categories(₦)				ICT Webb-tools								
	Tele Grams	You Tube	Insta gram	Twitte r	Face book	Whats App	Skype	Tik tok	Agric. webb	Snap chat	Esoko	Total
-25000 – 1	33	14	22	16	1	2	29	7	3	21	11	159
1.01 – 10000	38	26	51	31	3	10	32	16	12	32	36	287
10001 – 25000	14	35	18	27	21	15	18	23	45	19	24	259
25001 – 50000	11	16	8	18	25	20	11	32	22	17	19	199
50001 – 100000	4	8	1	7	28	31	7	12	7	8	6	119
100001 – 250000	-	1	-	1	15	16	3	6	6	3	4	55
250001 - 1000000	-	-	-	-	7	6	-	4	5	-	-	22
Total	100	100	100	100	100	100	100	100	100	100	100	1100*

Source: Field survey, 2021

Objective 4: Appraise factors influencing assess to ICT on farm income of cassava farmers

The multiple regression model was used to appraise factors that influence farm income of cassava farmers as a result of access and use of ICT (Webb tools). Multiple Linear Regression (MLR) model was used because of its suitability. SPSS version 17 was used for the analysis. The paper hypothesized 11 independent variables of 6 continuous and 5 discrete variables respectively. These variables were selected on the basis of theoretical explanation, reviews of similar studies and the results of various empirical studies. Table 8 revealed that 6 variables of the 11 hypothesized independent variables were found to be significant. These hypothesized variables are: Education (X_4), Source of information (X_7), Member of farming organization (X_8), Marital status (X_9), Livelihood sources (X_{10}) and Cropping system (X_{11}).

The Multiple Correlation Coefficient (R = 0.683) indicates that the degree of access and use of these ICT (Webb-tools) is very robust, as explained by these hypothesized variables, and are quite strong and positive. The results of the MLR value of coefficient of determination ($R^2 = 0.617$) and the adjusted R^2 of 0.60, implies that about 62% of the hypothesized 11 independent variables variation explained the farm income of cassava farmers as a result of access and use of ICT (Webb tools).

Thus, this study hypothesized that cassava farmers whose earnings are relatively high could be participating in technology packages and innovativeness which, in turn, will expose them to new business opportunities. Findings from this study indicated that source whey they obtained information from (X_7) was positive and significant in explaining the respondent ability to enhanced farm income. The coefficient of variable X_7 (0.554) implies that 1-unit increment in access and use pf ICT (Webb tools) would bring about 0.6 increments to farm income. The other significant variables that were positive and significant were member of farm organization (X_5) Livelihood sources (X_{10}), Cropping pattern (X_{11}) and Education (X_4). However, variable marital status (X_9) is significant but negative. The implication of this finding is that 1-unit increment in farm organization (X_5) Livelihood sources (X_{10}), Cropping pattern (X_{11}) and Education (X_4) would bring about 0.22, 0.14, 0.23 and 0.5 improvement in the farm income of the respondents respectively. However, for variable marital status (X_9) a 1-unit increase would reduce farm income by 0.7 (Table 8). This result implies the positiveness of farmers towards access and use ICT (Webb tools) for innovation and value chain advancements.

Table 8: Multiple regression model analysis results

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	815.160	1084.693		.752	.454
	Religion	-49.732	224.471	-.025	-.222	.825
	Education	0.51373	0.251036	.064	2.046	.0622
	Marital status	-702.975	350.714	-.491	-2.004	.048
	Family size	173.477	114.985	.327	1.509	.135
	Livelihood sources	.140820	.077881	.072	1.808	.0802
	Sources of information	.554	.18556	.000	2.698	.0398
	How did you acquire cassava farmland	-55.807	111.163	-.062	-.502	.617
	Farmland Size	44.378	60.536	.097	.733	.465
	When did you start Cassava farming	7.530	51.499	.021	.146	.884
	Cropping system	0.2338	0.10225	.130	2.287	.0303
	Member of farm organization	376.815	185.156	.219	2.035	.045

Source: Computer generated results sheet

Problems to Access ICTs (web tools)

Table below shows the factors militating against the utilization of ICTs by the cassava farmers in the study area. Lack of technical experience in manipulating ICT (web tools) was low at 45%, Incessant Electricity Supply was another factor militating the effective usage of Webb tools in the study areas. Likewise, high cost of ICT (web tools) was Low at 41%, Poor network reception was low (55%) while lack of physical access was moderate at 45%

Table 9: Factors militating against the utilization of ICTs by the cassava farmers

	Factors	Low (%)	Moderate (%)	High (%)
1	Lack of technical experience in manipulating ICT (web tools)	45	35	209
2	Incessant Electricity Supply	40	40	20
3	High cost of ICT (web tools)	41	36	23
4	Poor Network Reception	55	35	10
5	Lack of Physical Access	30	45	24

Conclusion.

Information is an important factor in any human endeavor as it enables individuals made timely and informed decisions that would assist them in the realization of their production goals. The Information and Communication Technology (ICT) revolution is sweeping through the world and the windstorm has even caught up with Nigeria. ICT tools have helped people find, explore, analyze, exchange, and present information without discrimination. ICT, if efficiently used can provide quick access to ideas and experience from wide range of people, communities and cultures. The study investigates the level of awareness, access and effectiveness of information and communication technology (web tools) among the cassava farmers in Ekiti State, Nigeria.

The paper revealed that Facebook was the major source (24.7%) for input delivery and value chain analysis. While 12.3% of the respondents goes for WhatsApp for value addition of processing, 15.3% for Agric-webb for Farm product advertisement. This clearly evidence that access and use of ICT has really improved cassava operations and productivity. The paper found out that access and the use of ICT (Webb-tools) of Facebook, WhatsApp, Agric. Webb and Tik-Tok enhanced farm income. Factors influencing assess to ICT on farm

income of cassava farmers are source of information, member of farm organization. Livelihood sources, Cropping pattern and Education.

Hence, the result from this paper suggested that the Multiple regression model adopted was highly predictive of the Use of ICT-based on farm input information. In addition, use of these ICT-based farm input information was also highly predictive of the increased adoption of farm input information by cassava farmers in Ekiti State, Nigeria. This paper evaluates factors affecting the using information and communication technologies (ICTs) by cassava farmers in the Ekiti state, Nigeria. The empirical results in this paper provide many interesting evidences thus suggest more participation on the usage of Webb tools to improve their farm productivity. Hence, it was recommended that the agricultural extension services through the ministry of agriculture should provide intensive ICT training particularly those Webb tools identified by the study to be effective in agricultural information dissemination and exchange. These Webb tools to be incorporated into extension advisory service for cassava farming operations

References

Abebaw, A., and Yared, M. C. (2019). Factors affecting the use of information and communication technologies for cereal marketing in Ethiopia. Journal of Agricultural & Food Information, 20(1), 59–70. https:// doi.org/10.1080/10496505.2018.1438290

Adewusi SRA, Bradbury JH (1993). Carotenoid in cassava: comparison of open column and HPLC methods of analysis. J. Sci. Food Agric. 62:375-83. http://dx.doi.org/10.1002/jsfa.2740620411 1697

Anh, N.H., Bokelmann, W., Thuan, N.T., Nga, D.T., and Minh, N.V., (2019). Smallholders' preferences for different contract farming models: empirical evidence from sustainable certified coffee production in Vietnam. J. Sust. 11 (14), 1–26

Banmeke, T.O.A and Olowu, T.A. (2005): Accessibility of women farmers to agricultural information in South Western Nigeria. South African Journal of Agricultural Extension 34 (2): 237 – 246.

Bradbury JH, Holloway WD (1988). Chemistry of tropical root crops: significance for the nutrition and agriculture in the Pacific. Austr. Centre. Int. Agric. Res. (ACIAR). 6:1-20. 1697

Buitrago A (1990). La yuga en la alimentacion animal. Centro Internacional de Agricultura Tropical (CIAT). Cali, Colombia. pp. 10-18. 1697

Charles AL, Sriroth K, Huang TC (2005). Proximate composition, mineral contents, hydrogen cyanide and phytic acid of five cassava genotypes. Food Chem. 92:615-620. http://dx.doi.org/10.1016/j.foodchem.2004.08.0241697

FAOSTAT (2011a). Food balance sheet. Available online: http://www.faostat.fao.org Accessed on 20 Jun 2012. 1697

FAOSTAT (2012). Food and Agriculture Organization of the United Nations, Statistics Division. Available at

Gil JL, Buitrago AJA (2002). La yuga en la alimentacion animal. In: Osopina B, Ceballos H, (Eds). La yuga en el tercer milénio: sistemas modernos de produccion, procesamiento, utilizacion y comercializacion. Cali, Colombia: CIAT: pp. 527-569. Available online: http://www.clayuca.org/PDF/libro-yuca/capitulo28.pdf Accessed on 29 Jun 2012. 1697

Henri-Ukoha, A, C. Chikezie, Osuji, M.N, Ukoha, I. I. 2012. Rate of Information Communication Technology (ICT) Use: Its Determinants among Livestock Farmers in Ukwa West LGA, Abia State of Nigeria. International Journal of Agricultural and Food Science, 2(2): 51-54.http://dx.doi.org/10.1111/j.1541-4337.2009.00077.x http://faostat3.fao.org/browse

Hudson BJF, Ogunsua OA (1974). Lipids of cassava tubers (Manihot esculenta, Crantz). J. Sci. Food Agric. 25:1503-1508.http://dx.doi.org/10.1002/jsfa.2740251210. PMid:4437153 1697

ICS-Nigeria (2007): Information and Communication Support for Agricultural Growth in Nigeria http:llwww.ics-nigeria.org.

International Institute for Tropical Agriculture (2004): Nigeria's Cassava Industry: Statistical Handbook, Ibadan, Nigeria.

Kwame, D. Dakwa (2010); ICT in Nigeria Prospects and Challenges for Development (2010) From Africa Today. Vol. 56 No. 4 Pp 95 – 96.

Luqman, M., Yaseen, M., Ashraf, S., Mehmood, M. U., & Karim, M. (2019). Factors influencing use of information and communication technologies among farmers in rural Punjab, Pakistan. Journal of Agricultural Extension, 23(2), 101–112. https://doi.org/10.4314/jae.v23i2.11

Macire Kante, M , Oboko, R., and Chepken, C (2019): An ICT model for increased adoption of farm input information in developing countries: A case in Sikasso, Mali. Information Processing in Agriculture 6: 26 – 46

Mdoda, L and Mdiya, L | (2022) Factors affecting the using information and communication technologies (ICTs) by livestock farmers in the Eastern Cape province, Cogent Social Sciences, 8:1, 2026017, DOI: 10.1080/23311886.2022.2026017

Montagnac JA, Davis CR, Tanumihardjo SA (2009b) Nutritional value of cassava for use as a staple food and recent advances for important. Compr. Rev. Food Sci. Saf. 8:181-194.

Mowat L (1989). Cassava and chicha: Bread and beer of the Amazonian Indians. Shire Publications, Aylesbury, UK. 1698

Nwafor, C. U., Ogundeji A. A., & van der Westhuizen, C. (2020). Adoption of ICT-based information sources and market participation among smallholder livestock farmer's in South Africa. Agriculture, 10(2), 44

Nyarko, D.A and Kozári, J. (2021): Information and communication technologies (ICTs) usage among agricultural extension officers and its impact on extension delivery in Ghana. Journal of the Saudi Society of Agricultural Sciences 20 :164–172

Okigbo BN (1980). Nutritional implication of projects giving high priority of the production of staples of low nutritive quality. In the case of cassava (Manihont esculenta, Crantz) In the humid tropics West Africa. Food Nutr. Bull. 2:1-10.

Oladele, O.I (1999). Analysis of Institutional Research Extension, Farmers Linkage System in South Western Nigeria. An Unpublished Ph.D. Thesis in the Department of Agricultural Extension and Rural development, University of Ibadan, Nigeria, Pp. 11.

Oladipo, A. (2013). Investment Opportunities in Nigerian Economy: The Fastest Growing Economy in Sub-Saharan Africa. A Paper Presented at the 42nd Convention of Rain Push Coalition, ilusion State, USA.

Ozowa, V.N. (2004): Information Needs of Small-Scale Farmers in Africa. The Nigeria Example. Quarterly Bulletin of the International Association of Agricultural Information Specialist, IAALD/CABI, vol. 40 No 1 PP 22 – 30.

Salami A. And Arawomo D.F. (2013). Empirical Analysis of Agricultural Credit in Africa: Any role for institutional factors? Working Paper Series, No 192, African Development Bank, Tunisia.

Tewe O.O. (2004). Cassava for livestock feed in sub-Saharan Africa. FAO/FAD. 1255:1-64. 1698

Torimiro, D.O. (1997): The relationship between socio-economic characteristics of farmers and adoption of improved agricultural technology in Ogun State, Nigeria. The Rural Sociologist, vol. 2 PP 22 – 28.

Wobeto C, Correa AD, de Abreu CMP, dos Santos CD, de Abreu JR (2006). Nutrients in the cassava (Manihot esculenta, Crantz) leaf meal at three ages of the plant. Cienc. Technol Aliment. 26:865-869. http://dx.doi.org/10.1590/S0101-20612006000400024

West CE, Pepping F, Temalilwa CR (1988). The composition of foods commonly eaten in East Africa. The Netherlands: Wageningen Agricultural University. 1698