

## Original Research Article

### AVAILABILITY AND USE OF INFORMATION AND COMMUNICATION TECHNOLOGY BY OIL PALM FARMERS IN THE AKYEMANSA DISTRICT, GHANA

#### Abstract

The use of ICTs forms part of efforts to achieve the Sustainable Development Goals (SDGs) especially ensuring inclusive and equitable quality education and promote life-long learning opportunities for all. In the agricultural sector, access to the right knowledge and information in a timely manner enhances agricultural production and thus increase food production. This study sought to determine the extent of access and use of Information and Communication Technologies (ICTs) by oil palm farmers in the Akyemansa District of Ghana. The primary data used in the study were collected through focus group discussions and structured questionnaires administered to 120 randomly selected oil palm farmers. Both descriptive and inferential statistics were employed in analyzing the data. Results show that 99.00% of farmers have access to radio with a very low availability and access to computer. Chi square test analysis showed that there was a significant difference  $p = (0.00, 0.00 \text{ and } 0.2914)$  between farmers' extent of access to ICTs and their use for oil palm production activities. Also there was a significant difference  $p = (.2233)$  between the extent of access to radio and its frequency of use for oil palm production activities. However, there was no significant relationship  $p = (.8137)$  between farmers extent of access to mobile phone and how often farmers used it for oil palm production. There is need to improve organizational structures, technical and infrastructural facilities regarding ICT availability to allow more access to and use of these facilities.

**Keywords:** Information and Communication Technologies (ICTs), oil palm production, ICT access, Agricultural knowledge Systems

**Comment [U1]:** Where is the research problem?

**Comment [U2]:** Restructure the abstract in line with the corrections given in the body of the work.

#### Introduction

Agriculture Sector has been identified to play a significant role in developing economies that could help achieve the much needed global goal of poverty reduction, in a much more sustainable way [1]. In Ghana, the Agriculture sector accounts for about 20% of the Gross Domestic Product (GDP) and employs more than half of the workforce, mainly small landholders [2].

The oil palm industry which is second to cocoa is segmented into different types of agro-systems, ranging from large agro-industry plantations to smallholder farmers who may or may not be organized into formal groups. This small scale sector is characterized by low-yielding oil palm varieties, low productivity of farms and mills, and low quality CPO, which is sold in the village or at small town markets. Among the constraints faced by the local industry are little demand-driven research, limited access to land and finance, high production costs, low levels of

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technology, low extraction rates and poor quality CPO, and lack of adequate government support [3].

In order to position themselves against the adverse effects of the constraints identified, smallholder farmers in the oil palm industry need to empower themselves through training, facilitation, and networking. Smallholder farmers need to share knowledge in farm and agronomic management through linking with “expert farmers”, who provide a rich source for identified technologies in input use and the sharing of experiences [3].

The conventional public extension service delivery system is bedeviled with several constraints, thus affecting their efficiency and effectiveness. To cope with the low extension contact hours by farmers, these farmers adopt other ways to get agricultural information. Some of these include exploring the ICT tools that are available

Information and communication technologies may be broadly defined as the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware [4]. Ifueko Omoigui Okraku [5] also defined ICT to be the digital processing and utilization of information by the use of electronic computers. It further includes the storage, retrieval, conversion and transmission of information.

ICT covers all forms of computer and communication equipment and software used to create, design, store, transmit, interpret and manipulate information in its various formats. Personal computers, laptops, tablets, mobile phones, radios, television and transport systems are among the many examples of ICT tools (<http://WWW.uq.edu.au/ICT/what-is-ICT>, 2012).

The benefits inherent in the utilization of ICT for agricultural extension and training purposes are well documented [6, 7, 8, 9].

According to Nwagwu and Soremi [10] ICTs offer the potential to increase efficiency, productivity, competitiveness and growth in various aspects of agricultural sector by way of increasing access and exchange of information,

ICTs are considered as being able to improve and enhance two-way information flows and most developments efforts fail due to lack of two-way information flow [9]. At the farm level, farmers require information on supply of inputs, new technologies, early warning systems (on drought, pests and diseases), credit, market prices and their competitors.

In the agricultural sector, access to the right knowledge and information in a timely manner enhances agricultural production and thus increase food production [11].

The use of ICTs forms part of efforts to achieve the Sustainable Development Goals (SDGs) especially ensuring inclusive and equitable quality education and promote life-long learning opportunities for all.

Rural areas and poorer communities in developing countries are disadvantaged in their access to ICT compared with the urban areas and wealthier social groups [12].

Therefore, issues regarding access to ICT by poor rural households have become critical, despite the increasing potential of ICT for promoting economic growth, alleviating poverty and improving food security [13, 14, 15, 16].

**Comment [U4]:** Use only the surname.

**Comment [U5]:** If this is your definition of ICT, how come you involved radio and television in this study? Are they part of electronic computer?

**Comment [U6]:** You must be consistent with your pattern of referencing.

Given the fact that knowledge and information are basic ingredients of food security, ICTs if properly harnessed, offer the potential to store and transmit needed information for agricultural and rural development. However, rural communities in Ghana are marginalized in this era of global integration by being denied access to ICTs [17].

In Ghana, a number of studies have reported on the access and use of ICT tools by farmers in crop and poultry sectors ([18, 19, 20, and 21], however much work has not been done in the tree crop sector, especially the oil palm subsector.

This study was therefore conceived to investigate the extent of access and use of Information and Communication Technologies (ICTs) by oil palm farmers in the Akyemansa District of Ghana. For the purpose of this study, the ICT tools assessed were radio, television, computer/internet and mobile phone.

**Comment [U7]:** Are assessing the availability of ICT or the extent of access? You should note that availability and access are two different things.

The objectives of the study are:

- i. To investigate the common ICT devices that oil palm farmers adopt?
- ii. to determine possible relationships between extent of access and use of ICT by oil palm farmers in the Akyemansa District.
- iii. to determine the extent to which oil palm farmers harness the potential of ICT for use in their oil palm production.

### Study Area and Methodology

**Comment [U8]:** Study area should be separated from methodology.

The study was undertaken in the Akyemansa District in the Eastern Region of Ghana. Akyemansa District is located on longitude 1° 10W and 1° 0E. The district has a land size of 611.80km<sup>2</sup> and population of 97, 374 constituting 3.4% and 3.7% of the total land size and population of the Eastern Region of Ghana respectively. Agriculture employs about 80% of the labour force who cultivate oil palm and cocoa as cash crops. ([www.ghanadistricts.com](http://www.ghanadistricts.com)). Akyemansa district was purposively selected as the study area because of their active involvement in oil palm production as their livelihood activity and also the presence of two radio stations, (Obouba FM, a privately owned radio station and Sunrise FM, a state owned radio station) that run farmers' education programmes. Also this location was selected based on a pre-

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survey in the district that indicated a fair distribution of the ICTs in the area. The scientists wish to investigate into radio, TV, mobile phone, computer and internet.

### Sampling, questionnaire, and data collection

Through the assistance of the Department of Agriculture in the district, multi-stage cluster sampling procedure was used to select four communities (Akim Ofoase, Akokoaso, Abenase and Chia) and respondents for the survey. The list of oil palm farmers in these communities were solicited from the Agricultural Extension Officers assigned to each community. Through simple random sampling technique, thirty (30) farmers were selected per community, making a total of 120 oil palm farmers as the sample size for the study.

A structured survey questionnaire was developed based on in-depth literature review and consultation with experts. The questionnaire was pre-tested with 20 respondents who were randomly selected to complete and make inputs into the content of the questionnaire to ensure clarity of the information obtained. The data collection instrument was subjected to face validity among the different stakeholders involved in oil palm production and Information and Communication and Technology issues. Face to face interview was done between June and August, 2019 to collect data. Three focused group discussions were done to obtain some qualitative data to further explain the observations made in the questionnaire.

Data was analysed by using the Statistical Package for Social Sciences (SPSS) 21.0. Descriptive statistics such as frequency counts and percentages were used to describe the data. Tables, graphs and percentages were used to summarize-present the data and enhance the readability of the results. Chi-square test was employed to examine significant difference between categories and within variable.

**Comment [U10]:** How many persons participated in the focus group discussions? How many respondents were given the questionnaire? How many sessions of FGDs were held and why?

**Comment [U11]:** Are you saying that you used FGDs, Questionnaire and interviews for this study? If yes, you must explain how you selected participants for each segment.

## Result and Discussion

### Access to and use of ICT by Oil Palm Farmers

Figure 1 shows oil palm farmers access to ICT devices. This indicates that oil palm farmers have more access to radio, mobile phones and television compared to internet and computer. Access to radio was observed to be the most common ICT device used by oil palm farmers (99%) in the Akyemansa District of Ghana. Isaya et al. [22] reported that radio and agricultural extension workers were the primary sources of agricultural information for women farmers in Tanzania. [A

**Comment [U12]:** You must provide the name before you put reference number. This makes the reading to make sense.

**Comment [U13]:** This should be linked to the current result. It should be restructured to read, "This result support the view of 22 when he noted that radio and agricultural extension workers were the primary sources of agric information...."

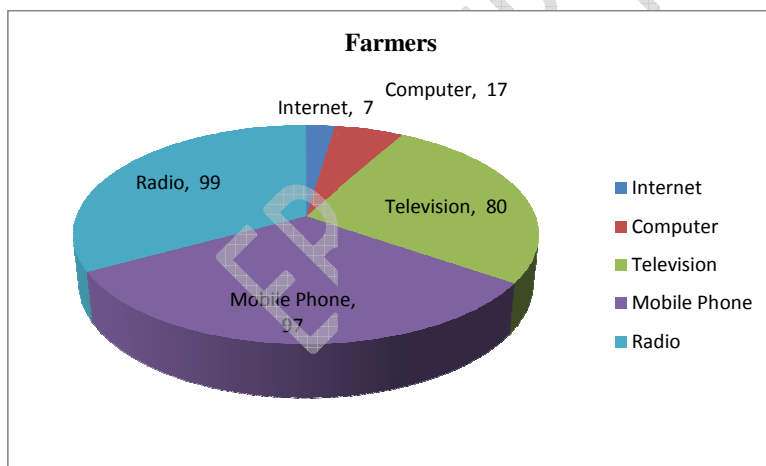
study conducted by Kevin and Mark [23] also showed radio to be the most widely used medium for disseminating information to rural audiences across Africa. Radio is more readily accessible to farmers even in communities with limited access to without phones or electricity. Radio, television, newspapers and mobile phones are vital in wide dissemination of information on climate change information in Tanzania. The high affordability and extensive coverage of radio make it widely accessible to people especially in the rural areas [24, 25].

Of the total number of respondents (N=120), 97% have access to mobile phone for their oil palm production activities and social endeavours. This observation is corroborated by [26] and [27] that mobile phones are among the most exciting forms of ICT, dominant in developing nations especially among the young population. They are speeding up ways in which farmers exchange or manipulate information. Folitse et al. [21] reported of the high penetration of mobile phones in the small scale poultry industry in Ghana. Alam et al. [15] did observe that 81% of rural households, who are mostly farmers in Bangladesh, possessed mobile phones. The findings of this study however indicate a rather low population of oil palm farmers with access to computer (17%) and internet (7%). (Figure 1).

The finding coincides with [28] who reported of low penetration of computer technology in most of rural areas due to lack of electricity, illiteracy, lack of local content and limited opportunities.

**Comment [U14]:** These views are hanging. You must link them to your own result. You result is either supporting or refuting them.

**Comment [U15]:** The finding coincides with the report provided by 28 that..... Always provide the names before the reference number.



**Fig 1. Access to ICT devices by Oil Palm Farmers (multiple options)**

**Extent of access of to ICT Tools and its Use in oil palm production**

Table 1 showed a significant relationship between oil palm farmers' access to Television and its use for oil palm production activities ( $P < 0.001$ ;  $\chi^2 = 29.632$ ;  $df = 1$ ).

On how access to mobile phone affects the use for oil palm production activities, a significant difference was observed between oil palm farmers who have access to mobile phone and those who do not have access. ( $P < 0.001$ ;  $\chi^2 = 29.8143$ ;  $df = 1$ ) (Table 2). Mobile phones enable farmers to easily share information among them at a relatively low cost and in a timely manner. Boadi et al. [29] revealed that farmers in rural Eastern and Central Regions of Ghana get better information flow, enhanced marketing activities, operational efficiencies and cost savings through the use of mobile phones.

The study however observed that mobile phone access was not significantly associated with the frequency of its use in oil palm production ( $P < 0.813749$ ;  $\chi^2 = 1.5724$ ;  $df = 1$ ). Thus, oil palm farmers with easy access did not use them more frequently for oil palm production activities than farmers without access to mobile phone (Table 3).

The effect of oil palm farmers' access to radio on its use and frequency of use for oil palm production activities were studied as indicated in table 4 and 5. It was realized that there were significant differences ( $P < 0.2914$ ;  $\chi^2 = 10.789$ ;  $df = 1$ ,  $P < 0.2233$ ;  $\chi^2 = 11.4092$ ;  $df = 1$ ) for radio use and frequency of use respectively. The two radio stations, Obouba FM, and Sunrise FM, in the area do present programme in the local language, that is the Akan Language on agricultural activities and this really situates well with the farmers, thus the high use by farmers who have access to radio.

This finding confirms the study by [30] who reported that most farmers used radio for agricultural information due to its cost effectiveness, the low educational level of farmers and the aging of the rural population.

Comment [U16]: Provide name

Table 1: Farmers' extent of access to TV and its use in oil palm production

Extent of access to TV palm production?	Frequency/ Percentage	Do you use <u>information from</u> Television in oil		
		Yes	No	Total
Personal	Frequency	50.0	14.0	64.0
	%	78.1	21.9	100.0
Non-personal	Frequency	16.0	40.0	56.0
	%	28.6	71.4	100.0

Total	Frequency	66.0	54.0	120.0
	%	55.0	45.0	100.0

**Source:** Survey Data ( $\chi^2=29.632$ ,  $df=1$ ,  $p=0.00001$ )

**Table 2: Farmers' extent of access to Mobile Phone and its use in oil palm production**

Extent of access to Mobile Phone	Frequency/ Percentage	Do you use mobile in oil palm production?		
		Yes	No	Total
Personal	Frequency	124.0	9.0	133.0
	%	93.2	6.8	100.0

Non-personal	Frequency	5.0	7.0	12.0
	%	41.7	58.3	100.0
Total	Frequency	129.0	16.0	145.0
	%	89.0	11.0	100.0

Source: Survey Data ( $\chi^2=29.8143$ ,  $df=1$ ,  $p=0.00001$ )

**Table 3: Extent of access to mobile phone and frequency of its use**

Extent of access to Mobile Phone	Frequency/ Percentage	How often do use mobile phone in oil palm production?		
		Very often	often	Total
Personal	Frequency	102	22	124
	%	82.1	17.9	100.0
Non-personal	Frequency	3.0	2.0	5.0
	%	60.0	40.0	100.0
Total	Frequency	105	24.0	129.0



%                      81.4                      18.6                      100.0

Source: Survey Data ( $\chi^2=1.5724$ ,  $df=1$ ,  $p=.813749$ )

**Table 4: Farmers' extent of access to Radio and its use in oil palm production**

Extent of access to Radio	Frequency/ Percentage	Do you use radio in oil palm production?		
		Yes	No	Total
Personal	Frequency	120.0	10.0	130.0
	%	92.3	7.7	100.0
Non-personal	Frequency	12.0	6.0	18.0
	%	67.0	33.0	100.0
Total	Frequency	132	16.0	148.0

%                      89.0                      11.0                      100.0

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Source: Survey Data ( $\chi^2=10.7809$ ,  $df=1$ ,  $p=0.2914$ )

**Table 5: Extent of access to radio and frequency of its use**

Extent of access to Radio	Frequency/ Percentage	How often do use radio in oil palm production?		
		Very often	often	Total
Personal	Frequency	116.0	13.0	129.0
	%	89.9	10.1	100.0
Non-personal	Frequency	2.0	3.0	5.0
	%	40.0	60.0	100.0
Total	Frequency	118.0	16.0	134.0
	%	88.1	11.9	100.0

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Source: Survey Data ( $\chi^2=11.4092$ ,  $df=1$ ,  $p=.2233$ )

### **Sourcing of Agricultural Information for oil palm production**

Table 6 revealed that oil palm farmers' information sourcing pattern from production to marketing was skewed towards non ICT sources. Most of the farmers depend largely on non ICT sources, such as face-face with fellow farmers, relatives, friends, AEAs and indigenous knowledge. Thus the farmers are not exploiting the full potential of ICT in their production activities. This finding confirmed the study by [31] in Cyprus that face-to-face communication was among the major sources of agricultural information to farmers. Farmers indicated in a focus group discussion that they are able to strengthen their connection with government policies and other stakeholders through radio programs. Radio is still used as an agricultural information source, both in developed and developing countries. Radio is the most convenient way by which farmers access affordable, relevant and reliable information [32].

**Comment [U17]:** This is not part of the objectives that stated earlier.

**Table 6: Farmers' information sources along the oil palm production**

<b>chain</b>		Responses	Percent cases
Agricultural activity	Source of information	N	
Production decision	Non ICT sources	167	128.4
	Phone calls	34	26.1
	TV	1	0.76
	Radio	45	34.6
Total		<b>247</b>	<b>189.7</b>

Input acquisition	Non ICT sources	123	94.4
	Phone calls	67	51.5
	TV	11	8.4
	Radio	35	26.9
Total		<b>236</b>	<b>181.2</b>
Meteorological information	Non ICT sources	60	46.1
	Phone calls	43	33.0
	TV	18	13.8
	Radio	112	86.0
Total		<b>233</b>	<b>178.9</b>
New/improve technology use	Non ICT sources	108	82.9
	Phone calls	45	34.6
	TV	12	9.2
	Radio	43	33.0
Total		<b>208</b>	<b>159.7</b>
Processing and packaging	Non ICT sources	112	86.0
	Phone calls	57	43.8
	TV	18	13.8
	Radio	35	26.9
Total		<b>222</b>	<b>170.5</b>

Marketing	Non ICT sources	78	59.9
	Phone calls	69	53.0
	TV	37	28.4
	Radio	40	0.7
Total		<b>224</b>	<b>72.0</b>

*Multiple responses exist*

Source: Survey, 2019

**Comment [U18]:** Your 3<sup>rd</sup> objective is not reflected in your results. The results from the FGDs and interviews are not reflected in your results.

## Conclusion and Recommendations

The study identified the availability and use of ICT tools by oil palm farmers in the Akyemansa District of Ghana. Subsequently it examined the common ICT devices oil palm farmers adopt.

The study also looked at the extent of access to ICT devices and their use. The ICT devices considered for this study comprised Television, Mobile Phone, radio, Computer and the internet

The primary data used in this study were collected through structured questionnaires administered to randomly selected 120 oil palm farmers. The data was analyzed using both descriptive statistics and inferential statistics. The descriptive statistics comprised frequencies pie chart and percentages while the inferential statistics used is the Chi square. Analysis shows that majority (99.00%) of the farmers have access to radio which is followed by (97.00%) having access to Mobile phone. However, the study show a very low access to Computer (17.00%) and internet (7.00%)

**Comment [U19]:** These are mere repetitions.

The result of the Chi Square analysis shows a significant difference between access to Television, mobile phone, radio and their use by farmers. There is a significant difference between farmers' access to radio and its frequency of use. However, there is no significant difference between access to mobile phone and its frequency of use.

The study further revealed that most of the farmers are skewed towards non ICT sources to source for information regarding their production and marketing activities. Thus, they are not fully exploiting the IC Technologies available to them.

**Comment [U20]:** You are presenting results here instead of conclusion.

From the ~~foregoing~~ results, it can be seen the study has shown that ICT is available and being used by oil palm farmers for their production ~~actives~~.

**Comment [U21]:** This conclusion is too hasty. You must make your conclusions according to your objectives based on your results.

However, in order to harness the full potential of ICT, it is recommended that government puts in policies that will promote the use of computer and internet among farmers. Specifically, Community Computer Laboratories should be opened in these areas with reliable source of electricity ~~and to training~~ farmers on how to use ICT for sustainable agricultural production.

The farmers' radio programmes should be strengthened in term of content and frequency of broadcast as radio use was observed to be high among the farmers. Finally, supporting organizational structures, technical and infrastructural issues need to be in place to promote more access to and use of these facilities.

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**Comment [U22]:** You may need to adjust your title to reflect the body of your work. I suggest you change it to read: Access and use of information and communication technology for oil palm production among farmers in Akyemansa District, Ghana.

**Comment [U23]:** The conclusion is poor. It needs proper rework.

**Comment [U24]:** Tables 1-5 can be merged into a single table. It will make the work more catchy and reduce space.

**Comment [U25]:** You must support your findings with the result from FGDs and interviews. It will strengthen the work.