ASSESSMENT OF LEVELS OF INFORMATION AND COMMUNICATION TECHNOLOGY APPLICATION ON AGRICULTURAL PRODUCTION FOR SUSTAINABLE NATIONAL DEVELOPMENT

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Abstract

The study assessed the levels of ICT application on agricultural production towards economy recovery. Specifically, the study examined the relationship between ICT and Agricultural production; and identified the challenges faced by the department as regard the use of ICT in agricultural production, husbandry, and marketing of farm produce. Purposive and simple random sampling techniques were used to select a sample of 50lecturers and students of department of Agriculture in the college. Data were collected with the aid of questionnaire. Data analysis and hypotheses testing were carried out using frequency distribution tables, simple percentages and chi square. The findings showed that the level at which farmers applied ICT in agricultural production, record keeping and marketing was low which was represented by 30%. The study found that there was relationship between ICT and agricultural production. This finding was supported by the chi-square result in which the X^2 calculated (40.62) is greater than X^2 tabulated (21.026).The study identified challenges being faced by farmers on ICT application to include lack of education (70%); lack of technical knowhow (70%); inadequate funding (70%); lack of government intervention (72%); inadequate power supply (80%); poor internet infrastructures (72%); high cost of maintenance of internet infrastructures (74%); and lack of support for intensive use of e-learning network for teaching and learning by the government. It was concluded that the level at which ICT was applied by farmers to boost agricultural activities was low. It was however recommended that harmonized ICT curriculum should be introduced at all level of education; adequate ICT infrastructure must be provided; farmers should have access to good and affordable internet connectivity and there must be availability of constant/adequate power supply

Keyword: Assessment level, Information, Communication, Technology, Agriculture, Sustainable, Development

Introduction

Agriculture is a major and most certain part to economic growth and sustainability. It encompasses all aspect of human activities. Therefore, Agriculture is critical to achieving national development and global poverty reduction and it is still the single most important productive sector in most low-income countries, often in terms of its share of Gross Domestic Product and almost always in terms of the number of people it employs (IDA, 2009). In countries where the share of agriculture in overall employment is large, broad-based growth in agricultural incomes is essential to stimulate growth in the overall economy, including the non-farm sectors

selling to rural people. Hence, the ability of agriculture to generate overall GDP growth and its comparative advantage in reducing poverty will vary from country to country (FAO, 2012). Majority of the poor populace in Nigeria live in rural areas, and most of them depend mainly on agriculture for their livelihoods. To support broad-based poverty reduction and food security in Nigeria, smallholder agriculture must be a central investment focus (Garvelink et al., 2012). Nigeria is a vast agricultural country "endowed with substantial natural resources" which include: 68 million hectares of arable land; fresh water resources covering about 12 million hectares, 960 kilometres of coastline and an ecological diversity which enables the country to produce a wide variety of crops and livestock, forestry and fisheries products (Arokoyo, 2012). Poverty in Nigeria is concentrated in rural areas, which are home to more than 70% of the nation's poor.

Increasing agricultural production is critical in reducing poverty as it can boost farmers' income especially smallholder farmers who have limited resources to leverage in growing and marketing their produce.

Statement of the Problem

The Nigeria agricultural sector, despite its potential, continues to face challenges in terms of productivity, efficiency, competitiveness. One major constraints is the limited adoption and application of information communication technology (ICT) in agricultural production. The lack of effective ICT integration hinders access to critical information, markets, and resources resulting in suboptimal yields, reduced incomes, and diminished national food security. The study seeks to assess the levels of ICT application in agricultural production in Nigeria with a view to identifying the challenges and opportunities for leveraging ICT to drive sustainable national development through agricultural transformation.

Purpose of the Study

The study focused on the assessment of levels of Information and Communication Technology application on Agricultural Production towards a sustainable national development and economy recovery. This study will specifically examine:

1. The personal characteristics of respondents.
2. The level of ICT application in agricultural production.
3. The relationship between ICT and Agricultural production.
4 The problems faced by farmers in application of ICT

Research Questions

- What are the personal characteristics of the respondents?
- What is the level of ICT application in agricultural production?
- Is there any relationship between ICT and Agricultural Production?
- What constraints were faced by farmers in the application of ICT in Agricultural Production?

Study Hypothesis

Ho: There is no relationship between ICT and Agricultural Production.
H_1: There is significant relationship between ICT and Agricultural Production.

Significance of the Study

This study would be of great importance to the Government to create an integrated agricultural information system on agro-technologies and techniques, pricing and market information so that strategic and vital information could be provided to farmers and other stakeholders at national, local and region levels and also it will also help government to solve the problem of economic recession through agricultural production. The study will help in the development of ICTs skills among agricultural extension workers and farmers

Scope of the Study

The study focused on assessment of levels of Information and Communication Technology application on Agricultural Production for sustainable development. This study was limited to department of Agricultural Education, Federal College of Education (Special), Oyo, Oyo State

Research Design

The design of the study was a descriptive survey. Data was collected through the use of questionnaires to investigate the assessment levels of Information and Communication Technology application on Agricultural Production for sustainable national development.

Population of the Study

The target populations were lecturers and students of Federal college of education (Sp) Oyo.

Sample and Sampling Techniques

A total number of five (5) lecturers were purposively selected and forty five (45) students were randomly selected to make a total of fifty (50) respondents used in this study.

Research Instrument

The instrument used for this study was structured questionnaire. The questionnaire was in two sections. Section A and B, section A contained personal characteristics of the respondents while Section B contained questions relevant to the research questions. The respondents were provided with 4-point Liker Scale, made up of the following responses: Agree (A), Strongly Agree (SA), Disagree (D) and Strongly Disagree (SD). The questionnaire has twenty (20) items.

Validity and Reliability of Instrument

The validity and reliability of instrument was ensured through test re-test method, a structured questionnaire was subjected to reliability testing to ensure its consistency and accuracy in measuring the levels if ICT application in agricultural production

Method of Data Analysis

Frequency table and Simple percentage were used to analyze demographic data and research questions. Chi-square was employed to establish the relationship between the study variables – ICT and Agricultural Production.

Results and Discussion

Descriptive Analysis

Table 1: Distribution of Respondents by Demographic factors

Demographic Factors	Frequency	Percentage (%)
Sex		
(i) Male	26	52
(ii) Female	24	48
Age(years)		
(i) 20 – 25	20	40
(ii) 26 – 35	15	30
(iii) 36 – 45	10	20
(iv) 46 and above	05	10
Religion		
(i) Christianity	24	48
(ii) Islam	22	44
(iii) Traditional	04	08
Working Experience		
(i) 1-10years	25	50
(ii) 11 – 20 years	15	30
(iii) 21years and above	10	20

Source: Field Survey, 2023

From the above table, it was revealed that 52% of the respondents were males while 48% were females. This implies that there was gender balance as numbers of male respondents in the department of agriculture were almost at par with female respondents. Also the table showed that 40% of respondents fell within the age of 20-25 years, 30% fell between 26-35 years, 20 % of ages were between 36-45 and 10% are above 45 years. Furthermore, it was revealed that 48% of the respondents were Christians, 44% were Muslims, and however, 8% were traditionalists. This implies that majority of the respondents in the agricultural department were Christians and Muslims, this is in line with Rumezaet et al. (2006), which stated that all religion support farming. The table finally showed that 40% of the respondents had 1 – 10 years' experience in agriculture, 30% had 11 – 20 years' experience while 20% of the respondents were in agricultural businesses for 21 years and above. This implies that respondents participated in the study had gained a lot of knowledge in agriculture

Table 2: Distribution of Perception of Respondents on the level of ICT application in Agricultural production

S/N	SA	A	D	SD	TOTAL
1	20(40)	15(30)	05(10)	10(20)	50(100)
2	15(30)	17(34)	12(24)	06(12)	50(100)
3.	10(20)	25(50)	05(10)	10(20)	50(100)
4.	08(16)	22(44)	08(16)	12(24)	50(100)
5.	12(24)	24(48)	12(24)	02(04)	50(100)
6.	18(36)	18(36)	05(10)	09(18)	50(100)
7.	05(10)	10(20)	15(30)	20(40)	50(100)

Source: Field Survey, 2023.

Note: The bracket figures indicate the percentage and figures not bracket indicate frequency.

Descriptive analysis of the responses of the respondents on the level of ICT application in Agricultural production

Table 2 above, shows that the respondents strongly agreed that ICT are useful tools in agricultural production toward economic recovery which was indicated by 40%. 30% also agreed to it. However, 10% and 20% disagreed and strongly disagreed respectively. This implies that ICT are useful tools in agricultural production for sustainable livelihood. It was shown that30% of the respondents strongly agreed; 34% agreed; 24% strongly disagreed and 12% disagreed that ICT plays a vital role in informing farmers about pest and disease outbreak. This implies that the role of ICT in pest and disease control on the farm is significant. It was revealed in the table that 20% strongly agreed and 50% agreed that ICT helps in assessing market situation and better marketing channels for farm yield. Meanwhile, 10% strongly disagreed and 20% disagreed. This implies that ICT is a potential tool for marketing of farm yield; this is in line with assertion of Sikoraetal (2012) which stated that ICT will continue to remain a driving force for marketing in the ever changing digital world. Likewise, the table revealed that 16% of the respondents strongly agreed and 44% agreed while 16% and 24% strongly disagreed and disagreed respectively that ICT application was very important in helping to find out where to purchase high quality farm input at cheaper rate. This implies that ICT application provides information on different sources of farm input supplies. The table also showed the responses of the respondents of Federal College of Education Special Oyo on the statement that ICT played important roles in facilitating agricultural productions through increase in efficiency of market interactions: 24% of the respondents strongly agreed, 48% agreed. However, 24% strongly disagreed and 4% disagreed. This implies that ICT played important roles in facilitating agricultural productions through increase in efficiency of market interactions, this is in line with the argument of Sabo etal (2009) which stated that importance of ICT in boosting food

production cannot be overemphasized as this contribute to the massive food production in most advanced countries of the world. Information presented in the table showed that majority of respondents 36% strongly agreed and agreed respectively that ICT tools allowed farmers to obtain immediate information on a regular basis. While, 10% and 18% strongly disagreed and disagreed with it respectively. This implies that ICT tools allow farmers to obtain immediate information on a regular basis. The table finally showed that 10% strongly agreed, 20% agreed, however, 30% strongly disagreed and 40% disagreed that farmers apply ICT tools to improve agricultural production, record keeping and husbandry. This implies that farmers did not apply ICT tools to improve agricultural production, record keeping and husbandry as this is in line with Arokoyo (2012) which affirms that farmers have not been making maximum use of ICT to boost food production.

Table 3: Distribution of Perception of Respondent on the relationship between ICT and Agricultural Production.

S/N	SA	A	D	SD	TOTAL
8.	15(30)	20(40)	10(20)	05(10)	50(100)
9.	18(36)	18(36)	04(08)	10(20)	50(100)
10.	16(32)	22(44)	05(10)	07(14)	50(100)
11.	17(34)	15(30)	08(16)	10(20)	50(100)
12.	08(16)	12(24)	14(28)	16(32)	50(100)

Source: Field Survey, 2023.

Information on table 3 above revealed that 30% of the respondents strongly agreed that there is relationship between ICT and agricultural production. 40% also agreed, while 20% and 10% strongly disagreed and disagreed respectively. This implies that there is relationship between ICT and agricultural production. 36% of the respondents strongly agreed and agreed respectively ICT helps to develop skills among agricultural extension workers and farmers while 8% strongly disagreed and 20% disagreed. This implies that ICT helps to develop skills among agricultural extension workers and farmers. The table reveals that 32% of the respondents strongly agreed that ICT boost agricultural production through strategic and vital information retrieve by means of information system. 44% agreed to it. However, 10% and 14% strongly disagreed and disagreed respectively. This implies that ICT boost agricultural production through strategic and vital information retrieved by means of information system. The table showed that 34% and 30% of the respondents strongly agreed and agreed that information is a vital resource and has its application in rural area, agricultural and industrial development; this is in line with Sabo et al. (2009) assertion that ICT is a vital resource that promotes rural industrial development. Meanwhile, 16% and 20% strongly disagreed and disagreed respectively. This implies that Information is a vital resource and has its application in rural area, agricultural and industrial development. It was finally revealed that 16% of the respondents strongly agreed, 24% agreed, 28% strongly disagreed and 32% disagreed that ICT enables solutions for food and agricultural productions. This implies that ICT alone does not facilitate solutions to food and agricultural

productions problems, this contradict the assertion of Tanumihardjo et al. (2005) which argued that ICT is the major solution to food security.

Table 4: Distribution of Perception of Respondent on the constraints faced by farmers as regard the application of ICT in Agricultural Production, husbandry, marketing of farm products.

S/N	SA	A	D	SD	TOTAL
13.	20(40)	15(30)	05(10)	10(20)	50(100)
14.	10(20)	25(50)	05(10)	10(20)	50(100)
15.	10(20)	25(50)	06(12)	09(18)	50(100)
16.	12(24)	24(48)	04(08)	10(20)	50(100)
17.	18(36)	22(44)	05(10)	05(10)	50(100)
18.	20(40)	16(32)	10(20)	04(08)	50(100)
19.	15(30)	22(44)	06(12)	07(14)	50(100)
20.	14(28)	26(52)	04(08)	06(12)	50(100)

Source: Field Survey, 2023.

Note: The bracket figures indicate the percentage and figures not bracket indicate frequency.

The table 4, above shows that 40% of the respondents strongly agreed, 30% agreed, 10% strongly disagreed and 20% disagreed that lack of education is one of the constraints faced by farmers as regard the application of ICT in agricultural production. It implies that lack of education is one of the constraints faced by farmers as regard the application of ICT in agricultural production. Study revealed that 20% of the respondents strongly agreed and 50% agreed while 10% strongly disagreed and 20% disagreed that lack of technical knowhow is the major constraint faced by farmer as regard the application of ICT. This implies that lack of technical knowhow is the major constraints faced by farmer as regard the application of ICT, which is in line with Sabo et al (2009) which emphasized that most farmers in the rural areas are having issues in utilization of modern innovations as a result of problems of technical knowhow. The table also shows that 20% strongly agreed, 50% agreed, 12% strongly disagreed and 18% disagreed that inadequate funding to purchase the required ICT tools is another constraint faced by farmers as regard application of ICT. It implies that inadequate funding to purchase the required ICT tools is another constraints faced by farmers as regard application of ICT.

The table further reveals that 24% of the respondents strongly agreed, 48% agreed, while 8% strongly disagreed and 20% disagreed that lack of Government intervention is also a major constraint to application of ICT in agricultural production, husbandry, and marketing of farm products. Opinions of the respondents also indicated that 36% strongly agreed and 44% agreed to the statement that inadequate power supply and poor awareness are also bane faced by farmers on application of ICT in agricultural production. 10% disagreed and 10% strongly disagreed. It therefore implies that inadequate power supply and poor awareness are also challenges faced by

farmers on application of ICT in agricultural production. It was shown that 40% of the study participants strongly agreed and 32% agreed while 20% strongly disagreed and 8% disagreed that poor internet infrastructure and access problem is one of the challenges faced by farmers. It implies that poor internet infrastructure and access problem is one of the challenges faced by farmers.

More so, the table revealed that among the respondents 30% strongly agreed and 44% agreed that high cost of maintaining ICT infrastructures is also a major problem while 12% strongly disagreed and 14% disagreed. It implies that high cost of maintaining ICT infrastructures is also a major problem ICT application by farmers, this is in line with Arokoyo(2012) and FAO (2012) which state that ICT infrastructure requires huge financial resources for maximum performance:.

It was shown in the table that 28% of the respondents strongly agreed and 52% agreed that Government inability to support intensive use of e-learning network for teaching and learning is also a major challenge.8% strongly disagreed and 12% disagreed. It implies that Government inability to support intensive use of e-learning network for teaching and learning is also a major challenge.

Testing of Research Hypothesis

A non-parametric statistic testing tool chi-square was used to test hypotheses about the difference between means of the groups. The hypotheses were tested using the chi-square test at 5% level of significance.

$$X^2\text{- calculated} = \frac{\sum (O-E)^2}{E}$$

Where, $\sum$ = Summation
O = Observation
E = Expected or theoretical frequency
X^2 = Chi-square

Decision Rule

If the X^2 calculated from observation in each of test is greater than the critical value of 0.05 (95%) level of significance, the null hypothesis (Ho) will be rejected while alternative hypothesis (Hi) will be accepted. If otherwise, alternative hypothesis will be rejected and null hypothesis (Ho) will be accepted.

Hypothesis

H0: There is no significant relationship between ICT and Agricultural Production.
H1: There is significant relationship between ICT and Agricultural Production.
Items of questionnaire used were 8 to 12.

Table 4.A: Item 4, 8, 9 and 12Table

Item	SA	A	D	SD
8	15	20	10	05
9	18	18	04	10
10	16	22	05	07
11	17	15	08	10
12	08	12	14	16
Total	74	87	41	48

Table 4.B: Chi-Square Table

O	E	O – E	$(O – E)^2$	$(O – E)^2/E$
74	50	24	576	11.52
87	50	37	1369	27.38
41	50	-09	81	1.62
48	50	-02	04	0.10
Total				40.62

Degree of freedom = (r – 1) (c – 1)
Where r = row total, c = column total
Level of significance = 0.05

r = 5, c = 4

Degree of freedom = (5 – 1) (4 – 1)

= 12

Tabulated chi-square = 21.026
From table 4.B, calculated chi-square= 40.62

Since, the X^2 calculated (40.62) is greater than the critical value of X^2 tabulated (21.026). Null hypothesis (H0) is rejected which states that there is no relationship between ICT and Agricultural Production. The alternative hypothesis (H1) is accepted which states that there is relationship between ICT and Agriculture

Conclusion

Based on the findings, it was concluded that while there is a growing awareness and adoption of Information communication technology among stakeholders, the levels of application remains low. The study several key challenges hindering adoption and application, including lack of fund, inadequate infrastructure, limited access to ICT tools, lack of education, poor technical knowhow on the part of farmers, inadequate power supply among others.

Recommendations

Based on the findings, the study therefore recommends the following:

- One of the challenges faced by farmers in application of ICT is lack of education. Therefore, harmonized Information and Communication Technology curriculum should be introduced at all level of education.
- To encourage and sustain adequate use of ICT by farmers to boost agricultural production, marketing and record keeping, and qualified personnel must be on ground; adequate ICT infrastructure must be provided; farmers should have access to good and affordable internet connectivity; and there must be availability of constant/adequate power supply.
- The Government should create an integrated agricultural information system on agro-technologies and techniques, pricing and market information so that strategic information could be provided to farmers and other stakeholders at national, provincial and district levels.
- There is need to intensify the use of radio and television programmes and integrates new technologies as a mean.

- The study also recommends increased investment in ICT infrastructure, capacity building for agricultural stakeholders, and the development of context-specific ICT solutions.

By addressing these challenges and harnessing the potentials of ICT , Nigeria can enhance agricultural production , improve food security ,and drive sustainable national development.

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