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EFFECTS OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) ON THE LIVELIHOODS OF MAIZE FARMERS IN TARABA STATE, NIGERIA

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Abstract
This study investigated the effects of information and communication technologies (ICTs) on the livelihoods of maize farmers in Taraba State, Nigeria. Using a multi-stage sampling method and Slovin's formula, data were collected from primary sources and analyzed with descriptive and inferential statistics. Each type of ICT has a significant influence on maize farmers' livelihoods. Specifically, mobile phones and televisions significantly impacted living standards, with varying levels of statistical significance at 10 % and 5 %. The study concludes that there is a significant influence of ICT use on maize farmers, and effective ICT use positively affects their livelihoods. It is recommended that the use of mobile phones and televisions should be considered at the level of living, and efforts should be made to improve access to these ICTs for maize farmers. Extension guides and bulletins also have a notable impact on level of living. Expanding agricultural programs on these media, focusing on practical farming techniques, pest control, and market trends, and ensuring they are up-to-date, easily accessible, and widely distributed can help farmers stay informed about the latest agricultural practices and innovations.

Introduction

Information and Communication Technologies (ICTs) boost the information supply on improved farm technologies and the resultant effect, productivity, and income of farmers. The challenge is that most Nigerian farmers have little awareness, although some have adequate knowledge of the use of ICT facilities like computers and the Internet (Omotayo, 2015). Nkwocha *et al.* (2019) in their study found that there were more prevalent

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factors limiting access to ICTs in rural areas of Imo State. Similarly, Shah, (2019) reported that access to broadband internet services is substantially lower in rural areas and poor urban neighborhoods in many developing countries than in metropolitan areas.

As the World population grows from 6 to 7 and heads toward 9.1 billion by 2050, food production will need to double over this same period (Anjali *et al.*, 2024). Thus, more effective extension services are needed to address agricultural challenges, including meeting the information needs of poor smallholder farmers in developing countries. In response, agricultural extension experts and institutions around the world are promoting the use of ICTs by agricultural extension and education agents. Information and Communication Technologies can expedite the process of agricultural technology transfer from research and development institutions to farmers. Information Communication Technologies improve the adoption of agricultural technology by supporting farmer learning, problem-solving, and accessibility to profitable markets for crops. Research findings reveal that ICTs improve the productivity and livelihoods of poor smallholder farmers. Maximizing the above importance of ICTs by crop farmers in Taraba State has been a great challenge, hence the need to analyze the use of ICTs and their effects on the livelihood of maize farmers in the State.

Research Objective: to assess the effect of ICTs on the livelihoods of maize farmers in Taraba State, Nigeria.

Hypothesis: ICT usage has no significant usage on the livelihood of maize farmers.

Empirical Review

The result of a study conducted in Iran by Nazaril *et al.* (2015) indicated that 68% of the respondents believed that television-produced agriculture programs provided benefits to farmers.

The fruitful results of agriculture development depend on the use of access and the mobilization of the community to rely on television. Experts in agriculture extension believe that mass media can bring positive changes and growth to agriculture in developing countries by using communication technologies in their countries (Salleh, 2015).

There is no doubt that radio is one of the most important tools of communication technologies and has played an important role in the development of agriculture. Radio provides farmers with the latest information and knowledge about the market. Furthermore, using the radio, farmers get immediate responses from agriculture experts about agriculture issues and problems. Similarly, the role of radio in spreading socio-economic and cultural information is also important in rural areas of developing countries. (Murty and Albino, 2015).

Mobile phones have provided good facilities and access to farmers to obtain information about agriculture from nearby markets, especially in West African countries. However, many farmers live in remote areas and do not have proper access to communication technologies. The study conducted in South Africa showed that mobile phones have a positive impact on farmers' incomes (Aker, and Mbiti, 2015).

Other important effects of ICTs on crop farmers include; communication with agriculture experts to obtain information about the use of pesticides in their farms; weather monitoring systems which provide lots of benefits to different communities in the shape of increasing income and awareness; broadcasting different agricultural-related programs, disseminating scientific and agricultural knowledge among farmers, overcoming problems related to physical distance and mobility of people, and enhancement of agricultural financial transactions like the e-wallet innovation in Nigeria (Kefela, 2016).

Afolabi *et al.* (2020). The adoption of improved maize varieties has a positive impact on the livelihoods of maize farmers in Nigeria. The study revealed that farmers who adopted improved maize varieties had higher yields, incomes, and food security.

Ayim *et al.* (2022), in a similar study, also posited that ICTs could play a role in improving the livelihoods of maize farmers in Nigeria. The study found that ICTs can provide farmers with access to information, markets, and financial services.

Methodology

Taraba State is located in the North-Eastern geopolitical zone of Nigeria, West Africa. It lies roughly between the latitude of North 06° 20′ and North 09° 40′ and the longitude of East 09° 00′ to East 12° 00′. It shares an international boundary with the Republic of Cameroun in the south and east.

The State was created on August 27th, 1991, and it was removed from the defunct Gongola State. It covers a land area of 54,473 square kilometers.

The study uses primary data collection with structured questionnaires. However, maize farmers in the three (3) Senatorial zones in Taraba state formed the major respondents for data collection in this study. A structured questionnaire was designed to capture necessary information on the socioeconomic characteristics of respondents and the effects of ICTs on maize farmers' livelihood which is classified into yield, income, and level of living. A multiple regression model was also used to analyze the effects of ICT use on the livelihood of maize farmers and test the hypothesis at the 0.05 level of significance. The model is specified as follows:

$Y = \alpha + \delta_1 X_1 + \delta_2 X_2 + \delta_3 X_3 + \delta_4 X_4 + \delta_5 X_5 + \delta_6 X_6 + \delta_7 X_7 + \delta_8 X_8 + \delta_9 X_9 + U;$

Where:

Y = Livelihood of maize farmers (yield, income, and level of living).

X_1 = mobile phone.

X_2 = radio frequency

X_3 = Television

X_4 = social media.

X_5 = Magazines and Newspapers

X_6 = Internet

X_7 = Bulletins

X_8 = Pamphlets

X_9 = extension guide.

B_0= Constant

$\beta_1 - \beta_{10}$= Regression coefficients

U = error term.

Results and Discussions

Results

Table 1: Effects of the level of ICTS usage on level of living of maize farmers

Variable	Coefficient	Standard Error	T-Value
Constant	14.552	2.453	5.930
Radio	-1.263*	0.656	-1.925
Mobile phone	2.408*	1.375	1.751
Television	0.806**	0.347	2.318
Social media	-0.515*	0.278	-1.853
Internet	-0.095	0.348	-0.274
Magazines and News Papers	-0.393	0.690	-0.570
Pamphlets	-0.234	0.266	-0.880
Bulletins	0.086	0.267	0.324
Extension guide	-0.535*	0.282	-1.893
F-value	2.89		
Prob > F, where	0.000		
R-squared	0.566		
Adjusted R-squared	0.515		

*** and * represent 5% and 10% significance levels, respectively.*

To assess the effects of ICTs usage on the livelihood of maize farmers, the results on Table 1 reveal that Radio has a coefficient of -1.263* (t-value; -1.925), Mobile phone 2.408* (t-value; 1.751), Television 0.806** (t-value; 2.318), Social media -0.515* (t-value; -1.853), Internet -0.095 (t-value; -0.274), Magazine and newspaper -0.393 (t-value; -0.570), Pamphlets -0.234 (t-value; -0.880), Bulletins 0.086 (t-value; 0.324), Extension guide -0.535* (t-value; -1.893). The results show that various ICT tools have different degrees of effects on the livelihoods of maize farmers in Taraba State.

Hypothesis (H_{01}): ICT usage has no significant usage on the livelihood of maize farmers in Taraba State.

Based on the results in Tables 1, the level of mobile phones and television had a positive effect on the level of living of maize farmers with positive coefficients (2.408) and (0.806) and were significant at 10% and 5% levels of probability; therefore, the second hypothesis, which stated that the use of ICTs had no significant effects on maize farmers' livelihood in the study area, was rejected and the alternative was accepted.

Discussion of Findings

Farming is a major means of livelihood in Taraba and many rural communities in Nigeria. The level of ICT usage by these farming communities can affect their livelihood in the aspect of level of living as presented in Tables 1.The result showed that the use of mobile phones and television had a positive effect on the level of living of maize farmers with positive coefficients (2.408) and (0.806) and were significant at 10% and 5% levels of probability respectively, implying that the more the maize farmers use mobile phones and television, the more likely they increase their level of living, while, radio, social media and extension guide showed negative relationship to the maize farmers livelihood with coefficient (-1.263), (-0.515), (-0.535) and at 10% level of probability respectively, which agreed with the findings of Akweta *et al.* (2018), who reported that the most commonly used ICTs are radio, television and mobile phones. The use of radio and mobile phones was ranked highest because they are portable, user friendly and economical, supported by Nazaril *et al.* (2015) stated that 68% of the respondents believed that television-produced agriculture programs provided benefits to farmers. This implies that the more maize farmers use them, the better their level of living. Similarly, the finding agreed with Ayim *et al*. (2022) that ICTs play a role in improving the livelihoods of maize farmers and provide farmers with access to information, markets, and financial services. The study conducted in South Africa showed that mobile phones have a positive impact on farmers' incomes (Aker, and Mbiti, 2015).

Lee *et al.* (2016) found that in the rural areas of developing countries, ICT devices of this nature are spreading day by day, and different organizations have launched many projects for agricultural development and increased production by using different technologies in agriculture. Similar results were reported by Syiem and Raj (2015) as farmers' knowledge of the availability and accessibility of inputs, disease, and crop management escalated due to ICT use. In Samuel (2019), the most common ICTs used by maize farmers in Bauchi State were television and mobile phones. The study also found that the use of ICTs had a positive impact on the knowledge, skills, and outputs of maize farmers.

Conclusion and recommendations

Based on the findings of this study, it is concluded that mobile phones had 10%, social media 10%, bulletins 1%, extension guides 10%, and television 10% level of probability effect on farmers' yield. On income, social media had 10%, bulletins 5%, magazines and newspapers 5%, and extension guides 10% level of probability. On level of living, mobile phones had a 10% probability and televisions a 5% probability. These results show that the variables influence the level of living of maize farmers at significant levels of probability. Therefore, it is recommended that

1. Given the significant influence of mobile phones and television on the level of living, efforts should be made to improve access to these ICTs for maize farmers.

2. Training on effectively using mobile phones and televisions for agricultural purposes, such as accessing market information, weather forecasts and demonstration of agronomical practices, should be implemented. Agricultural extension services should increase their presence on television platforms to share best practices, success stories and real-time advice with farmers.
3. Extension guides and bulletins also have a notable impact on level of living. Expanding agricultural programs on these media, focusing on practical farming techniques, pest control, and market trends, and ensuring they are up-to-date, easily accessible, and widely distributed can help farmers stay informed about the latest agricultural practices and innovations.
4. Radio, bulletins, internet, magazines, newspapers and pamphlets have negative effects on the yield, income and livelihood of maize farmers; hence, the content to farmers should be simplify and feedback should be created for ease of trials and adoption of techniques.

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