Direct Research Journal of Agriculture and Food Science

Vol. 13(1), Pp. 64-71, February 2025,

https://journals.directresearchpublisher.org/index.php/drjafs

Research Article
ISSN: 2354-4147

Assessment of the Socioeconomic Factors Affecting Smallholder Rice Farmers' use of ICTS to access Market information in Nasarawa State, Nigeria

Edwin Ejoga Idu[1], Samson Olayemi Sennuga[2], and Ajuma Owoicho[3*]

[1]Department of Agricultural Extension and Rural Sociology, Faculty of Agriculture, University of Abuja, Nigeria.
[2]Department of Agricultural Extension and Rural Sociology, Faculty of Agriculture, University of Abuja, Nigeria.
[3]Department of Agricultural Extension and Rural Sociology, Faculty of Agriculture, University of Abuja, Nigeria.
Corresponding Author Email: ajumaowoicho@gmail.com ; Tel: +2347053425208

ABSTRACT

The study assessed the socioeconomic factors affecting smallholder rice farmers' use of ICTs to access market information in Nasarawa State. A multi-stage sampling technique was used to sample respondents for the study, while primary data was used for the study, collected with a well-structured questionnaire. The study's objectives were achieved using descriptive statistics such as frequency, percentage, and mean, as well as chi-square test and multiple regression analysis. The result revealed that the majority (70.7%) of the respondents were male, with a mean age and household size of 39 and 6, respectively. Most (38.6%) of the farmers had secondary education, 64.3% did not belong to cooperative societies, and 68.1% had farming as their primary occupation. The average farming experience, farm size, and annual income of the farmers were 11 3.187 and N471, 312.68, respectively. The majority, 93.9%, of the farmers never used ICT to access market information and digital skills such as basic computer knowledge, navigation of the internet, email marketing, digital marketing, and search engine optimization. The result of the regression analysis showed that gender, age, membership of cooperatives, farming experience, farm size, and annual income of the farmers significantly influenced the use of ICT to access market information. The study, however, revealed that the cost of ICT devices, limited access to a reliable internet connection, lack of digital literacy skills, unavailability of information tailored to meet specific needs, and lack of funding were the major hindrance to the use of ICT to access market information by smallholder rice farmers. The study recommends that efforts be put in place by the state government to increase digital literacy and training to improve digital literacy among smallholder rice farmers.

Keywords: *Socioeconomic factors, smallholder rice farmers, information and communication technology, market information*

Article Information
Received 17 January 2025;
Accepted 19 January 2025;
Published 12 February 2025
https://doi.org/10.26765/DRJAFS41193432

Citation: Idu, E. E., Sennuga, S. O., and Owoicho, A. (2025). Assessment of the Socioeconomic Factors Affecting Smallholder Rice Farmers' use of ICTS to access Market information in Nasarawa State, Nigeria. *Direct Research Journal of Agriculture and Food Science*. Vol. 13(1), Pp. 64-71.

INTRODUCTION

Rice is one of the most important staple foods in the world, feeding over half of the global population (Food and Agriculture Organization [FAO], nd, 2016). It plays a crucial role in food security, especially in Asia, where approximately 90% of the world's rice is produced and consumed (Mohidem *et al.,* 2022). Countries such as China, India, Indonesia, and Bangladesh dominate global rice production, with China and India alone accounting for

nearly 50% of the world's output (FAO, nd, 2016). In addition to being a vital food crop, rice is a source of livelihood for millions of smallholder farmers, particularly in developing countries. Rice production is expanding in Africa and Latin America, contributing to food security. Countries like Nigeria, Egypt, and Brazil increasingly invest in rice farming to reduce import dependency and enhance domestic food supplies. In sub-Saharan Africa, there has been a significant push to increase rice production to meet the rising demand driven by population growth and urbanization (Arouna et al., 2021).

In Nigeria, rice has significant economic importance, and it is grown in all federation states (Agro Nigeria, 2016) due to the favourable climatic conditions in various producing regions (Kadiri & Eze, 2015). Nevertheless, Nigeria ranks third in rice production in Africa after Egypt and Madagascar, and it is the highest producer of rice in West Africa. Its rice production is still far below demand (FAO, 2016; Agro Nigeria, 2016). The Nigerian rice sector has much potential for increased rice productivity as the country has an abundant rice-growing environment.

The role of Information and Communication Technologies (ICTs) in enhancing agricultural productivity and market access has become a crucial subject of study in global development discourses. Across the globe, ICTs have been identified as essential tools for bridging the information gap between farmers and markets, enabling more efficient decision-making and improving income opportunities (Stienen et al., 2017). In developing countries, particularly smallholder farmers, ICTs can facilitate access to vital market information, such as prices, demand, and trends. This can improve market participation, reduce transaction costs, and create better bargaining power for farmers.

In Sub-Saharan Africa, agriculture remains the backbone of many economies, with smallholder farmers constituting a significant percentage of the agricultural workforce. Information and communication technologies can connect farmers to real-time information on prices, buyers, and market opportunities. The growth of mobile phone usage, digital platforms, and other ICT tools has offered hope for transforming the agricultural sector in Sub-Saharan Africa by improving access to markets and increasing the efficiency of value chains (Oyelami, Sofoluwe, and Ajeigbe, 2022).

Adequate access to and use of appropriate agricultural information are paramount in achieving successful and sustainable agricultural production and rural development. This underscores the idea that farmers' ability to access and use agricultural information significantly influences their performance in any given agricultural context (Oguya, 2017).

In order to boost agricultural production and productivity, farmers must have access to well-structured and relevant information. Also, Blait (2016) emphasized that one of the most cost-effective inputs for improving agricultural development lies in ensuring farmers have adequate access to knowledge and information about various aspects, including new agricultural technologies, early warning systems for issues like drought and pests, access to improved seedlings, fertilizers, credit, and market prices.

Market information must be distinguished from marketing information services through ICT, which encompasses a broader spectrum of details related to potential market channels, necessary payment systems, product packaging, quality labelling, and a range of other information, including market-related data. Enhanced market information services, like ICT, contribute to the efficiency of marketing systems and price determination. Access to improved market information is expected to provide farmers with dependable data for planning their production in alignment with market demand, facilitating decisions regarding market participation, and empowering them to negotiate more favourable terms with other market participants.

The dissemination of agricultural information holds immense significance for improving farmers' productivity, as it serves as a primary avenue through which they can acquire knowledge about innovative practices that can enhance their agricultural output (Singh, 2016). Consequently, many scholars advocate re-evaluating the approaches to incorporating ICT in agriculture, with some asserting that there is a lack of clarity regarding the role of ICT in agricultural development among those engaged in this endeavour (Janssen et al., 2017). Realising the objectives set in national visions, such as Nigeria's Vision 2050, necessitates sustained research and development, social transformation, and the effective utilisation of ICT in agriculture. It is based on this that the study is necessitated.

The broad objective of this study is to examine the socioeconomic factors affecting the use of Information and Communication Technologies (ICTs) among smallholder rice farmers in Nasarawa State for accessing market information.

The specific objectives are to:

i. Describe the socioeconomic characteristics of smallholder rice farmers in the study area.
ii. Assess smallholder rice farmers' perceived market information needs in the study area.
iii. Determine the effect of smallholder rice farmers' socioeconomic characteristics on ICT use to access market information in the study area.
iv. Identify challenges that hinder smallholder rice farmers from using ICTs for market information access in the study area.

METHODOLOGY

Study area

The study was carried out in Nasarawa State. Nasarawa State is located in North-central Nigeria and is situated between latitude 7°45' and 9°15' North and longitude 7°00' and 8°45' East. It shares borders with Benue State to the East, Plateau State to the south, Kaduna State to the southwest, the Federal Capital Territory (FCT) to the west, and Kogi State to the northwest. The state capital is Lafia. Geographically, Nasarawa State features a diverse landscape with plains, hills, and valleys. Nasarawa State is characterised by its predominantly agricultural economy, with a significant portion of the population engaged in farming activities. Rice farming is crucial, and smallholder farmers contribute to local and regional agricultural production. The state's agricultural landscape and the socioeconomic conditions of smallholder farmers provide a pertinent context for studying the socioeconomic factors affecting their use of ICTs for market information (Idu et al., 2020).

Population of the study

The population of the study were smallholder rice farmers in Nasarawa State, Nigeria. With specific emphases on key rice farming areas. Smallholder rice farmers are individuals or households actively engaged in rice cultivation on a scale of less than 2 hectares, typically characterised by limited resources and land. This substantial population forms the core focus of the research. The comprehensive examination of this sizable population will contribute to a nuanced understanding of the challenges, opportunities, and dynamics associated with ICT usage for accessing market information within the context of rice farming in Nasarawa State.

Sampling technique

A multi-stage sampling technique was used to sample smallholder rice farmers for the study. The first stage involved the purposive selection of two (2) ADP zones in the state. This is because the areas are predominantly rice-farming zones. In the second stage, three (3) ADP blocks were selected from each zone, totalling six (6) blocks. The third stage involved the selection of four (4) cells from each extension block, making a total of twenty-four (24) cells. Finally, from each cell, (15) rice farmers were selected, totalling 360 for the study.

Data collection and analysis

Primary data were used for the study, and they were collected using a well-structured questionnaire administered to smallholder rice farmers in the state with the assistance of local enumerators familiar with the states. The study's objectives were achieved using descriptive statistics such as frequency, percentage, and mean and multiple regression analysis.

Model specification

Multiple regression model

The multiple regression model shows a relationship between the dependent variable, Y (use of ICT for market information) and the independent variable, X (socioeconomic characteristics of the farmers).

$$Y=\beta_0+ \beta_1x_1+ \beta_2x_2+ \beta_3x_3+ \beta_4x_4+ \beta_5x_5 + \beta_6x_6e$$

Y = use of ICT for market information (which was measured as use or no use)
X_1= level of education
X_2= Age of respondent
X_3= Farm income
X_4= farming experience
X_5 = household size
X_6 = gender
X_7 = farm size
X_8 = membership of association
X_9 = Major occupation
e= error term
β_0= Constant
β_1- β_6= Coefficients of determination

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Rice Farmers in the Study Area

Table 1 shows the distribution of respondents according to their gender. Most (70.7%) respondents were male, while only 29.3% were female. This aligns with Shisler (2016), who stated that agriculture is male-dominated. This gender distribution may reflect underlying social, cultural, or economic factors that influence who participates in farming.

The age of the respondents, as shown in Table 1, indicates that most (36.1%) of the respondents were between the ages of 31 and 40 years, while those between 41 and 50 years old accounted for 35.2% of the respondents. About 17.2% were between the ages of 21 and 30, 9.7% were 51 years and above, while only 1.8% of the farmers were at most 20 years old. The average age of the farmers was 39 years. Age plays a crucial role in farming, with diverse implications. Older farmers typically possess extensive experience and deep knowledge of farming practices, crop management, and problem-solving, which can enhance decision-making

Table 1: Respondents' socioeconomic characteristics of rice farmers.

Socioeconomic Characteristics	Frequency	Per cent	Mean
Gender			
Male	239	70.7	
Female	99	29.3	
Age			
≤ 20	6	1.8	39.48
21 – 30	62	17.2	
31 – 40	129	36.1	
41 – 50	127	35.2	
≥ 51	34	9.7	
Household Size			
≤ 5	216	62.4	6
6 – 10	78	22.5	
11 – 15	18	5.3	
≥ 15	6	1.8	
Level of Education			
Primary education	43	12.2	
Secondary education	136	38.6	
Tertiary education	80	22.7	
No formal education	93	26.4	
Membership of Cooperative Society			
Yes	121	35.7	
No	218	64.3	
Major Occupation			
Civil service	12	3.7	
Farming	222	68.1	
Trading	46	14.1	
Student	46	14.1	
Years of Rice Farming Experience			
≤ 10	211	59.5	10.72
11 – 20	120	33.8	
21 – 30	23	6.5	
Farm Size (Ha)			
1-3	226	63.7	3.187
4.6	119	33.5	
>6	10	2.8	
Annual Income			
<100,000	53	15.7	471,312.68
100,001-500,000	173	51.1	
500,001-1,000,000	95	28.1	
>1,000,000	18	5.4	

Source: Field Survey (2024).

and boost efficiency. Conversely, younger farmers often introduce fresh perspectives, innovative technologies, and new approaches. However, if older farmers are reluctant to embrace these new methods, productivity may be impeded (Ngeywo, Basweti, and Shitandi, 2015).

The distribution of the farmers by household size revealed that the majority (62.4%) of them had a household size of 5 or fewer people, 22.5% had a household size of 6-10 people, and 5.3% had a family size of 11-15 people. The result further shows that only 1.8% of the farmers had a household size of 15 people or more. The average household size of the respondents was 6. An enormous household can allocate resources more efficiently.

Regarding the educational qualifications of respondents, as shown in Table 1, about 38.6% of the respondents had secondary school education. About 22.7% had post-secondary education, while 12.2% had primary education. The study revealed that 26.4% did not have any formal education. The implications of high educational qualifications among farmers can positively impact agriculture and rural development. According to Kassem, Alotaibi, Muddassir, and Herab (2021), farmers with higher educational qualifications will likely better understand modern and sustainable agricultural practices.

The results showed that most (64.3%) farmers were not cooperative societies, while 35.7% were associations. Higher membership numbers strengthen the association's collective bargaining power. A large membership base enhances effective communication and information sharing among farmers. This exchange of knowledge can result in better farming practices, access to new technologies, and the adoption of innovative techniques (Onyeneke, Emenekwe, Chidiebere-Mark, Munonye, Aligbe, Kanu, and Azuamairo, 2020).

Table 1 shows the distribution of the farmers by their farming experience revealed that most (59.5%) of them

Table 2: Perceived Market Information Needs of Rice Farmers.

Digital Skills	Highly Needed (%)	Needed (%)	Not needed (%)	Mean Score	Decision
Real-time market prices	62(17.4)	294(82.6)	0(0)	2.15	Low perception
Price trends and fluctuations	292(82.0)	2(0.6)	72(17.4)	2.44	High perception
Consumer preferences and demands	63(17.7)	292(82.3)	0(0)	2.14	Low perception
Customer insights	351(99.2)	3(0.8)	0(0)	2.94	High perception
Market dynamics	64(18.0)	291(82.0)	0(0)	2.15	Low perception
Access to potential buyers and markets	291(80.8)	2(0.6)	62(17.5)	2.61	High perception
Government policies and regulations	63(17.8)	290(82.2)	0(0)	2.13	Low perception
Quality standards and certifications	115(35.2)	206(63.0)	3(0.9)	2.11	Low perception
Logistics and transportation information on rice farming	352(99.4)	2(0.6)	0(0)	2.94	High perception
Financial services and credit opportunities for rice farmers.	290(82.4)	62(17.6)	0(0)	2.76	High perception
Training and capacity-building programs are available to rice farmers.	62(17.5)	291(82.2)	1(0.3)	2.14	Low perception
Market intelligence and competitor analysis	291(82.8)	1(0.3)	62(17.5)	2.60	High perception
Emerging Technologies and Innovation	1(0.3)	292(82.3)	62(17.5)	1.80	Low perception
Global market trends on rice	0(0)	290(82.4)	62(17.6)	1.78	Low perception
Consumer feedback and reviews.	2(0.6)	353(99.4)	0(0)	1.98	Low perception

Note: N = 360, Decision – weighted average (average value of all the mean scores) = 2.31. Source: Field Survey, (2024)

had been involved in rice production for not more than 10 years. About 33.8% had between 11 and 20 years of experience in farming, while only 6.5% had been involved in production for more than 20 years. Meanwhile, the mean farming experience of the respondents was 11 years. Experienced farmers are better prepared to assess and manage agricultural risks, including disease outbreaks, pests, and market fluctuations. Their ability to foresee and address challenges enables them to reduce potential losses (Akintunde, Coster, Nwigwe and Agboola, 2020).

The result in Table 1 further revealed that most (63.7%) of the farmers have a farm size of 1-3 hectares, 33.5% of them have a farm size of 4-6 hectares, while only 2.8% of the rice farmers have a farm size greater than 6 ha. The average farm size of farmers in the study area is 3 hectares. Overall, the results show that rice farming in the study area is characterized mainly by small-scale operations, with the vast majority of farmers managing less than 6 hectares of land. This distribution may impact the productivity, access to resources, and scalability of farming practices in the region (Makate, 2019).

The result shows that most (51%) rice farmers had an annual income of 100,001 and 500,000 naira. About 28.1% made between 500,001 and 1,000,000 naira annually, while 15.7% of the farmers earned less than 100,000 annually. Only 5.4% of the respondents had an annual income of more than 1,000,000 naira. The average annual income of rice farmers in the study area is 471,312.68 naira. The income distribution shows that most rice farmers in the study area have a moderate income, with a smaller portion earning either significantly more or significantly less.

Perceived market information needs of rice farmers

The result in (Table 2) shows rice farmers' perceived market information needs in the study area. The data analysis reveals that the majority of the respondents indicated that "customer insights" and "logistics and transportation information on rice farming" (2.94) were the most significant information needs by rice farmers in the study area. Also, the result revealed that other primary information needs of rice farmers include financial services and credit opportunities for rice farmers (2.76), access to potential buyers and markets (2.61), market intelligence and competitor analysis (2.60), and price trends and fluctuations (2.44). The study, however, revealed that the least prevalent information needs among rice farmers in the study area include real-time market prices (2.15), market dynamics (2.15), consumer preferences and demands (2.14), training and capacity-building programs available to rice farmers (2.14), government policies and regulations (2.13), quality standards and certification (2.11), consumer feedback and reviews (1.98), emerging technologies and innovation (1.80), and global market trend on rice (1.78). This result is consistent with the findings of Zarmai, Okwu, Dawang and Nankat (2014), who conducted a study on market information needs of rice farmers. They stated that farmers' information needs and preferences differ because they are not homogenous.

Effect of Socioeconomic Factors on the Usage of ICT to Access Market Information in the Study Area

Table 3 shows the result of the regression analysis on the effect of socioeconomic factors on using ICT to access market information in the study area. The result shows an R^2 value of 0.534, which means that the independent variables can predict 53.4% of the variations in the dependent variable. The remaining 46.4% was due to errors or variables not captured in the model. The f-statistic is 14.465 and significant at 1% probability. This implies that the model was correctly stated, and the independent variables correctly predict the dependent variable. The result shows that gender, age, major occupation, farming experience, and farm size were significant at a 1% probability level, annual income at 5%, and membership of cooperatives at a 10% probability

Table 3: Effect of Socioeconomic Factors on the Usage of ICT to Access Market Information in the Study Area.

Model	B	Std. Error	T	p-value
(Constant)	4.769	.259	18.411	.000
Gender	-.033	.009	-3.609***	.000
Age	-.015	.004	-3.456***	.001
Household size	.011	.013	.826	.409
Level of Education	-.045	.034	-1.349	.179
Membership of cooperatives	-.121	.069	-1.759*	.080
Farming Exp	.038	.007	5.455***	.000
Farm Size	-.082	.019	-4.226***	.000
Annual Income	-2.142E-007	.000	-2.400**	.017

***significant at 1% **significant at 5% *significant at 10%
R^2 = 0.354, F-statistic = 14.465 and significant at 1%
Field survey, 2024

level. The result of the regression analysis in (Table 3) shows that gender was significant at 1% probability and negatively influenced the use of ICT to access market information in the study area. The significance level of 1% ($p < 0.01$) means that the observed relationship between gender and the use of ICT is highly statistically significant. This high significance level implies that gender strongly predicts ICT usage in the study area. The negative effect indicates that as the value of the gender variable increases, the use of ICT to access market information decreases. This result would suggest that being male is associated with a higher likelihood of using ICT for market information than being female. This is consistent with the findings of Tata and McNamara (2018), who conducted a study on the socioeconomic factors influencing the use of ICT. They affirmed that gender plays a significant role in the use of ICT as well as the level of proficiency.

The regression result further reveals that age was negative and significant at 1% probability. The regression result indicates that age negatively and significantly affects using ICT to access market information. This means that as age increases, the likelihood of using ICT for accessing market information decreases. The negative sign suggests an inverse effect, meaning older individuals are less likely to adopt or effectively use ICT for this purpose than younger individuals. Older individuals may find it more challenging to adapt to new technologies or lack the skills to use ICT tools effectively. Some may rely more on traditional methods for accessing market information, such as face-to-face interactions or other non-digital means. This study agrees with Hasan *et al.* (2019), who found that younger individuals are more likely to embrace new information and communication tools.

Membership in cooperatives is negative and significant at a 10% probability level. This implies that membership of cooperatives has an inverse relationship with the use of ICT for accessing market information in the study area. This means that individuals who are members of cooperative societies are less likely to use ICT to access market information. This could be attributed to the members' dependence on cooperative networks. Members of cooperatives might rely more on the cooperative's collective resources, information, and support rather than seeking information independently through ICT. The cooperative structure often facilitates information sharing through meetings, word-of-mouth, or other traditional methods, reducing the perceived need to use ICT. This does not align with the findings of Ajah and Atewamba (2019), who found that farmers who are members of cooperatives adopt the use of ICT more than those who do not belong to any cooperative society.

The result further shows that the farming experience of farmers has a positive influence on the use of ICT to access market information. This result suggests that more experienced are likely to use ICT to access market information than inexperienced ones. Experienced farmers have likely developed a deeper understanding of the agricultural market and recognise the importance of timely and accurate information. This awareness may motivate them to utilise ICT tools to stay informed about market trends, prices, and other relevant data. This is consistent with the findings of Tata and McNamara (2016), who also found that the level of use of ICT can be influenced by years of practice or experience.

Also, the result revealed that farm size has a negative but significant effect on using ICT to access market information. This means that as the size of the farm increases, the likelihood of using ICT to access market information decreases. This could be because larger farms already have established market channels and relationships with buyers, reducing the need to seek out market information via ICT actively. These farms might rely on direct negotiations or long-term contracts instead of using ICT to find new markets or price information. This result is consistent with the findings of Hasan *et al.* (2019), who found that farm size had a significant but negative impact on farmers' use of ICT.

The result further revealed that annual income is negative and significant at a 5% probability level. This suggests that as the annual income of rice farmers' increases, their likelihood of using ICT to access market information decreases. Individuals with higher incomes

Table 4: Challenges that Hinder Smallholder Rice Farmers from Using ICTS for Market Information Access in the Study Area.

Challenge	SA (%)	A (%)	UD (%)	D (%)	SD (%)	Mean Score	Decision
The cost of ICT devices	356(99.7)	1(0.3)	0(0)	0(0)	0(0)	4.94	Severe
Limited access to a reliable internet connection hinders my ability to use ICT for market information access	356 (100)	0(0)	0(0)	0(0)	0(0)	4.94	Severe
Lack of the necessary digital literacy skills to use ICT devices for market information access effectively	355(99.7)	1(0.3)	0(0)	0(0)	0(0)	4.94	Severe
The content available on ICT platforms for market information is not tailored to the specific needs of smallholder rice marketers	355(99.7)	1(0.3)	0(0)	0(0)	0(0)	4.94	Severe
Concerns about the security and privacy of information hinder willingness to use ICT for market information access	64(18.0)	292(82.0)	0(0)	0(0)	0(0)	4.13	Not Severe
Complexity of ICT Devices	65(18.3)	291(81.7)	0(0)	0(0)	0(0)	4.14	Not Severe
Inadequate ICT Training Facilities	294(81.7)	0(0)	62(17.4)	0(0)	0(0)	4.60	Severe
Power Supply	3(0.8)	291(81.7)	62(17.4)	0(0)	0(0)	3.79	Not Severe
Lack of funding	356(100)	0(0)	0(0)	0(0)	0(0)	4.94	Severe
Lack of awareness of the benefits of ICT	2(0.6)	291(82.0)	62(17.5)	0(0)	0(0)	3.77	Not Severe

Note: N = 300, SA = Strongly Agree, A = Agree, UD = Undecided, D = Disagree, SD = Strongly Disagree, Decision–weighted average (average value of all the mean scores) = 4.5 **Source: Field survey, (2024)**

might have access to alternative, perhaps more traditional, or personalized sources of market information that they find more reliable or convenient, such as hiring market consultants, using premium services, or relying on established business networks. These alternatives reduce their reliance on ICT to access such information. Similarly, higher-income individuals might not perceive ICT as necessary for their market information needs, primarily if they are engaged in larger-scale operations where direct or traditional methods are preferred over ICT solutions. In their study on determinants of ICT usage among low-income groups in Colombia, Mexico, and Peru, Gutiérrez and Gamboa (2010) found that although income affected the use of ICT among the groups, the impact was low.

Challenges that Hinder Smallholder Rice Farmers from Using ICTS for Market Information Access in the Study Area

Presented in (Table 4) is the result of the challenges that hinder smallholder rice farmers from using ICTs for market information in the study area. The data analysis shows that majority of the respondents indicated that the cost of ICT devices (4.94), limited access to a reliable internet connection their ability to use ICT for access to market information (4.94), lack of necessary digital literacy skills to effectively use ICT devices for market information access (4.94), available content on ICT platforms are not tailored to specific needs of rice marketers (4.94), and lack of funding (4.94) were the major challenges that hinder smallholder rice farmers from using information and communication technology for accessing market information. Also, most believe inadequate ICT training facilities (4.60) limit their ability to deploy ICT to access market information. This result is consistent with the findings of Razaque and Sallah (2013), who reported that challenges such as the high cost of ICT and the technicality of using the devices limit the effectiveness of ICT by farmers. On the other hand, the result showed that the farmers were not hindered by the complexity of ICT devices (4.14), information security and privacy (4.13), power supply (3.79), and lack of awareness of the benefits of ICT (3.77). This implies that these factors do not impact farmers' use of ICT to access market information.

Conclusion and Recommendations

In conclusion, assessing the socioeconomic factors affecting smallholder rice farmers' use of ICTs to access market information in Nasarawa State, Nigeria, reveals a multifaceted landscape marked by challenges and opportunities. The findings highlight that while ICTs have the potential to enhance market access and overall agricultural productivity significantly, the extent of their adoption is heavily influenced by several critical factors. Challenges such as inadequate internet connectivity, high technology costs, and limited digital literacy among farmers' present significant barriers to effective ICT use. Furthermore, socioeconomic factors, including income levels and access to financial resources,

play a crucial role in shaping the use and utilisation of these technologies. Targeted interventions are essential to address these issues and foster greater ICT use. These could involve improving technological infrastructure, providing training programs to enhance digital skills, and developing policies that support affordable access to ICT tools. Collaborative efforts between government agencies, non- governmental Organisations, and private sector stakeholders will create an enabling environment that empowers smallholder rice farmers. Based on the findings of the study, the following recommendations are made: governmental organisations, and private sector stakeholders will create an enabling environment that empowers smallholder rice farmers. Based on the findings of the study, the following recommendations are made:

- Since digital literacy plays a significant role in ICT usage, local and state governments should develop targeted training programmes to improve smallholder farmers' digital skills. These programs should be accessible, practical, and delivered in local languages to ensure farmers can effectively use ICT tools to access market information.
- The study highlights the need for ICT tools/apps that cater specifically to the information needs of smallholder farmers. Agricultural stakeholders, including government agencies and tech developers, should create localised, farmer-friendly mobile applications and platforms that provide real-time market information, weather updates, and price forecasts.

REFERENCES

Agro Nigeria (2016). Rice farming: What you need to know. Retrieved 8th October 2016 from https://agronigeria.ng/ricefarming-what-you-need-to-know/Accessed on 10th 0ctober,2023.

Ajah, J. and Atewamba, C. (2018). Impact of gender and cooperative membership on farmers' use of information communication technologies in Abuja, Nigeria. *Tropical Agriculture*, *95*(2), 194.

Akintunde, O. K., Coster, A. S., Nwigwe, C. A., and Agboola, T. O. (2020). An analysis of factors influencing access to credit by poultry egg farmers in Southwestern Nigeria. *Nigerian Journal of Animal Science*, *22*(2), 204-212.

Arouna, A., Fatognon, I. A., Saito, K., and Futakuchi, K. (2021). Moving toward rice self-sufficiency in sub-Saharan Africa by 2030: Lessons learned from 10 years of the Coalition for African Rice Development. *World Development Perspectives*, *21*, 100291.

Blait, S., Calvelo Rios, M., and Masias, L. (2016). Communication for development for Latin America: a regional experience. FAO, Rome, Italy.

Food and Agriculture Organization. (nd). Chapter I. Rice production, consumption and nutrition - V.N. Nguyen. https://www.fao.org/4/y4347e/y4347e02.htm#TopOfPage

Food and Agriculture Organization (FAO) (2016). Food and Agriculture Organization Year Book. Food and Agriculture Organisation, Rome, Italy. p. 79.

Gutiérrez, L. H. & Gamboa, L. F. (2010). Determinants of ICT usage among Colombia, Mexico, and Peru low-income groups. *The Information Society*, 26(5), 346-363.

Hasan, F., Rahman, M. H., Hoque, M. J., Kamruzzaman, K., Rahman, M. A., Mojumder, S., and Talukdar, M. M. (2019). Farmers' awareness of the use of ICT in farm practices. *Asian-Australasian Journal of Bioscience and Biotechnology*, *4*(1), 34-47.

Idu, E.E., Fadiji, T.O., and Evinemi, C. A. (2020). Socio-economics Determinants of Youth's Participation in Rice Production Activities in Kogi and Nasarawa States. *Direct Research Journal of Agriculture and Food Science,8(6), 151-157.*

Janssen, S. J., Porter, C. H., Moore, A. D., Athanasiadis, I. N., Foster, I., Jones, J. W. and Antle, J. M. (2017). Towards a new generation of agricultural system data, models and knowledge products: Information and communication technology. *Agricultural systems*, *155*, 200-212..

Kadiri, F., and Eze, C. (2015). Effects of Paddy Rice production on the welfare of farmers and the determinants of the achievements of Paddy rice farmers in the Niger Delta Region of Nigeria. Journal of Economics and Sustainable Development, 6(4), 202-209.

Kassem, H. S., Alotaibi, B. A., Muddassir, M., and Herab, A. (2021). Factors influencing farmers' satisfaction with the quality of agricultural extension services. *Evaluation and Program Planning*, *85*, 101912.

Makate, C. (2019). Effective scaling of climate-smart agriculture innovations in African smallholder agriculture: A review of approaches, policy and institutional strategy needs. *Environmental science & policy*, *96*, 37–51.

Mohidem, N. A., Hashim, N., Shamsudin, R., & Cheman, H. (2022). Rice for food security: Revisiting its production, diversity, rice milling process and nutrient content. *Agriculture*, *12*(6), 741.

Ngeywo, J., Basweti, E., and Shitandi, A. (2015). Influence of gender, age, marital status and farm size on coffee production: a Kisii County, Kenya case. *Asian Journal of Agricultural Extension, Economics & Sociology*, *5*(3), 117-125.

Oguya, V. (2007). CTA Vision for the Question-and-Answer Service (QAS). Paper Presented at NAQAS Stakeholders meeting on Strategies to involve farmers in NAQAS Service in Nigeria held at NAERLS/ABU Zaria. 8Pp

Onyeneke, R. U., Emenekwe, C. C., Chidiebere-Mark, N. M., Munonye, J. O., Aligbe, J. O., Kanu, C., ... & Azuamairo, G. C. (2020). Impact of poultry farmers' participation in modern food retail markets on household dietary diversity: Lessons from Southeast Nigeria. *Animals*, *10*(4), 611.

Oyelami, L. O., Sofoluwe, N. A., and Ajeigbe, O. M. (2022). ICT and agricultural sectorperformance: empirical evidence from sub-Saharan Africa. *Future Business Journal*, *8*(1), 18.

Razaque, A., and Sallah, M. (2013). The use of mobile phone among farmers for agriculture development. *Int. J. Sci. Res*, *2*, 95-98.

Shisler, R. C. (2016). *The male-dominated field: A study on the gendered experiences of female farmers in Northern Colorado* (Master's thesis, Colorado State University).

Singh, S. (2016). Selected Success Stories on Agricultural Information Systems. Asia-Pacific Association of Agricultural Research Institutions. Bangkok, Thailand.

Stienen, J., Bruinsma, W., and Neuman, F. (2017). How ICT Can Make a Difference in Agricultural Livelihoods. The Commonwealth Ministers Reference Book.

Tata, J. S., & McNamara, P. E. (2016). Social factors that influence the use of ICT in agricultural extension in Southern Africa: *Agriculture*, *6*(2), 15.

Zarmai, J. U., Okwu, O. J., Dawang, C. N., and Nankat, J. D. (2014). A review of information needs of rice farmers: a panacea for food security and poverty alleviation. *Journal of Economics and Sustainable Development*, *5*(12), 9-15.