Socioeconomic determinants and availability of ICT for use among small holder rice farmers in Southeast, Nigeria

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Abstract— *The study examined socioeconomic determinants and availability of ICT for use among small holder rice farmers in Southeast, Nigeria. Specifically, it described enterprise characteristics of the farmers, ICT availability to rice farmers, enterprise characteristics and their level of use of ICT. Data were collected with a well-structured questionnaire from 476 randomly selected rice farmers and were analyzed using a combination of analytical tools such as descriptive statistics, Tobit regression, Analysis of variance, correlation and z-test. The result revealed male dominance (61.3%), active age (mean age of 38 years), high percentage of married farmers (65.5%). The mean years of formal education (10 years), mean farming experience was 9 years while the mean household size, farm size and annual income from rice were 5 persons, 11.42 plots, and ₦426, 499.76 respectively. Also, the primary occupation was majorly (64.5%) farmers. The study equally showed that majority (62.0% and 99.7%) of the farmers sampled in Ebonyi and Enugu were members of farmer's cooperative. The result of farmer's response on ICT availability revealed that most of the ICT tools were scarcely available. Tobit regression analysis showed that age, marital status, primary occupation, household size and farm size were significant, while result of significant relationship between the levels of use of ICT tools/format and availability showed a positive and strong relationship with the level of use of ICT. It was recommended that Government and other relevant bodies should ensure that ICT facilities are installed in rural communities and the cost of ICT tools/format and other ICT infrastructures should be subsidized for rice farmers in order to increase their access to information that is beneficial for rice production.*

Keywords— Determinants, use of ICT, rice farmers, Southeast.

I. INTRODUCTION

Agriculture is the engine of growth for most developing countries of the world and also one of the most effective ways to alleviate poverty and hunger (Amungwa and Baye, 2014). It can raise income and improve food security for 80% of the world's poor, who live in rural areas and work mainly in farms (World Bank, 2018). Agriculture in Africa has a massive social and economic footprint; more than 60% of the populations of Sub-Saharan Africa are smallholder farmers, and about 23% of Sub-Saharan Gross Domestic Product (GDP) comes from agriculture (Goedde, Ombaka and Pais, 2019). Agriculture contributed about 22.86% of Nigeria's GDP in 2017 (National Bureau of Statistics (NBS), 2018). These smallholder farmers engage in different livestock and crops production including rice.

Globally, rice production has grown at an annual average of 10% over the past decades, reaching 486.7 million tons in 2017 (NBS, 2018). Most of this growth came from Asia, accounting for 89% of the global output. China and India are the largest producers, each with a share of 29.6% and 22.6% of the global production respectively. Africa accounts for about 4% of world production and the continent is the second-largest consuming region (Abdul-Gafar and Yu, 2016). Nigeria reached a peak of 3.7million tons in 2017 making them the second-largest producer in Africa. Rice is the primary staple food for most of the populace in the region, especially the rural area, with about 6% of global rice consumption. According to Uba (2003), about 70% of Nigeria feeds on rice, while 30% of their cereal-based diets are also from rice. Udemezue (2018) opined that

Nigerians consume 8 million tonnes of rice and the figure rises by 6% annually. Programs, projects, and technologies like Value Addition and Information Communication Technologies (ICTs) have been introduced in rice production and agricultural sector to enhance farmers' agricultural production.

Information Communication Technology (ICT) can be broadly described as the means through which information can be communicated for individual, societal and collective growth of a nation (Ogunyemi, 2010). Information and Communication Technologies (ICTs) are becoming more and more important in connecting farmers and providing information. ICTs helps to keep young people involved in agriculture. The use of ICT becomes imperative among the stakeholders in agriculture, most especially extension workers. ICTs are useful tools and have been exploited by different organizations like Technical Centre for Agricultural and Rural Cooperation (CTA), World Bank and other international organizations to achieve the mission of advancing food and nutritional security in many countries.

ICTs are used to champion practical, cost-effective, and scalable solutions that impact lives. ICTs have a high potential to transform agriculture. They are "means" rather than the "ends". Information and communication technologies (ICTs) could transform agricultural activities in many parts of the world. ICTs contribute to improving youth livelihoods, agricultural modernization and create benefits throughout value chains, especially through increased access to more effective information via many Smartphone apps (Spore, 2019). ICTs also help to strengthen and develop farmers' organizations, especially through social networks.

II. MATERIAL AND METHODS

The study was conducted in Southeast Nigeria. The zone comprises of Imo, Anambra, Abia, Enugu and Ebonyi States. The region is located between latitude $5^{o}45^{'}00^{''}$N and longitude $8^{o}30^{'}00^{''}$E. It is bordered by the Niger River in the west with the total surface area of approximately 76000 square kilometers (29,400sqkm).The region has three types of vegetation. The coastal area in the south is dominated by mangrove swamps and tidal waterways.

Anambra State is located in the South-Eastern part of the country, and comprises 21 Local Government and four agricultural zones to aid planning and rural development. The climate is typically equatorial with two main seasons, the dry and the rainy seasons. It is known for production and marketing of several raw materials and agro products in different parts of the state. Some of the crops produce and marketed in the state include oil palm, maize, rice, yam, groundnut, cassava, garri, cucumber, watermelon, melon, potato, greenbeans (akidi) ,pigeon pea, soyabean and livestock such as fish, goat, sheep, poultry and cattle are also raised (Nkamigbo, Ugwumba and Okeke,2019). It is an agrarian state with high crop production and marketing activities .Majority of the people are subsistence farmers .It is situated on a generally low elevation on the eastern side of the river Niger, sharing boundaries with Delta State to the west Imo, Abia and Rivers States to the south, Enugu state to the East and Kogi State to the North. The state occupies an area of about 4,844km^2. Geographically, the state lies within longitude $5^{0}55^{1}$ and $6^{0}42^{1}$N.The population of the state is 4,182,232 with 863 sqkm density (NPC,2006). The annual rainfall ranges from 1400mm in the North to2500mm in the South with temperature of $25^{o}C - 35^{O}C$.

Ebonyi State is made up of 13 L.G.As with 5533 km^2 as the total landmass and estimated population of 2198371 (NPC 2006). The occupation of the people is predominantly farming with over 80 percent of the population living in rural area and is involved in agricultural production. The vegetation lies between the Rain Forest and Guinea Savannah of Nigeria..

Enugu State is located between latitude 6.5 ($6^{0}30'0$N) and longitude of 7.5 ($7^{0}30'0$E). The state occupies an area of about 8,022,950KM^2 (Ezike, 1998) and has a population of about 3,257,278 (NPC,2006). The state has seventeen (17) Local Government Areas (LGA) and is divided into six (6) agricultural zones namely: Agbani,Awgu, Enugu, Enugu-Ezike, Udi and Nsukka.

2.1 Sampling Technique and sample size

A multi-stage sampling technique was adopted for this study to select 480 respondents among states in Southeast, Nigeria.

Stage 1: This involved purposive selection of three states with a high concentration of rice farmers in Southeast, Nigeria; (Anambra, Enugu and Ebonyi State).

Stage 2: Purposive selection of two (2) agricultural zones from each State making it a total of six (6) zones.

Stage 3: Purposive selection of two (2) Local governments from each of the agricultural zones based on high concentration of rice farmers making it a total of twelve (12) local governments.

Stage 4: Random selection of two (2) communities from each local government making it a total of twenty-four (24) communities.

Finally, twenty (20) rice farmers were selected from each community using the simple random sampling technique. This gave a total sample of four hundred and eighty (480) respondents.

2.2 Method of Data collection and Analysis

Qualitative and quantitative methods were used to collect data from the respondents. Qualitative data were collected using focus group discussion (FGD).The researcher employed the use of Survey CTO which is a powerful, reliable and easy to use survey platform that allows one to at least transport and process data for academic research. Data were analyzed using descriptive analysis such as mean, frequency and percentage, Tobit regression model and inferential statistics (Analysis of variance, Spearman bivariate correlation, and Z-test).

2.3 Measurement of variables

Sex: Sex (dummy, male = 1, female = 0)

Age: Measured in years.

Marital status: single =1, married = 2, widow (er) = 3, separated = 4

Educational qualification: Number of years spent in School

Farming experience = Years

Farm size (Ha)

Household size

Primary occupation

Annual income = (₦)

Membership of a corporative

The level of knowledge of ICT: farmers were asked to tick yes or no to assess their knowledge from the list of statements about ICT. The respondents were allowed multiple responses as they may have more than one knowledge of the subject under discussion. Based on the rule of thumb, level of knowledge is categorized into three as low knowledge with a value of 2, medium knowledge with a value of 4, and high knowledge with a value of 6. A ratio representation of these indicates that variables with percentage value less than 33.3% is low knowledge, while 33.3% to less than 50.0% is medium knowledge, and high knowledge ranges from 50.0% and above.

Attitude of the farmers: The farmers were asked to rate their feelings on ICT, on a 5-point Likert scale of strongly agree (5) agree (4) somewhat agree (3) disagree (2) strongly disagree (1)

Available ICT for use: The respondents were asked to tick from the list of the available ICT provided. The respondents were allowed multiple responses as more than one ICT tools/format maybe available to them.

Level of access to ICT: The farmers were asked to rate their access to available ICT on a 5-point Likert scale. The Likert scale and their corresponding values include highly accessible = 5; accessible = 4, moderately accessible = 3, barely

accessible = 2 and strongly not accessible = 1. The values will be added to get 15, which will be divided by 5 to get a mean score of 3.Variables with a mean score of 3 and above will be regarded as accessible while variables with a mean score less than 3 were regarded as not accessible.

Challenges faced by farmers on the use of ICT: 5- point Likert scale, with options of very serious = 5; serious = 4; somewhat serious = 3; not serious = 2; not a problem = 1. The farmer's rating was subjected to a principal factor analysis (PFA) matrix to ascertain the factor loading.

Level of usage of ICT by the farmers: The farmers were asked to rate their extent of use of ICT available to them on a 5-point Likert scale of very often = 5; often = 4; moderate = 3; rarely = 2 and never used = 1. The values were added to get 15 and divided by 5 to get the mean value of 3 Any variable with a mean score 3 and above was regarded as being used frequently by farmers while variable with a mean score of less than 2 was regarded as not being used frequently.

III. RESULT AND DISCUSSION

3.1 Enterprise Characteristics of Rice Farmers

Enterprise characteristics of rice farmers in Table 1 indicate that majority (61.3%) of the rice farmers in the study area were male, while the rest 39.7% were female. This implies that rice farming in the study area were male dominated; this could be owing to the fact that rice farming is masculine in nature. . This agrees with findings of Efah and Kuye (2015) that recorded more male farmers than females in their study area. The study found out that the greater proportion (31.9%) of the farmers were within the age bracket of 31 – 40 years, while the remaining 27.3%, 26%, 10.1%, 3.4% and 1.3% are within the age bracket of 21 – 30 years, 41 – 50 years, 51 – 60 years, ≤ 20 years and 61 years and above respectively. The mean age was found to be 37.93 (38 years). The implication is that rice farmers in the area are still in their active farm age. At the mean age, the use of ICT is expected to be high. In support of this Ajah and Ajah (2014) opined that rice farming is physically demanding and old age can pose a problem to the cultural operations.

The results also revealed that majority (65.5%) of the farmers were married. Thus, married people dominated rice farming in the area. The cultural practices of rice farming are enormous and require hands, hence the involvement of many married farmers. This agrees with the findings of Agbolahor, Obunyela and Adebowale (2012). The study equally found out that the mean level of education was 10.29 (10 years), this implies that the farmers are fairly literate; the use of ICT is also expected to be high. Kuye and Ettah (2015) stated that the relevance of the literacy level of a farmer to farm productivity and production efficiency. They further pointed that education facilitates farmers understanding of information on credit, use of credit and improved crop technologies. The study revealed that the majority (50.2%) of the respondents had ≤ 5 years farming experience, while the remaining 19.7%, 14.3%, 10.3% and 5.7% had farming experience within the bracket of 6 – 10 years, 16 – 20 years, 21 years and above, and 11 – 15 years respectively. On the average, the farmers have spent 9 years (9.28) in rice farming in the study area. This implies that rice farmers in the area were fairly experienced. The result shows that the majority (64.5%) of the farmers were primarily farmers, while the remaining 22.7%, 7.3% and 5.5% are primarily civil servant, artisans and traders respectively. Table 1 study shows that the majority (62.6%) of the farmers were secondarily traders, while the remaining 17.7%, 15.5% and 4.2% were secondarily farmers, artisans and civil servants respectively. Interestingly, the study revealed that the majority (54.0%) of the farmers had a household size of ≤ 5 persons, while the remaining 39.1% and 6.9% have a household size of 6 – 10 persons and 11 persons and above respectively. The farmers averagely had 6 persons (5.56) as their mean household size. Large household size supplies cheap family labour. This number is capable of reducing the cost incurred for labour in the farm. Greater proportion (48.3%) of the farmers had ≤ 10 plots, while the remaining 26.3%, 15.3% and 10.1% had a farm size of 31 plots and above, 11-20 plots, and 21 - 30 plots respectively. The mean farm size was found to be 11.42 plots. It was measured that 15 plots makes a hectare. This may be as a result of land ownership system in the South East Nigeria, which is predominantly by inheritance. Annual income from rice shows that the majority (56.3%) of the farmers had annual income of ₦350,001 and above, while the remaining 19.3%, 12.0%, 10.1% and 2.3% have annual income within the bracket of 50,001 - 150,000, 250,001 - 350,000, 150,001 - 250,000, and ≤ 50,000 respectively. The mean annual income from rice was found to be ₦426, 499.76.

TABLE 1
DISTRIBUTION OF ENTERPRISE CHARACTERISTICS OF RICE FARMERS (n = 476)

Variable	Frequency	Percentage (%)	Mean
Sex:			
Male	292	61.3	
Female	184	38.7	
Age (years):			
≤ 20	16	3.4	
21 – 30	130	27.3	**37.93**
31 – 40	152	31.9	
41 – 50	124	26.0	
51 – 60	48	10.1	
61 and above	6	1.3	
Marital status			
Single	140	29.4	
Married	312	65.5	
Divorced	24	5.0	
Level of education			
Primary school uncompleted	46	9.7	
Primary school	111	23.3	
W.A.S.C/NECO	156	32.8	**10.29**
HND/B.Sc.	121	25.4	
M.Sc./PhD	42	8.8	
Farming experience (years):			
≤ 5	239	50.2	
6 -10	94	19.7	
11 – 15	27	5.7	**9.28**
16 – 20	67	14.1	
21 and above	49	10.3	
Primary occupation			
Farming	307	64.5	
Trading	26	5.5	
Art and craft	35	7.3	
Civil servant	108	22.7	
Secondary occupation			
Farming	84	17.7	
Trading	298	62.6	
Art and craft	74	15.5	
Civil servant	20	4.2	
Household size			
≤ 5	257	54.0	
6 – 10	186	39.1	**5.56**
11 and above	33	6.9	
Farm size (plot)			
<= 10	230	48.3	
11 – 20	73	15.3	
21 – 30	48	10.1	**11.42**
31 and above	125	26.3	
Annual income from rice (₦)			
≤ 50,000	11	2.3	
50,001 - 150,000	92	19.3	
150,001 - 250,000	48	10.1	**426,499.76**
250,001 - 350,000	57	12.0	
350,001 and above	268	56.3	

Source: Field Survey Data, 2020

3.2 Cooperative Membership State wise

The farmer's cooperative membership was shown in Table 2. The findings revealed that in Anambra State, majority (57.6%) of the respondents were not members of farmer's cooperative, while the rest 42.4% are members. Reverse is the case in Ebonyi State where the study shows that the majority (62.0%) of the respondents were members of farmer's cooperative, while the remaining 38.0% are not. Also, majority (99.7%) of the respondents in Enugu were members of farmers cooperative while the remaining 1.3% was not. This implies that the State with high farmers' cooperatives can easily access government loan, improve more in their farming activities because of mutual group learning.

TABLE 2
DISTRIBUTION OF COOPERATIVE MEMBERSHIP STATE WISE

State	No (0)	Yes (1)	Total
Anambra	57.6	42.4	100
Ebonyi	38.0	62.0	100
Enugu	1.3	99.7	100

Source: Field Survey Data, 2020.

3.3 ICT Availability in the Study Area

The farmer's responses on ICT availability is presented in Table 3. The farmers were allowed multiple responses and were ranked. Thus, the top 10 ICT tools/format available to the rice farmers in the area are; Mobile Phone (Personal GSM), Radio set, Television, Facebook, Short Message Services (SMSs), Internet, E-mail, Whatsapp, Video CD Player, and Digital video Disk (DVD). The Table showed the order of their percentage representation as; 96.8%, 96.4%, 96.4%, 57.1%, 56.3%, 43.5%, 39.5%, 29.4%, 27.1%, and 14.7% respectively. This implies that most of the ICT tools are scarcely available in the study area. This may be as a result of the high cost of the ICT tools considering the economic situation of the country. Cooperative societies in the study area should be encouraged to pull resources together for the procurement of these tools even if they will only be made available for its member's use. This findings collaborates with (Ansari and Pandey, 2013), according to them most ICT tools are not available except mobile phones.

TABLE 3
DISTRIBUTION OF ICT AVAILABILITY IN THE STUDY AREA

Sr. No.	ICT Tools/formats Availability	Frequency	Percentage	Ranking
1.	Radio set	459	96.4	2
2.	Television	459	96.4	2
3.	Facebook	272	57.1	4
4.	Mobile Phone (Personal GSM)	461	96.8	1
5.	Short Message Services (SMSs)	268	56.3	5
6.	CD-ROM	14	2.9	12
7.	Video CD Player	129	27.1	9
8.	Computer System	8	1.7	15
9.	Internet	188	39.5	7
10.	Digital Camera	41	8.6	11
11.	YouTube	13	2.7	14
12.	Multimedia Projector	5	1.1	18
13.	Digital video Disk (DVD)	70	14.7	10
14.	E-mail	207	43.5	6
15.	On-line Magazines	7	1.5	17
16.	GPRS	0	-	19
17.	Whatsapp	140	29.4	8
18.	Instagram	8	1.7	15
19.	Video Conferencing	0	-	19
20.	Tele Conferencing	0	-	19
21.	Robots	0	-	19
22.	Twitter	14	2.9	12
23.	Likee (Online Video posting)	0	-	19
24.	Mixler (Online Radio)	0	-	19

Source: Field Survey Data, 2020.

3.4 Rice farmers' enterprise characteristics and their level of use of ICT

The result of the Tobit regression done to test the significant relationship between enterprise characteristics and level of use of ICT tools/format is presented in Table 4. The Tobit regression from STATA version 14 recorded a Log likelihood of -149.566. The more negative value of the Log-likelihood the better the Tobit result to explain the model. The Likelihood Ratio (LR Chi^2) of 142.75 is significant at probability of 0.01 indicating the model goodness of fit to explain the enterprise characteristic relationship with level of use of ICT tools/format. The Sigma value of 0.84995 shows that the total variation of 85% in the use of ICT tools/format is caused by the rice farmer's enterprise characteristics.

Thus, the Tobit regression is predicted as follows:

Use * = 2.244 - $0.14297X_1$ - $0.04016X_2$ - $0.72259X_3$+ $0.00809X_4$ + $0.01265X_5$ + $0.3487X_6$ + $0.144786X_7$ + $3.65e\text{-}02X_8$ - $2.76e\text{-}08X_9$ + $0.03791X_{10}$.

The coefficients of sex, education, experience, annual income from crops and membership of a cooperative were not significant at 10%, 5% or 1% level of probability. The coefficient of age (0.040) was negative and significant at 5% level of probability. This implies that increase in the age of farmers will reduce their ability to use ICT tools/format by 4.0%. This was expected based on *a-priori* expectation as farmer's willingness to use a technology decrease with an increase in age. The predictive value of marital status was negative and significant at 1% level of probability. This implies that as the number of married farmers increase, their use of ICT tool\format will reduce by 72.2%. This is probably as a result of increased responsibilities. The coefficient of primary occupation was positive and significant at 1% level of probability. This implies that as the farmers switch from main occupation (example farming to trading) will increase their use of ICT by 34.9%. The respondents may have to consult ICT material to learn various farming techniques strange to them as a result of their switch of occupation. The coefficient of household size (0.145) was positive and significant at 1% level of probability. This implies that a unit increase in the number of household people will increase the use of ICT tool\format by 14.5%. This result was expected as extension information may be accessed by any member of the family and brought to the knowledge of others who are later subjected to using it.

The coefficient of farm size (0.003) was positive and significant at 1% level of probability. This implies that a unit increase in the farm size will increase the magnitude of use of ICT tool/format by 0.3% by *a prior* expectation, as the farm size increases farms may needs to consult extension services through ICT tools for better and improved farming. This contradicts the findings of Kabir (2015) who stated that education and farming experience are potential factors of enhancing ICT use. On age and farm size, this agrees with the findings of Barclay (2017). Summarily, the study has been able to establish that the enterprise characteristics influencing the use of ICT tool\format in the area were; age, marital status, primary occupation, household size and farm size.

TABLE 4
RICE FARMERS' ENTERPRISE CHARACTERISTICS AND THEIR LEVEL OF USE OF ICT (n = 476)

ICT use	Coefficient	Std. Err.	t-ratio	P>|t|	Decision
Constant	2.244	0.486	4.62	0.000	
Sex	-0.143	0.185	-0.77	0.440	Accept
Age	-0.040	0.016	-2.45**	0.014	Reject
Marital status	-0.723	0.232	-3.12***	0.002	Reject
Education	0.008	0.025	0.33	0.741	Accept
Experience	0.013	0.017	0.75	0.456	Accept
Primary Occupation	0.349	0.111	3.14***	0.002	Reject
Household size	0.145	0.045	3.25***	0.001	Reject
Farm size	3.65e-02	7.72e-03	4.73***	0.000	Reject
Annual income	-2.76e-08	2.74e-07	0.21	0.920	Accept
Cooperative membership	0.038	0.179	0.21	0.832	Accept
Diagnostic tool					
Sigma	0.850	0.096			
Log likelihood	-149.566				
LR Chi^2	142.75				
Number of obs.	476				

Source: Field Survey Data, 2020. (*) Significant at 10%, (**) Significant at 5%, (***) Significant at 1%.

3.5 Levels of use of ICT tools/format and availability

The result of test on the significant relationship between the levels of use of ICT tools/format and availability is in Table 5. The Pearson Product Moment Correlation (PPMC) for non-parametric tool conducted to test the significant correlation between the level of use of ICT tools/format and availability in the study area was positive and significant at two tailed probability level of 0.01 with an effect size of 0.885**. This result showed a positive and strong relationship with the level of use of ICT tools/format and availability. Based on the two tailed outcome, an increase in one causes 0.885 increases in another and vice versa. This is in line with the findings of (Raghpresad, Gopala and Devaraj, 2016) who opined that knowledge is a key factor in modern agriculture.

TABLE 5
LEVELS OF USE OF ICT TOOLS/FORMAT AND AVAILABILITY (n = 476)

Correlations			Use	Availability
Spearman's rho	Use	Correlation Coefficient	1.000	0.885**
		Sig. (2-tailed)	.	0.000
		N	476	476
	Availability	Correlation Coefficient	0.885**	1.000
		Sig. (2-tailed)	0.000	.
		N	476	476
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: Field Survey Data, 2020. Bivariate correlation matrix

IV. SUMMARY AND CONCLUSION

The study examined the socioeconomic determinants and level of use of ICT among small holder rice farmers in Southeast, Nigeria**.** Data were collected with a well-structured questionnaire from 476 randomly selected rice farmers and were analyzed using a combination of analytical tools such as descriptive statistics, Tobit regression, Analysis of variance, correlation and z-test. The result revealed male dominance (61.3%), active age (mean age of 38 years) and majority (65.5%) of the farmers were married. The mean years spent in formal education was 10 years, mean farming experience was 9 years while the mean household size, farm size and annual income from rice were 5 persons, 11.42 plots, and ₦426,499.76 respectively. Also, the primary occupation was majorly (64.5%) farmers. The study equally showed that majority (62.0% and 99.7%) of the farmers sampled in Ebonyi and Enugu were members of farmer's cooperative.

The result of farmer's response on ICT availability revealed that most of the ICT tools were scarcely available due to high cost of procurement of these tools considering the economic situation of the country.

The result of Tobit regression analysis showed that age, marital status, primary occupation, household size and farm size were significant while the coefficients of sex, education, experience, annual income from crops and membership of a cooperative were not significant at 10%, 5% or 1% level of probability. The result of significant relationship between the levels of use of ICT tools/format and availability showed a positive and strong relationship with the level of use of ICT.

RECOMMENDATION

1. Government and other relevant bodies should ensure that ICT facilities are installed in rural communities.
2. The cost of ICT tools/format and other ICT infrastructures should be subsidized for rice farmers in order to increase their access to information that is beneficial for rice production.

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