



## **AWARENESS OF SMART-MEDIA TOOLS FOR AGRICULTURAL EXTENSION UTILISATION AMONG MAIZE FARMERS IN NIGERIA**

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### **ABSTRACT**

This study assessed the awareness of smart-media tools for agricultural extension (SMTsAE) utilisation among maize farmers in three selected States in Nigeria. Multistage random and purposeful sampling procedures were used selecting 456 maize farmers for the study. Data were obtained using mixed methods and triangulations of the survey instruments through a structured questionnaire and focus group discussion and analysed using descriptive statistics. Results showed that the relationship between the mean ages of the maize farmers from adopted and non-adopted villages of NEARLS as 45.4 and 45.8 with standard deviation 9.793 and 11.200 respectively, mean farmland sizes of 1.44 and 1.45 (ha) with Std. dev. 4.990 and 6.823. Both respondents had an average household size of 6 persons per household in the NAERLS-adopted and non-adopted villages, respectively. The results on awareness showed that 21% and 16% of respondents from the adopted villages got it from extension agents and radio while 16% accessed it from the internet. 18% 15% of respondents from the non-adopted villages got it from extension agents and radio while 14% accessed it from the internet. The results further revealed that text messaging, facebook and whatsapp were highly accessible by the respondents with a mean score (4.76), (4.58) and (4.46), respectively. A significant proportion (28.6%) of the studied maize farmers utilised the SMTsAE for sourcing general agricultural information, followed by sourcing inputs (25.7%), and sourcing agribusiness market outlets (13.1%), respectively. The major challenge faced was inadequate finance (9.86%). The study concludes that the maize farmers in the study area were aware and utilised SMTsAE in sourcing agricultural information and inputs. The study recommends that private-public sector digital tool developers should develop a user-friendly tools, policies and technical support for sustainability.

**Keywords:** Awareness, Accessibility, Utilisation, Maize Farmers

### **INTRODUCTION**

Information and Communication Technology (ICT) is the convergence of media technologies utilising a unified system of 'smart media tools' applications and services enabling users to access and manipulate information in a digital form (FAO, 2016). Digital farming, which 'involves' the use of ICTs and agricultural innovation via smart-media tools for agricultural extension to collect and analyse data in real-time (Bacco *et al.*, 2019; Chadwick, 2017; Walter *et al.*, 2017). The aforementioned 'smart-media tools' help to provide interactive platforms to other media tools used for different processes and assist with the machine-learning operations (MLOps) of any hardware connected to solving problems (Amason, 2024; Garber-Metrology, 2021). Also, these interactive platforms are a significant addition to conventional extension services. When conventional in-person communication networks are impossible in an emergency setting thus, investing in low-cost smart-media tools becomes an alternative solution (Olagunju *et al.*, 2021). Moreover, providing farmers the opportunity to gather real-time agricultural information on market prices, connections, and solutions to overcome challenges is becoming an urgent priority (Hassan *et al.*, 2020). In Nigeria, the efficacy of the agricultural sector particularly agricultural extension depends on a digital drive for real-time



agricultural information sharing (Ali *et al.*, 2020; Sisinni *et al.*, 2018). Similarly, effective communication and interaction on agricultural innovation systems (AIS) and knowledge management exchange basis can be achieved swiftly using the Smart Media Platform (SMP) for awareness creation between agricultural stakeholders such as researchers, extension agents, and farmers (Wan Mohd *et al.*, 2020; Patil & Kale, 2016).

In the words of Wilson, (as cited in Nava-Muños and Morán, 2014), stated that awareness-raising means making people conscious of a problem or issue. You want to make a certain topic or issue more visible within a community. According to Suleiman *et al.* (2018); Kuria (2014), awareness improves access to and usage of social media tools. Utilisation is an act or instance of making practical or profitable use of something (Mondal & Patit, 2022). In the view of Kothari and Kameswari (2019), competence in utilising smart media tools for agriculture (SMTsA) is related to tasks of accessing information for problem-solving, decision-making, communicating, creative expression, and empirical reasoning for agricultural practices. The goal is to make people understand the importance of a certain issue and find support to address it. In this study, awareness is defined as knowing that SMTsAE selected for this study exist and are important.

The National Agricultural Extension and Research Liaison Services (NAERLS) began its adopted village project in 2005 with the general objective as defined by the Agricultural Research Council of Nigeria (ARCN) of improving the productivity and livelihoods of selected villages in the six agro-ecological zones in Nigeria namely, North-East, North-West, North-Central, South-East, South-West, and South-South zones, where the SMTsAE were deployed to and utilised by the farmers for improving agricultural practices (Adio *et al.*, 2016; NAERLS, 2011; Afolabi *et al.*, 2023). The SMTsAE's potential were utilised at different occasions in all the NAERLS adopted villages across the agro-ecological zones in Nigeria. Despite the support given to the farmers under the Growth Enhancement Support Scheme (GESS), and the Alliance for Green Revolution in Africa (AGRA) /NAERLS Community Based Advisors (CBA) Project, challenges still persist. There were no sufficient empirical evidences that the SMTsAE enhanced the farming activities in NAERLS adopted villages. Also, the food growth rate did not improve as expected, furthermore, the Nigerian agricultural sector's growth dwindled consistently for many years (National Bureau of Statistics [NBS], 2021). Against this background, the study assessed the awareness, accessibility and utilisation of smart-media tools for agricultural extension (SMTsAE) among maize farmers in three selected States in Nigeria. Essentially, this study's findings shed more light on the importance of available SMTsAE to policymakers and stakeholders in the agricultural sector with the issues of e-agriculture, the need for increased productivity, and the provision of imperative information on smart agriculture to scale up resilient agriculture. Also, serve as an impetus for the private/ public agricultural researchers to solve numerous challenges faced by farmers across the agro-ecological zones in Nigeria. The specific objectives of the study are to:

- (i) describe the socio profile of the maize farmers;
- (ii) identify the sources of awareness of SMTsAE;
- (iii) identify areas of utilisation of the SMTsAE;
- (iv) evaluate the relationship of socio-economic characteristics;
- (v) identify the constraints faced with the utilization of SMTsAE in farming activities in the study area.

## **METHODOLOGY**

### **Study area**

This study was conducted in the three agroecological zones of Nigeria, namely the North, North Central, and East. In each of the three zones, one State was selected based on the location where the NAERLS-adopted villages are domiciled. Thus, Kaduna State was selected in the (North) located at the centre of Northern Nigeria. It lies between Latitude 10°20' N 7°45' E and Longitude 10.333 °N 7.75 °E of the Equator. Niger State, (North Central) is located approximately between latitudes 8°20'N and 11°30'N, and longitude 3°30'E and 7°20'E makes it lie entirely within the



Guinea Savanna belt of the country. Abia State (East) is located approximately within Latitudes 4° 40' and 6° 14' north and Longitudes 7° 10' and 8° E of the Equator.

### **Sampling procedure and Sample Size**

The population of the study included maize farmers across the three agroecological zones in Nigeria. Multistage random and purposeful sampling procedures were used in collecting primary data from 456 maize farmers from the NAERLS-adopted villages and non-adopted villages across the three agroecological zones in Nigeria.

### **Method of Data Collection**

Primary data and documented information needed for the study were collected through the use of survey instruments such as a structured questionnaire Focus Group Discussion (FGD) and Key Informant Interview (KII) to elicit more detailed information and views of the experts as counterfactual for in-depth analysis, and administered via interview schedule to gather information from the maize farmers.

### **Method of Data Analysis**

Data for the study were analyzed using descriptive statistics. The descriptive statistics used were frequency, percentage, mean, mean score, rank, standard deviation and thematic analysis to achieve the study specific objectives.

## **RESULTS AND DISCUSSION**

### **Socioeconomic Characteristics of the maize farmers**

The results in Table 1 showed that the majority (79% and 70%) of the maize farmers from NAERLS adopted and non-adopted villages were male, while, 21% and 30% were female respectively. This implied that maize farming activities within the study area are carried out mostly by men. The result agrees with Adio *et al.* (2016), who reported that males constitute the majority of their farmers in the study area. This result cannot be relied on to put up an argument that the SMTsAE disseminated is strongly sex bias. It is reasonable that men may have been more receptive to the advantages of SMTsAE and used it more in their agricultural practices. Therefore, it can be argued that men were more exposed to the use of the SMTsAE and enjoyed its potential in their farming activities. The argument is contrary to the study by Akinola (2017), who found female farmers use smart media tools more recently than male farmers in the study area. On the other hand, the low percentage of female maize farmers in this present-day, can be attributed to cultural norms, religious beliefs, economic strength and communication methods used in dissemination of smart-media tools may have excluded women from the surveyed regions, causing them to focus more on tasks such as store cleaning, post-harvesting, and off-farm work. These factors likely contributed to women's limited exposure to SMTsAE, a reasonable hypothesis.

The findings revealed that the majority (53.3%); (49.3%) of maize farmers in the study area had a household size of 4-6 persons. Additionally, 23% of maize farmers studied had a household size of 7-9 persons. The households with 1-3 persons constituted 18% and 17%, while, 11% and 6% of the maize farmers constituted the households with 10-13 persons. Also, the mean household size was 6 persons per household in the study area. The results corroborate the findings of Olaniyi and Ismaila (2016), who reported that household size with modal class is between 4-6 members and use the SMTsAE for information. While disagreeing with the findings of Awoyemi and Aderinoye-Abdulwahab (2019), and Nenna (2020), who found that among farming households, the farmers had a large household size are 7-9 persons feeding in the same pot in South East, and South West, Nigeria. This implied that the average household size in North West, North Central and South East Nigeria is about 6 persons per household. The implication is that the greater household size of a maize farmer, the greater the supply of available labour, thereby, reducing the cost of labour, man-hours, and stress expended on maize farming activities as well as resulting in increase in number of bags in terms of yield per ha. Customarily, in the study area household size is used in agrarian society to determine the farmland size, availability of labour and level of productivity. This argument was supported by the Omoare and Oyediran (2015), who asserted that large households are essential in rural communities because they provide human resources for agriculture and other household activities.



The results revealed that 20% and 21% of the studied maize farmers had farming experience of 15 - 21 years in the study area, with mean scores of 17 and 17 years for respectively. This implied that the sampled maize farmers in the study area are well-grounded in the farming activities, thus, would be more interested in the utilisation of the SMTsAE to aid farming activities. This finding substantiated the study of Yakubu *et al.* (2014), who found that the majority of the maize farmers had farming experience of 21-30 years. The result, however, disagrees with the findings of Amponsah *et al.* (2018), who found that the majority of respondents had fewer years of experience and knowledge in maize farming. Overall, these findings means that farming is crucial for supporting the livelihoods of the sampled maize farmers and their families in the study area. This finding is consistent with Olaniyi and Ismaila's (2016), findings, which demonstrated that the scale of farming significantly determines the livelihoods of individual farmers in the research area.

**Table 1:** Distribution of Maize Farmers based on Sex, Marital Status, Household Size, Educational Level and Farming Experience (pooled data) =456

Variable	NAERLS-adopted villages			Non-adopted villages	
	Range	Frequency	%	Frequency	%
Sex	Female	48	21.1	69	30.1
	Male	179	78.9	159	70.0
Household size	1-3	41	18.0	39	17
	4-6	121	53.3	112	49.3
	7-9	51	22.5	52	23
	11-13	14	6.2	26	11
Mean/ Std. dev.		6/ 5.302		6/ 5.302	
Farming exp.	1 – 7	48	21	57	25
	8 – 14	46	20	39	17
	15 – 21	45	20	48	20.9
	22 – 28	57	25	34	14.8
	29 – 35	31	14	51	22.3
Mean/Std. dev.		17.29/ 29.326		17.48/ 29.506	

Source: Field survey 2022

### Sources of Awareness of Smart Media Tools for Agricultural Extension Among Maize Farmers

The section discusses objective two (ii); the sources of awareness of the SMTsAE. The findings in Table 2 showed that the majority (21% and 18%) of sampled maize farmers in the study area received information about SMTsAE from Agricultural Extension Agents (AEAs), (16%) and (15%) of the maize farmers heard it on the radio, while, 16% and 14% of the maize farmers accessed it online using the Internet service. In addition, 14% and 14% of maize farmers obtained the information from fellow farmers, while, 12% and 13% of the sampled maize farmers became aware of SMTsAE on television respectively, in the study area.

This result also supports the maize farmers' claims during focus group discussions (FGD), that ...we lacked sufficient information about other sources of awareness on SMTsAE. This implied that the maize farmers studied were not fully aware of other sources of information used to disseminate SMTsAE technologies apart from AEAs, as noted during the FGD. The implication is that, the inadequacy in the exposure to other sources of awareness of SMTsAE can hinder the maize farmers' ability to obtain and utilise SMTsAE in their farming activities and access new knowledge on smart media tools for maize farming activities. The findings corroborate the study conducted by Ezech *et al.* (2021), who found that awareness creation and the level of utilisation of SMTsAE in farming activities is low among the farmers in Nigeria, while this is contrary to what is attainable among the farmers in Kenya where awareness and the utilisation is high (Kuria, 2014).

Also, the results revealed that the sampled maize farmers (9%) and (12%) got the information through other means such as Babban Gona, worship centre, and NCRI Badeggi, 7% and 7% of the



maize farmers got the information through personal experience, while (5%) and (6%) of the maize farmers read it in newspaper/ magazine. This result disagrees with the finding of Suleiman *et al.* (2018), who found out that the major sources of information on improved agricultural technologies were from co-farmers, farm broadcast, and cooperative society members.

The results further showed that (5%) and (6%) of the sampled maize farmers in the study area rely on newspapers and magazines as sources of awareness on agricultural information. This implied that a notable level of literacy among the maize farmers studied. Therefore, it is possible to effectively disseminate and widely distribute agricultural information to these farmers through various sources, as they are capable of reading, browsing and obtaining the agricultural information, they require utilising SMTsAE. The results were corroborated by the selected maize farmers' leaders during the Key Informant Interview (KII) in the in the study area.

*...the extension agents are trying, but we need more awareness creation and technical support on the SMTsAE so that many farmers in the village can benefit. We measure our farmland, the quantity of inputs and outputs that we need because it is better now because of this smart tool (KII, 2023).*

**Table 2:** Distribution of Maize Farmers Based on the Sources of Awareness of SMTs4AE for Farming Activities (pooled data) n=456

Variable	NAERLS-adopted village			Non-adopted village		
	F	%	Ranking	F	%	Ranking
Extension agent	47	21	1 <sup>st</sup>	42	18.3	1 <sup>st</sup>
Newspaper/ Magazine	12	5.3	8 <sup>th</sup>	14	6.1	6 <sup>th</sup>
Radio	37	16	3 <sup>rd</sup>	34	14.8	2 <sup>nd</sup>
Television	26	11.5	5 <sup>th</sup>	29	12.7	4 <sup>th</sup>
Internet	37	16.3	2 <sup>nd</sup>	33	14.4	3 <sup>rd</sup>
Fellow farmers	32	14.1	4 <sup>th</sup>	33	14.4	3 <sup>rd</sup>
Personal experience	16	7.0	7 <sup>th</sup>	15	6.6	5 <sup>th</sup>
Others (Institutions)	20	8.8	6 <sup>th</sup>	29	12.7	4 <sup>th</sup>
<b>Total</b>	<b>227</b>	<b>100</b>		<b>229</b>	<b>100</b>	

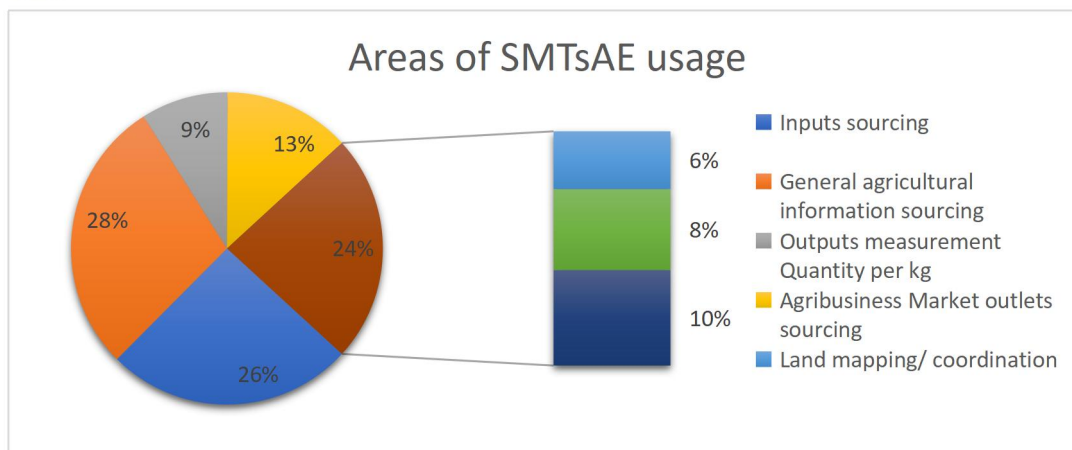
Source: Field survey 2022

### Areas of Utilisation of the Smart Media Tools for Agricultural Extension

The results in Figure 1 also discussed objective three (iii) and revealed that a significant proportion (28.6%) of the sampled maize farmers utilised the SMTsAE for sourcing general agricultural information, followed by sourcing inputs (quantity per kg) (25.7%), sourcing agribusiness market outlets (13.1%), links to credit (9.6%), outputs measurement (quantity per kg) (9.0%), data collection (8.2%), while (5.8%) for farmland mapping/ coordinates in the study area. This result is contrary to the findings of Suleiman *et al.* (2018), who found that most of the farmers got information on harvesting of produce and storage in the barn, site selection/ bush burning. These findings indicated that high number of maize farmers were mainly interested in obtaining general agricultural information rather than using the SMTsAE for farmland mapping and taking farm coordinates. This means that there will be difficulty in locating farmland areas, thus, limiting accessibility to accurate data of farmland in the study area. The implication is that the sampled maize farmers farms would not be visible on the radar to enhance Google search for scientific, and statistical data analysis due to inadequate farmland mapping and coordinate. The results presented were further validated by the maize farmers during the FGD in the study area. According to the maize farmers (men, women and youths) in this study during the FGD sessions:

*...despite utilising SMTsAE to source for inputs like fertiliser, seed, seedlings, and chemicals, the prices are still high. We are requesting for the provision of these inputs at a subsidised cost (FGD, 2023).*

*...we utilised the SMTsAE to gather and share general agricultural information regarding, meeting online, training and financial linkage as a group (FGD, 2023).*



**Figure 1:** Distribution Based on the Area of SMTsAE Usage in Farming Activities.

### Relationship Between Maize Farmers' Age and Farm Size

The result presented in Table 3 discussed objective four (iv) the study revealed the relationship between the mean ages of the maize farmers is 45.4 and 45.8 in the NAERLS-adopted and non-adopted villages respectively. This implied that, the maize farmers studied are energetic, and in their productive age. The findings corroborate the studies by Jain and Hundal (2017), Darshan (2015), who found that the new media users are also characteristically linked with their age and farm size owned and cultivated in various countries, including African nations and Western countries. The implication is that the use of smart media tools in agriculture and farming is said to be prevalent among younger individuals, as it influences their level of participation in farming activities and the size of farmland, they can manage effectively using SMTsAE. In light of this, it is worth noting that the maize farmers observed in this study belong to the age group of SMTsAE users and possess the necessary skills to cultivate farmland as age comes with experience. As a result, their prospects in maize farming can be significantly enhanced with the assistance of SMTsAE, leading to greater productivity.

While the results on farm size (ha) revealed that the sampled maize farmers cultivate 1.1 hectares of land for maize, with the mean score of 1.44 hectares for total farmland cultivated in the NAERLS-adopted villages. In the non-adopted villages, the sampled maize farmers cultivate 1.1 hectares of land for maize, and mean score was 1.45 hectares for total farmland cultivated. This implied that most of the maize farmers studied were smallholder farmers and cultivated small piece of land which might be as a result of difficulty in accessing land or communal barriers. This result confirms the studies of Kolade and Harpham (2014), and Nenna (2020), who found that farming activities are dominated by smallholder farmers in the South-West and South-East of Nigeria. The implication is that access to arable farmland is highly contextual. This, in turn, affects their potential yield and being food insecure. It can be argued that the maize farmers that own smaller farmland sizes are more likely to have low standard of living due to low food supply. By leveraging these innovative technologies, farmers can enhance their knowledge, improve productivity, and streamline their operations.

**Table 4:** Relationship of Maize Farmers' Age and Farm Size (pooled data) =456

Variable	NAERLS adopted village					Non-adopted village				
	N	Min	Max	Mean	SD	N	Min	Max	Mean	SD
Age (years)	227	15	70	45.4	9.793	229	14	71	45.8	11.200
Sizes of farmland (ha)	227	0.50	6.0	1.44	4.990	229	0.40	6.0	1.45	6.823

Source: Field survey 2022



### Constraints to the Utilisation of SMTs4AE in Farming Activities

The results in Table 5 revealed the maize farmers' perception of the constraints faced towards utilisation of SMTsAE in farming activities were inadequate finance, inadequate farming equipment, damaging flooding of farm crops and inadequate internet facilities, which ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup>, respectively in the study area.

**Table 5:** Constraints With the Utilisation of SMTSAE in Farming Activities

Perceived constraints Indicators	Frequency	%	Rank
Inadequacy of finance	45	9.86	1 <sup>st</sup>
Damaging flooding of farm crops	28	6.14	3 <sup>rd</sup>
Epileptic power supply	15	3.28	8 <sup>th</sup>
Inadequate internet facilities	24	5.26	4 <sup>th</sup>
Inadequate smart tools facilities	14	3.07	9 <sup>th</sup>
Insecurity	13	2.85	10 <sup>th</sup>
Inadequate farm equipment	32	7.01	2 <sup>nd</sup>
Inappropriate timing for training	14	3.07	9 <sup>th</sup>
Inadequate information about other sources	17	3.72	7 <sup>th</sup>
No internet coverage and associated disruptions	23	5.04	5 <sup>th</sup>
Inadequate knowledge of smart media tools	22	4.82	6 <sup>th</sup>

Source: Field survey 2022

### CONCLUSION AND RECOMMENDATION

The study concludes that maize farmers were aware of Smart Media Technologies for Agricultural Extension (SMTsAE) and utilized it in sourcing general agricultural information and inputs among others. Also, the relationship between the mean ages of the maize farmers is 45.4 and 45.8 in the study area. However, they expressed a need for better access to credit facilities to acquire these tools and receive training.

Based on the constraints highlighted, the study made the following recommendations;

- There is a need to support their capacity with other probable inputs to increase their productivity.
- Frequent capacity building through the training of trainers (ToT) as Rural-based Digital Extension Tools Advisors (RubDETA).
- Private-public partners should provide affordable SMTsAE to smallholder maize farmers in rural regions, as it promotes the usage of digital extension services.
- Private-public partners should develop more user-friendly SMTsAE in Nigerian native languages or a combination of native and English to overcome knowledge and language barriers.

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