



DETERMINANTS OF INFORMATION AND COMMUNICATION TECHNOLOGIES USAGE AMONG MAIZE VALUE CHAIN ACTORS IN ADP ZONE 1 OF TARABA STATE, NIGERIA

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Abstract

The study examined the determinants of ICT use among maize value chain actors in ADP Zone I of Taraba State, Nigeria. Specifically, the study described the socio-economic characteristics of the respondents, identified the ICT facilities available to them, assessed the utilization of ICT tools for agricultural information, and examined the constraints militating against ICT usage. A multistage sampling procedure was employed to select maize producers, processors, and marketers. Primary data were collected using structured questionnaires and analyzed using descriptive statistics such as frequencies, percentages, means, and inferential statistics where applicable. The findings revealed that the average ages of maize producers, processors, and marketers were 43.8, 43.4, and 42.8 years, respectively, indicating that most respondents were economically active. The majority had formal education, belonged to cooperative societies, and maintained regular contact with extension agents. The most available ICT facilities among producers were radio (96.0%), mobile phones (84.0%), and television (80.0%), while processors had greater access to radio (92.0%), television (90.0%), and mobile phones (89.0%). Among marketers, television (93.3%), radio (90.0%), and newspapers (80.0%) were the dominant ICT facilities. These tools were primarily utilized for accessing production, processing, marketing, and extension information. Major constraints to ICT utilization included inadequate funding, unstable electricity supply, high costs of ICT facilities, poor network connectivity, limited technical skills, and inadequate training. The study concludes that although conventional ICT tools remain the major channels for agricultural information dissemination, addressing infrastructural, financial, and capacity-related constraints is essential for improving ICT utilization and enhancing the efficiency of the maize value chain in Taraba State.

Keywords: Information and Communication Technology (ICT), Maize Value Chain Actors, Agricultural Information, ICT Utilization, Extension Services,

INTRODUCTION

Agriculture remains one of the most important sectors of the Nigerian economy, contributing significantly to employment generation, household income, food security, and rural development. Among cereal crops cultivated in Nigeria, maize (*Zea mays* L.) occupies a strategic position because of its multiple uses as human food, livestock feed, and industrial raw material. The increasing demand for maize has heightened the need for improved production, processing, and marketing systems capable of ensuring sustainable productivity and profitability.

The rapid advancement of Information and Communication Technologies (ICTs) has transformed agricultural extension systems globally by improving access to timely and reliable

information. ICTs facilitate communication among farmers, extension personnel, researchers, processors, marketers, financial institutions, and policymakers, thereby enhancing innovation dissemination and informed decision-making. Technologies such as mobile phones, radio, television, internet services, social media platforms, and computer-based applications have become important channels for delivering agricultural advisory services, weather forecasts, market information, pest and disease alerts, and improved production technologies.

In developing countries, particularly Nigeria, ICTs have significantly complemented conventional agricultural extension services by overcoming geographical barriers and reducing the cost of information dissemination. Rural farmers increasingly rely on mobile communication devices and mass

media to obtain information on improved seed varieties, fertilizer application, pest management, market prices, and climate-smart agricultural practices. Similarly, processors and marketers depend on ICTs to monitor commodity prices, identify potential markets, coordinate supply chains, and establish business networks.

Despite these benefits, the adoption and effective utilization of ICTs among agricultural value chain actors remain below expectation in many rural communities. Several challenges continue to limit ICT utilization, including inadequate electricity supply, poor telecommunication infrastructure, high costs of ICT devices, low digital literacy, limited internet connectivity, and insufficient technical support. These constraints reduce the effectiveness of ICT-based extension services and limit the capacity of farmers and other stakeholders to maximize available agricultural opportunities.

Taraba State is one of Nigeria's major maize-producing states, where maize production provides employment and income for thousands of rural households. However, information gaps across production, processing, and marketing stages continue to constrain value chain performance. Improving access to ICT-based information services has the potential to increase productivity, reduce transaction costs, strengthen market integration, and improve household livelihoods. Understanding the availability and utilization of ICTs among maize value chain actors is therefore essential for designing effective interventions that promote agricultural modernization and rural transformation.

Although several studies have examined ICT adoption among farmers in Nigeria, relatively few have investigated determinant of ICT usage among maize value chain by simultaneously considering producers, processors, and marketers. This study addresses this gap by assessing the socio-economic characteristics of maize value chain actors, identify factors influencing usage of ICT among the value chain actors, identify the ICT tools available to them, and examining the major constraints affecting ICT utilization in ADP Zone I of Taraba State, Nigeria. The findings are expected to provide empirical evidence for policymakers, extension agencies, development organizations, and other stakeholders seeking to strengthen digital agricultural extension services and improve the performance of the maize value chain.

MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Agricultural Development Programme (ADP) Zone I of Taraba State, Nigeria. Taraba State lies in the North-East geopolitical zone of Nigeria and is located between Latitudes 6°30' and 9°36' N and Longitudes 9°10' and 11°50' E. The state covers an estimated land area of approximately 54,473 km² and shares boundaries with Bauchi and Gombe States to the north, Adamawa State to the east, Benue and Plateau States to the west, and the Republic of Cameroon to the south-east. Taraba State comprises of sixteen Local Government Areas (LGAs), which are grouped into three Agricultural Development Programme (ADP) zones.

ADP Zone I consists of Ardo-Kola, Jalingo, Lau, Yororo, and Zing LGAs, where maize production constitutes one of the major agricultural enterprises.

The area experiences a tropical climate characterized by distinct wet and dry seasons. Annual rainfall ranges between 900 and 1,500 mm, while average temperatures vary from 25°C to 35°C, creating favourable conditions for maize cultivation. The predominant occupations of the inhabitants include crop farming, livestock production, agro-processing, and agricultural marketing. Maize is one of the major staple crops cultivated and traded in the study area, making the zone suitable for assessing Information and Communication Technology (ICT) utilization among maize value chain actors.

2.2 Research Design

A cross-sectional survey research design was adopted for the study. The design was considered appropriate because it enabled the collection of quantitative data from maize producers, processors, and marketers at a single point in time. The survey approach provided an effective means of describing respondents' socio-economic characteristics, determine the factors influencing ICT usage among the value chain actors, identify ICT tools available to them, utilization of ICTs tools for agricultural information and examining the constraints influencing ICT utilization along the maize value chain.

2.3 Population of the Study

The target population comprised all maize value chain actors, including maize producers, processors, and marketers operating within ADP Zone I of Taraba State. These actors constitute the major stakeholders responsible for maize production, value addition, and distribution within the study area.

2.4 Sampling Procedure and Sample Size

A multistage sampling technique was employed for selecting the respondents.

In the first stage, ADP Zone I was purposively selected because of its prominence in maize production and marketing activities in Taraba State.

The second stage involved the purposive selection of two major maize-producing and marketing Local Government Areas (Ardo-kola and Lau).

The third stage involved the purposive selection of major maize-producing and marketing communities within the five Local Government Areas that constitute ADP Zone I.

The fourth stage involved obtaining sampling frames of maize producers, processors, and marketers from extension offices, farmers' associations, cooperative societies, and market associations operating within the selected communities.

Finally, respondents were selected using simple random sampling techniques from each category of value chain actors.

A total of 90 respondents participated in the study, comprising:

50 maize producers

16 maize processors

24 maize marketers

The sample adequately represented the three major segments of the maize value chain and provided sufficient information for the study objectives.

2.5 Sources of Data

The study utilized primary data collected directly from respondents through the administration of a structured questionnaire. The questionnaire contained both closed-ended and limited open-ended questions designed to elicit information on respondents' socio-economic characteristics, identify factors influencing ICT usage, ICT tools available, utilization of ICT tools for agricultural information and constraints affecting ICT utilization.

2.6 Instrument for Data Collection

A structured questionnaire was developed based on the objectives of the study and relevant literature on ICT utilization in agriculture. The questionnaire was divided into four sections:

Section A captured respondents' socio-economic characteristics.

Section B elicited information on ICT facilities available to maize value chain actors.

Section C assessed the utilization of ICT tools for agricultural information.

Section D examined constraints affecting ICT utilization among maize producers, processors, and marketers.

Prior to the main survey, the instrument was pre-tested among a small group of maize value chain actors outside the selected study communities to ensure clarity, reliability, and validity. Necessary corrections and modifications were incorporated before the final administration.

2.7 Measurement of Variables

Availability of ICT facilities was measured by asking respondents to indicate the ICT tools accessible to them for agricultural information. The ICT tools assessed included radio, television, mobile phones, internet services, computers, newspapers, electronic mail, bulletins, digital cameras, and CD-ROMs. Responses were summarized using frequencies and percentages.

Constraints affecting ICT utilization were measured by asking respondents to identify the major challenges limiting their use of ICT facilities. The identified constraints included inadequate funding, unstable electricity supply, high cost of ICT facilities, poor network connectivity, limited technical know-how, inadequate training, language barriers, high internet subscription costs, inconvenient broadcasting schedules, and inadequate ICT service centres.

2.8 Data Analysis

Data collected from the field survey were coded, entered, and analyzed using the Statistical Package for the Social Sciences (SPSS), Version 25.0. Descriptive statistical tools, including

frequencies, percentages, means, and tables, were employed to summarize respondents' socio-economic characteristics, describe the availability and utilization of ICT facilities, and identify the major constraints affecting ICT utilization among maize value chain actors.

The choice of descriptive statistics was appropriate because the study primarily sought to describe patterns of ICT availability and utilization among different categories of maize value chain actors rather than establish causal relationships.

RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of Maize Value Chain Actors

The socio-economic characteristics of maize value chain actors are presented in Table 1. The results indicate that the mean ages of maize producers, processors and marketers were 43.8, 43.4 and 42.8 years, respectively, implying that the respondents were within their economically productive years. Individuals within this age category possess the physical capacity and managerial experience required for agricultural production, processing and marketing activities. This finding supports Obasi et al. (2022), who reported that farmers within the active age bracket are more willing to adopt improved agricultural technologies and information systems.

Gender distribution revealed that maize production and processing were dominated by males (60.0% and 62.5%, respectively), whereas maize marketing was predominantly undertaken by females (66.7%). This pattern reflects the traditional gender roles in rural agricultural systems, where men are more involved in labour-intensive farm operations while women participate actively in marketing and value addition. Similar observations were reported by Ogunwade et al. (2020) and FAO (2023).

The majority of respondents were married, accounting for 68.0% of producers, 62.5% of processors and 73.3% of marketers, indicating relatively stable household structures capable of supporting agricultural enterprises. Marriage often enhances labour availability and household decision-making, thereby improving participation in agricultural production.

Educational attainment was generally satisfactory, as more than half of the respondents had completed secondary education, while approximately one-quarter had tertiary education. The relatively high literacy level suggests favourable prospects for ICT adoption because educated actors are more capable of understanding and utilizing modern communication technologies. This finding is consistent with the reports of Dhehibi et al. (2020) and the World Bank (2024), which identified education as an important determinant of digital technology adoption in agriculture.

Cooperative membership was high across all categories of respondents, ranging from 87.5% to 93.3%. Membership of cooperative societies facilitates access to agricultural information, credit facilities, production inputs and extension services. Likewise, extension contact was high, with more than 86% of respondents reporting interaction with extension

personnel during the previous production season. Frequent extension contact improves farmers' awareness of improved technologies and promotes the dissemination of ICT-based advisory services.

The average household size ranged between 5 and 7 persons, indicating the availability of family labour for production, processing and marketing activities. Similarly, respondents possessed considerable experience in maize enterprises, averaging 12.5 years for producers, 10.7 years for processors and 9.4 years for marketers. Such experience enhances

managerial competence and facilitates the adoption of improved production and communication technologies.

Most respondents financed their enterprises through personal savings, suggesting limited dependence on formal financial institutions. Inadequate access to institutional credit may constrain investment in modern ICT devices and other productivity-enhancing technologies. Furthermore, radio emerged as the dominant source of agricultural information among all categories of respondents, emphasizing the continued importance of conventional ICT platforms for agricultural extension delivery in rural Nigeria.

Table 1. Socio-economic Characteristics of Maize Value Chain Actors in ADP Zone I of Taraba State, Nigeria

Variable	Producers (n=50)	Processors (n=16)	Marketers (n=24)
Mean age (years)	43.8	43.4	42.8
Male (%)	60.0	62.5	33.3
Female (%)	40.0	37.5	66.7
Married (%)	68.0	62.5	73.3
Secondary education (%)	52.0	62.5	66.7
Tertiary education (%)	20.0	25.0	26.7
Cooperative membership (%)	92.0	87.5	93.3
Extension contact (%)	96.0	93.8	86.7
Mean household size	5.4	5.0	6.9
Mean farming/marketing experience (years)	12.5	10.7	9.4
Mean farm size (ha)	6.12	–	–
Major source of finance	Personal savings (40.0%)	Personal savings (56.3%)	Personal savings (60.0%)
Major source of information	Radio (60.0%)	Radio (68.8%)	Radio (70.0%)

Source: Field Survey, 2026.

3.2 Socio-economic Factors Influencing Usage of ICTs among Maize Value Chain Actors

Socio-economic Factor Influencing Usage of ICTs among maize producers

The result in Table 2 revealed the result of logit regression of the socio-economic factors influencing the usage of ICT among maize producers. The result shows that the coefficient of educational level (-2.0864) was negative and statistically significant at 5%. This implies that low educational level of maize producers would lead to a decrease in the probability of usage of the available ICT and subsequently bring a drastic reduction in maize production as the actor don't have access to production technology that will increase their production output. This result disagreed with the findings of Obayelu *et al.* (2022) who reported that education and technical training appear to have a positive effect on farmers' usage of ICT to boost their production and allow people to adapt more easily to technical changes. The coefficient of logit regression for the acquisition of land (8924276) is positive and statistically significant at 10%. This implies that the acquisition of land is among the determinants of the use of ICTs as the producer has more access to land for maize production and subsequently

has money to purchase ICT tools available to obtain information.

Table 2 Socioeconomic Factors Influencing Usage of ICTs among maize producers

Variable	Coefficient	Std Error	Z-statistic	P-value
Constant	4.9235	4.8886	1.01	0.126
X ₁ (Age)	.108753	.44898	0.24	0.809
X ₂ (Sex)	.189111	1.2744	0.15	0.882
X ₃ (Marital Status)	-.886472	1.0790	-0.82	0.411
X ₄ (House Hold Size)	-.788596	.89720	-0.88	0.379
X ₅ (Educational level)	-2.0864	.97686	-2.14	0.033*
X ₆ (Years of exp.)	.769353	1.0674	0.72	0.471
X ₇ (Extension contact)	-.10865	.99417	-1.09	0.126
X ₈ (Membership of ass.)	-.369649	1.0041	-0.37	0.713
X ₉ (Land acquisition)	.892427	.48725	1.83	0.067**
X ₁₀ (Source of income)	.033584	.23415	0.14	0.886
X ₁₁ (Labour)	1.8147	1.1871	1.53	0.126
X ₁₂ (Farm size)	-.172945	.87900	-0.20	0.844
Prob>chi	0.1809			
Pseudo R ²	0.2588			

Source: Field survey, 2026

* Significant at 5% level of probability

** Significant at 10% level of probability

Socio-economic factors influencing usage of ICTs among maize processors

The results of the logit regression of socioeconomic factors affecting maize processors' use of ICTs are displayed in

Table . The findings showed that for processor's the age coefficient (1.2520) was positive and statistically significant at 10%. It suggests that an increase in the age of processors who use ICT could be as you grow older in the business and experience you will look for ICT tools to use for expansion. This supports Nuer (2018) assertion that ICT is thought to encourage young people to pursue agribusiness and increase their interest in agriculture.

Result in Table 3 reveals that the household size regression coefficient (-2.1519) was negative and statistically significant at 10%. This could be that larger households need more money to care for and feed their constituents. Purchasing ICT tools with a little sum of money may affect feeding of the family. This result supports the findings of Ajayi (2022), which show that the larger a household is, the less money it can spend on ICT instruments. Additionally, the more money

available for the purchase of ICT instruments, the smaller the household. The size of the household is therefore a major factor in determining whether maize processors will purchase ICT instruments or not.

At 10%, the negative coefficient of labor variable (-1.9062) was statistically significant. It suggests that labor use can give more income since many people are working for him which in turn have more income to purchase ICT tools for used. The maize processors' access to credit variable had a positive and statistically significant coefficient (2.5976) at the 5% level. More loan availability increases a processor's capacity to purchase ICT instruments for accessing agricultural information. This suggests that processors with financial availability have a greater opportunity to use ICT technologies to increase agricultural supply.

Table 3 Socio-economic factors influencing usage of ICTs among maize processors

Variable	Coefficient	Std Error	Z-statistic	P-value
X ₁ (Age)	1.2520	.64219	1.95	0.051**
X ₂ (Sex)	-1.6273	1.2289	-1.32	0.185
X ₃ (Marital status)	45637	1.2908	0.35	0.724
X ₄ (House Hold Size)	-2.1519	1.1512	-1.87	0.062**
X ₅ (Educational level)	107598	530491	0.20	0.839
X ₆ (Years of exp.)	-2.0365	1.3003	-1.57	0.117
X ₇ (Extension contact)	-13710	1.5814	-0.09	0.931
X ₈ (Membership of coop.)	-09980	1.0957	-0.09	0.927
X ₉ (Source of capital)	-14600	64282	-0.23	0.0820
X ₁₀ (Labour)	-1.9062	1.118	-1.70	0.088**
X ₁₁ (Access to credit)	2.5976	1.2484	2.08	0.037*
Constant	6.0961	3.9169	1.56	0.120
Prob > chi	0.0628			
Pseudo R ²	0.3148			

Source: Field survey, 2026

* Significant at 5% of probability

** Significant at 10% of probability

Socio-economic factors influencing usage of ICT among maize marketers.

Result in Table 4 demonstrates that the age coefficient (1.1641) was positive and statistically significant at 5% level. It suggests that the marketing skills of marketers who use ICT have increased in tandem with their age. The logit regression coefficient for household size (2.9451) was positive and statistically significant at 5%, as indicated in Table 4. Because of the large household size, farmers may find inexpensive labor, which motivates them to look for marketing information in order to boost their output. This result is consistent with the findings of Ajayi (2022), who found that household size influences how farmers use ICTs. Years of experience coefficient (2.3954) was positive and statistically significant at 10%, as indicated by the results in Table 4. This suggests that the adoption of ICTs would rise by (0.094) units

for every unit increase in marketing experience. The reason for this could be that seasoned marketers would have sought out and gradually gained the ICT knowledge and expertise necessary to use ICTs as a marketing tool. This result is consistent with that of Ajayi (2022), who found that years of farming experience have a considerable impact on farmers' adoption of ICTs.

The access to extension contacts variable (-2.6630) has a negative coefficient, which indicates that having contact with extension agents lowers the likelihood that marketers in the study area will use ICT. This could be because farmers are using any available farming and marketing technologies, which will have an impact on their agricultural output.

Table 4 Socio-economic factors influencing usage of ICT among maize Marketers

Variable	Coefficient	Std Error	Z-statistic	Probability
X1(Age)	1.1641	548631	2.12	0.034*
X2(Sex)	-1.2690	1.5153	-0.84	0.402
X ₃ (Marital status)	26024	1.0618	0.25	0.806
X ₄ (House Hold Size)	2.9451	1.4110	2.09	0.037*
X ₅ (Educational level)	49873	708589	0.70	0.482
X ₆ (Years of exp.)	2.3954	1.4282	1.68	0.094**
X ₇ (Extension contact)	-2.8942	1.5412	-1.88	0.060**
X ₈ (Membership of assoc)	-1.2902	1.6109	-0.80	0.423
X ₉ (Source of capital)	-211682	598755	-0.35	0.724
X ₁₀ (Labour)	1.1823	1.3176	0.90	0.370
X ₁₁ (Access to credit)	-2.6630	1.8557	-1.44	0.151
Constant	-5.6494	4.7729	-1.18	0.237
Prob > chi	0.0793			
Pseudo R ²	0.3568			

Source:Field survey, 2026

* Significant at 5% of probability

** Significant at 10% of probability

3.3 Availability of Information and Communication Technologies among Maize Producers, Processors and Marketers

The availability of ICT facilities among maize value chain actors is presented in Table 5. The findings indicate that conventional ICT tools remain the principal channels through which respondent's access agricultural information.

Among maize producers, radio (96.0%), mobile phones (84.0%) and television (80.0%) were the most widely available ICT facilities. Similarly, maize processors reported high availability of radio (92.0%), television (90.0%) and mobile phones (89.0%), whereas television (93.3%), radio (90.0%) and newspapers (80.0%) were the most common ICT facilities among maize marketers.

Conversely, internet services, electronic mail, computers, digital cameras and CD-ROMs recorded comparatively lower levels of availability across the three categories of respondents. This suggests that although digital technologies are gradually penetrating rural agricultural systems, their utilization remains constrained by infrastructural deficiencies, affordability and inadequate digital literacy.

The predominance of radio is not surprising because it remains one of the least expensive and most accessible communication channels in rural Africa. Radio broadcasts provide timely information on weather conditions, pest outbreaks, improved crop management practices and market prices without requiring internet connectivity or advanced technical skills. Likewise, the increasing availability of mobile phones has substantially improved communication between farmers, extension agents and input suppliers.

These findings are consistent with FAO (2024), GSMA (2023) and Akinboade et al. (2022), which reported that radio and mobile telephony remain the dominant ICT platforms

supporting agricultural extension and market information systems across Sub-Saharan Africa.

Table 5 Availability of Information and Communication Technology (ICT) Facilities among Maize Value Chain Actors (%)

ICT Facility	Producers	Processors	Marketers
Radio	96.0	92.0	90.0
Television	80.0	90.0	93.3
Mobile phone	84.0	89.0	60.0
Newspaper	60.0	60.0	80.0
Internet	52.0	42.0	46.7
Computer	48.0	50.0	33.3
Bulletins	58.0	58.0	26.7
E-mail	50.0	30.0	26.7
Digital camera	48.0	48.0	33.3
CD-ROM	44.0	44.0	26.7

Source: Field Survey, 2026.

3.4 Constraints Affecting ICT Utilization among Maize Value Chain Actors

The constraints affecting ICT utilization among maize value chain actors are presented in Table 6. The findings indicate that inadequate funding, unstable electricity supply, high cost of ICT facilities, poor network connectivity and limited technical knowledge were the major constraints affecting the effective utilization of ICTs across the maize value chain.

Among maize producers, unstable power supply (92.0%), high cost of ICT facilities (92.0%) and poor network connection (90.0%) were the most severe constraints. These challenges limit the ability of producers to acquire, operate and maintain ICT devices needed for accessing timely agricultural information. Frequent power outages also reduce

the effectiveness of electronic communication devices, thereby limiting access to extension services and market information.

For maize processors, inadequate funding (93.8%) and limited technical know-how (93.8%) emerged as the most critical constraints, followed by unstable power supply (87.5%) and inadequate training (81.3%). This suggests that processors require both financial support and capacity-building programmes to improve their ability to utilize digital technologies in processing operations, product quality management and market linkages. The findings highlight the importance of digital skills development alongside investments in rural infrastructure.

Among maize marketers, inadequate funding (95.0%) was the most severe constraint, followed by unstable electricity supply (90.0%) and language illiteracy (80.0%). Limited financial resources reduce the capacity of marketers to invest in smartphones, computers and internet services required for accessing market information and conducting digital transactions. Language barriers also hinder the effective use of digital platforms, particularly where agricultural information is disseminated in languages that are not easily understood by rural users.

Overall, the findings demonstrate that financial limitations and infrastructural deficiencies remain the principal barriers to ICT utilization across the maize value chain. Although ICT facilities such as radio, television and mobile phones are available to many respondents, their effective utilization is constrained by inadequate electricity supply, poor telecommunications infrastructure, high operating costs and insufficient technical knowledge. Addressing these challenges is essential for improving agricultural information delivery, strengthening extension services and enhancing productivity among maize value chain actors.

These findings are consistent with recent studies by Adeniran et al. (2020), FAO (2024), International Telecommunication Union (ITU, 2023) and the World Bank (2024), which identified inadequate digital infrastructure, high connectivity costs, unreliable electricity supply and low digital literacy as major impediments to the adoption of ICTs among rural farming communities in developing countries.

Table 6. Major Constraints Affecting ICT Utilization among Maize Value Chain Actors in ADP Zone I of Taraba State, Nigeria

Constraints	Producers	Processors	Marketers
Inadequate fund	80.0	93.8	95.0
Unstable power supply	92.0	87.5	90.0
High cost of ICT facilities	92.0	75.0	66.7
Poor network connection	90.0	62.5	60.0

Limited technical know-how	70.0	93.8	70.0
Inadequate training	60.0	81.3	33.3
Language illiteracy	56.0	62.5	80.0
High internet subscription cost	52.0	75.0	33.3
Broadcast at odd hours	52.0	75.0	40.0
Unavailability of ICT centres	44.0	68.8	26.7

Source: Field Survey, 2026.

3.5 Comparative Ranking of ICT Facilities among Maize Value Chain Actors

Table 8 presents the comparative ranking of ICT facilities available to maize value chain actors in ADP Zone I of Taraba State. The ranking was based on the average percentage of respondents across producers, processors and marketers reporting access to each ICT facility.

Radio emerged as the most available ICT facility with an overall mean availability of 92.7%, followed by television (87.8%) and mobile phones (77.7%). The dominance of these conventional communication technologies reflects their affordability, ease of use and extensive coverage within rural communities. Radio and television remain the primary channels through which agricultural extension agencies disseminate information on improved production practices, weather forecasts, pest and disease management, and market opportunities. Mobile phones have also become indispensable communication tools because they facilitate direct interaction between farmers, extension personnel, traders and input suppliers.

Newspapers ranked fourth with a mean availability of 66.7%, while bulletins, internet services and computers recorded moderate levels of availability. Although internet-based technologies offer substantial opportunities for precision agriculture, digital marketing and online advisory services, their utilization remains relatively low because of inadequate broadband infrastructure, high internet subscription costs and limited digital literacy among rural households.

Electronic mail and CD-ROM ranked lowest among the available ICT facilities. Their limited utilization reflects the gradual transition from traditional computer-based communication systems to more accessible mobile and internet-enabled technologies. Similar trends have been reported across many developing countries, where smartphones, radio and television continue to dominate agricultural information dissemination due to their affordability and user-friendliness.

The findings suggest that while conventional ICT facilities remain the backbone of agricultural communication in the study area, expanding rural internet connectivity and strengthening digital literacy programmes would accelerate the adoption of more advanced digital agricultural technologies. Such investments would enhance information accessibility, improve market integration and strengthen the overall performance of maize value chain actors.

These findings are consistent with the reports of FAO (2024), GSMA (2023), World Bank (2024) and Akinboade et al. (2022), which identified radio, television and mobile phones as the dominant ICT platforms supporting agricultural extension and rural development across Sub-Saharan Africa.

Table 7. Ranking of Information and Communication Technology Facilities Available among Maize Value Chain Actors

ICT Facility	Producers (%)	Processors (%)	Marketers (%)	Mean (%)	Rank
Radio	96.0	92.0	90.0	92.7	1
Television	80.0	90.0	93.3	87.8	2
Mobile phone	84.0	89.0	60.0	77.7	3
Newspaper	60.0	60.0	80.0	66.7	4
Bulletins	58.0	58.0	26.7	47.6	5
Internet	52.0	42.0	46.7	46.9	6
Computer	48.0	50.0	33.3	43.8	7
Digital camera	48.0	48.0	33.3	43.1	8
E-mail	50.0	30.0	26.7	35.6	9
CD-ROM	44.0	44.0	26.7	38.2	10

Source: Computed from Field Survey Data (2026).

CONCLUSION

This study assessed the determinant of Information and Communication Technologies (ICTs) usage among maize value chain actors in ADP Zone I of Taraba State, Nigeria. The study concludes that age, household size, labour, access to credit, extension contact, educational level, land acquisition, and years of experience, have a high significant influence on maize value chain actor's usage of ICT in the study area. Maize producers, processors, and marketers were predominantly within their economically active age group, possessed formal education, belonged to cooperative societies, and maintained regular contact with extension agents. These socio-economic characteristics provide a favourable

environment for the adoption and effective utilization of ICTs in agricultural activities.

The study further established that conventional ICT facilities, particularly radio, television, and mobile phones, remain the most widely available and accessible communication tools among maize value chain actors. These technologies continue to serve as the primary channels for disseminating agricultural information, including improved production practices, processing techniques, market prices, and extension advisories. However, the utilization of more advanced ICT facilities such as internet services, computers, and electronic mail remains relatively low due to inadequate infrastructure, limited digital literacy, and affordability challenges.

The study also identified several constraints hindering effective ICT utilization. The major challenges included inadequate funding, unstable electricity supply, high cost of ICT facilities, poor network connectivity, limited technical know-how, inadequate training, and language barriers. These constraints reduce the capacity of maize value chain actors to fully exploit ICTs for improving productivity, value addition, and market participation.

Overall, the study concludes that although ICTs have considerable potential to improve the efficiency and competitiveness of the maize value chain in Taraba State, their benefits cannot be fully realized without deliberate investments in rural digital infrastructure, affordable ICT services, capacity building, and supportive institutional policies. Addressing these constraints will enhance information dissemination, strengthen agricultural extension delivery, improve market access, and ultimately contribute to increased maize productivity and rural livelihoods.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. Agricultural extension agencies should intensify the use of radio, television, and mobile phones for disseminating agricultural information since these were identified as the most available and accessible ICT tools among maize producers, processors, and marketers. This will improve the timely delivery of production, processing, and market information to value chain actors.
2. Government should improve rural electricity supply and telecommunication infrastructure by expanding power and network coverage in farming communities. This recommendation is based on the finding that unstable power supply and poor network connectivity were among the major constraints limiting effective ICT utilization.
3. Regular training programmes on the use of ICT tools should be organized for maize producers, processors, and marketers by extension agencies, research institutions, and relevant stakeholders. This recommendation is based on the observed limitations in technical know-how and inadequate training among respondents.

4. Agricultural information should be disseminated in simple and local languages through radio and television programmes to improve understanding among value chain actors with limited educational backgrounds and to overcome language-related barriers identified in the study.

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