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Evaluation of information communication technology (ICT) utilization among livestock traders in the central agricultural region of Bauchi State, Nigeria

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Abstract:
The role of Information and Communication Technology (ICT) is beneficial to household nutrition and food security. ICT enables easy access to information regarding the availability, accessibility, and utilization of food. Consequently, this research explored how ICT is utilized by livestock marketers within the area studied. A simple random sampling method was employed to select 100 goat and sheep marketers, along with 60 cattle marketers from five different markets. Data was gathered using questionnaires and interviews, and analyzed through percentages, frequency counts, mean scores, and Likert scales. The findings indicate that all livestock marketers surveyed were male, with an average age of 43 and an average marketing experience of 13 years. The most frequently used ICTs were mobile phones ($\bar{x}$=1.44) and radios ($\bar{x}$=1.28). A significant majority of the marketers (74.0%) utilize mobile phones to inquire about the availability of animals and buyers. The primary challenges related to ICT usage included high costs imposed by network providers (86.0%); inconsistent power supply (81.0%); and poor mobile network connectivity (78.6%). The study concluded that livestock marketers are active users of ICTs, especially mobile phones and radios. Therefore, it is recommended that regulations be put in place regarding communication fees charged by network companies, alongside monitoring the quality of mobile phone battery sales and enhancing the electrical power supply in the country.

Keywords: *Agriculture, Food security, ICT, Livestock, Marketer, Utilization*

1. Introduction

Information and communication technologies (ICT) are essential in every area of human activity today, agriculture included. Farmers are the primary stakeholders in agriculture, and their proficiency in utilizing these technologies shapes the overall impact of ICT in the agricultural sector. The usage of ICT by farmers is witnessing a global rise. By enhancing access to and the exchange of information, ICT has the potential to boost efficiency, productivity, competitiveness, and growth in various segments of agriculture. Farmers involved in large-scale commercial agriculture are likely to employ tools such as cameras, computing devices, digital imaging technologies, the internet, Wide Area Networking (WAN), Wi-Fi, SMS services, WAP (Wireless Access Protocol) internet access via cellular phones, as well as digital media and DVDs, among other technologies, according to Van der Westuizen (2003). In contrast, small-scale farmers commonly utilize different types of ICT, including mobile phones, computers, and the internet, among others.

Of all the technologies available, mobile phones stand out as a preferred choice for many farmers, regardless of their scale of operation. Mobile phones are affordable, user-friendly, energy-efficient, and facilitate personal interactions. They enable farmers to compare prices more effectively and establish connections with buyers who were previously less accessible. Mobile phones enhance the relationship between farmers and traders, creating new market opportunities for small-scale producers, which can lead to increased incomes and help alleviate poverty in their communities. The use of ICT in agriculture within Nigeria is still developing, much like in various other developing regions. There are indications of usage at both individual and organizational levels; however, it remains uncertain whether livestock farmers, who are the intended beneficiaries, actually utilize these resources to fulfil their needs. Key challenges to adopting ICT in rural areas include a lack of ICT literacy, the need for relevant and localized content in native languages, accessibility that is both easy and affordable, and the

awareness and willingness to embrace new technologies, as noted by William and Opeyemi (2015).

The progress of agriculture in Nigeria heavily depends on small-scale farmers, who make up the majority of those engaged in farming. For agriculture to advance genuinely, these farmers need to understand and acknowledge what agricultural development entails. The extent of advancement achieved by these farmers is largely influenced by their access to accurate and reliable information, as well as the quality of the information that can adequately address their needs. Information Communication Technology encompasses a wide array of media, including telephones, television, videos, telex, voice information systems, and fax machines, in addition to technologies that require personal computers with modems or those that support communication processing and the distribution of information through electronic channels like radio, television, and both fixed and mobile telephony, as well as the internet (Omotayo, 2005). Adejo and Haruna (2010) categorized ICT into traditional ICT (such as radio and television) and modern ICT (like telephones and computers/internet). ICTs are essential to the developing global information-driven economy (Okwusi et al., 2009). They are increasingly acknowledged as vital drivers of socio-economic growth around the globe. Indeed, their capacity to rapidly deliver and share substantial amounts of information at minimal cost has been well established (FAO, 2004).

Agricultural extension refers to the services that equip farmers with the necessary knowledge and information to enhance productivity and sustainability in their production systems, thereby improving their quality of life and livelihoods. These services include, but are not limited to, the dissemination of knowledge derived from agricultural research

Agricultural extension services globally focus on conveying research findings and enhanced farming practices to farmers. In Nigeria, most agricultural information is sourced from research institutions that develop new technologies for farmers. Therefore, it can be said that the Agricultural Research Information Service Center serves as the custodian of various information resources, including agricultural information providers such as international organizations, non-governmental organizations, community-based organizations, farmers' magazines, newspapers, posters, leaflets, handbooks, radio, television, videos, and mobile telecommunication systems (AESON, 2011).

Recent global events highlight the significant impact of technology across multiple sectors. The role of technology in agriculture has been recognized over the years, particularly with the introduction of chemicals, fertilizers, labor, improved seeds, and advanced farming methods and systems. The integration of various relevant ICTs in disseminating agricultural information could facilitate farmers' access to market data, land resources and services, pest and disease management, and rural development initiatives (Meera *et al*., 2004).

Given that livestock farmers play a vital role in agriculture and rural development, and that the application of ICTs holds potential for enhancing livestock marketing and rural progress, a study on the utilization of ICTs for sharing agricultural information among livestock marketers is essential.

1.1 Study objectives

The primary aim of this study is to examine the use of ICT by livestock marketers in the region:

a. Describe the socio-economic profiles of the livestock farmers in the area of study.
b. Investigate the utilization of ICT among livestock marketers.
c. Identify the challenges related to the use of ICT among livestock marketers in the study region.

2. Methodology

2.1 Study area

The Bauchi Central Zone Area (LGA) serves as the research area, encompassing approximately six Local Governments spread over a land area of 11,473.25 square kilometers, situated outside the Bauchi metropolis. The NPC (2006) census reported a total population of 4,676,810 in Bauchi State, with over 75% being rural residents. Agriculture is the primary economic activity in this region, where significant crops include maize, sorghum, rice, millet, sugarcane, groundnuts, cowpeas, and various vegetables. Additionally, livestock such as cattle, sheep, goats, and poultry are raised. April is the warmest month, while humidity peaks in August (66.5%) and drops to its lowest in February (16.5%). The average annual rainfall varies from 700 to 900mm, marking the climate with two distinct seasons: wet and dry. The wet (rainy) season lasts for up to five months (from May to September), while the dry season continues for the remaining seven months of the year.

2.2 Sampling procedure and data collection techniques

For this study, six major local governments (Dambam, Misau, Darazo, Ganjuwa, Ningi, and Warji) were selected, and a total of one hundred sixty (160) marketers were chosen; comprising 100 goat/sheep marketers and 60 cattle marketers from five markets, utilizing a stratified random sampling method. Primary data were gathered using a pre-tested, semi-structured questionnaire designed to collect information on the socio-economic characteristics of livestock marketers and other relevant details about their access to ICTs and utilization of information.

2.3 Data Analysis Method

The data were analyzed using both descriptive and inferential statistics. Descriptive statistics addressed objectives I and ii, while the Likert scale was employed for objective iii of the study.

2.4 Descriptive Statistics

Descriptive statistics (frequency, percentage, mean, and standard deviation) were utilized to fulfill objectives a and b.

2.5 Likert Scale

This is a psychometric tool used in questionnaires, where respondents indicate their level of agreement with a given statement. This method was applied for achieving objective iii.

3. Results and Discussions

3.1 The socioeconomic characteristics of the study

The socioeconomic traits of the participants are crucial factors to consider in examining income diversification within the region. These traits encompass age, gender, marital status, household size, educational attainment, and farm size, among other variables.

The findings displayed in Table 1 indicate that male livestock marketers made up 83.75% of the respondents, while their female counterparts represented 16.25% in the area of study. This suggests that although both males and females participate in livestock marketing, males are more predominant. This finding supports Temu (2014)'s assertion that a higher number of men are involved in agricultural marketing compared to women. Additionally, it aligns with the observations made by Oluwatusin and Sekumade (2016), which noted that the majority of farmers in Nigeria are male.

Table 1: Distribution of the respondents based on Socioeconomic Characteristics (n = 160)

Age	Frequency	Percentage	Mean
21 - 30	15	10.0	
31-40	45	28.0	
41-50	58	36.0	**35.33**
Above 50	42	26.0	
Sex			
Male	134	83.75	
Female	26	16.25	
Marital status			
Single	16	10.0	
Married	144	90.0	
Educational level			
non-formal	70	44.0	
Primary	53	33.0	
Secondary	21	13.0	
Tertiary	16	10.0	
Household size			
1-3	26	16	
4-6	50	31	**8**
7-9	54	34	
Above 9	30	19	
Livestock farming experience (yrs)			
Less < 5	14	9.0	
5-9	34	21.0	**4.2**
10-14	51	32.0	
15-19	48	30.0	
Above 19	13	8.0	
Membership of Cooperatives			
Member	101	63	
Non-Member	59	37	

The results also revealed that the age group of 41-50 years had the largest proportion of livestock marketers at 36.0%, out of all respondents, whereas 28.0% and 10.0% fell into the age ranges of 31-40 and 21-30 years, respectively, with an average age of 35.33 years. This indicates that the respondents are primarily in their middle and most productive years, engaging more in livestock marketing than the younger marketers who represented 10%. These findings corroborate the work of Babatunde and Qaim (2009), which stated that a household comprised of more economically active adults is likely to produce more, assuming other factors are equal. Furthermore, the data show that 90.0% of the respondents were married, while 10.0% were single. This indicates that most of the respondents are married, suggesting maturity and a sense of responsibility, consistent with Akinbile (2007), who noted that marriage brings about added responsibility.

The results also indicated that a significant majority (44.0%) of the respondents had no formal education, while only 10.0% had attained tertiary education. Additionally, 33.0% had primary education, and 13.0% had completed secondary education in the area of study. This implies that a substantial portion of the respondents possess a low level of education, with very few reaching secondary educational levels. Consequently, this highlights a challenge regarding the availability of relevant localized content in their native languages, potentially hindering their ability to adopt new technologies, as noted by Davis and Adom (2010).

The subsequent table presents the distribution of respondents based on household size in the region. The findings illustrate that the majority (34.0%) of the respondents had household sizes ranging from 7 to 9 individuals, while 31.0% and 19.0% had household sizes of 4-6 and above 9 individuals per household, respectively.

The average household size was determined to be 8 individuals, indicating the presence of family labor to support livestock marketing efforts. A similar finding was reported by Oluwatusin and Sekumade (2016) in their research on Farm Households Income Sources Diversification Behavior in Nigeria, which noted that household sizes varied from a minimum of 1 to a maximum of 18 individuals, with a mean of 9.

The data further revealed that the majority (32.0%) of the respondents had 10-14 years of experience in livestock marketing, while 30.0%, 21.0%, and 9.0% had experience levels of 15-19 years, 5-9 years, and less than 5 years, respectively. The average years of experience recorded were 4.2 years, suggesting that respondents in the study area possess a considerable amount of experience in livestock marketing.

The usage of ICTs by livestock marketers is highlighted in the Bauchi central agricultural zone. The information regarding this utilization is detailed in Table 2.

Table 2: Distribution of ICTs usage as identified by livestock marketers in Bauchi central agricultural zone

S/No	Variables	Mean	Standard deviation	Ranking
1	Mobile phone	1.44	0.74	1st
2	Radio	1.28	0.50	2nd
3	Newspaper	1.16	0.40	3rd
4	Social media	1.06	0.38	4th
5	Television	1.03	0.12	5th
6	Web publishing	1.01	0.10	6th
7	Handbills and fliers	1.01	0.10	7th
8	Camera	1.00	0.00	8th

*Multiple Responses n=160

3.2 Factors Affecting ICT Usage Among Respondents

The findings in Table 2 illustrate the ranking of ICT usage within the study area, indicating that mobile phones ($\bar{x}$=1.44) have the greatest influence on ICT usage among livestock marketers in this region.

Table 3: Constraints that militate against the use of ICT among Livestock marketers

Variable	Highly severe (%)	Moderately severe (%)	Not severe (%)	Mean
High cost of tariff by Network	86.0	14.0	0	2.8
Unstable power supply	81.0	19.0	0	2.7
Poor Mobile Network connection	78.0	22.0	0	2.6
High cost of ICT devices	71.0	29.0	0	2.5
Insufficient ICT skill	68.0	38.0	0	2.4

*Multiple Responses n=160

Additionally, the results show that radio ($\bar{x}$=1.28) also plays a role in promoting ICT usage among livestock farmers. Furthermore, social media platforms significantly impact ICT usage in the study area, with a coefficient of ($\bar{x}$=1.06), suggesting that the adoption of ICT enhances and facilitates transactions in livestock marketing.

The findings presented in Table 3 indicate that livestock marketers face several challenges, including high tariff costs imposed by network providers (86.0%), unreliable power supply (81.0%), poor mobile network coverage (78.0%), expensive ICT devices (71.0%), and a lack of ICT skills (68.0%). According to ITU (2010), the sparse population in rural areas complicates the delivery of infrastructure and public services such as electricity, water, healthcare, and various modern ICT devices. Private companies are more likely to invest in regions where they see the potential for significant returns. Additionally, providing ICT services necessitates both electricity and technical expertise, which are often scarce in many rural locations. The income level of rural residents is generally lower compared to that of urban dwellers, leading many rural households to be unable to afford modern ICT devices, including computers and internet access

4. Conclusion and Recommendation

In northern Nigeria, livestock marketing is predominantly conducted by men. Despite facing issues like high fees from network companies, unreliable power supply for charging mobile devices, and the expensive costs associated with charging them at commercial outlets, livestock marketers still utilize various forms of ICT, particularly mobile phones and radio. Consequently, this study suggests implementing regulations on communication fees charged by network companies, alongside monitoring the sales quality of mobile phone batteries, as well as enhancing the electricity supply across the country

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