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Socio-Economic Determinants of ICT Utilization among Small Ruminant Farmers in Gombe North Senatorial District of Gombe State, Nigeria

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Abstract

This article examined the relationship between socioeconomic features on the utilization of ICT tools in small ruminant animal production in Gombe North senatorial district of Gombe state, Nigeria. 120 small ruminant animal producers were selected using multistage sampling methodologies. The findings revealed that the respondents' sex, highest educational level, farm size, and the number of secondary occupations, were the socio-economic characteristics which exerted a strong influence on the overall extent of ICT gadget usage. Respondents; sex was found to have a rho value of .862, the highest educational level.968, farm size .870 and the number of secondary occupations.930. The study suggests that farmers should seek further education, try to increase their farm size, introduce more other enterprises into their farms and engage in more other secondary occupations.

Keywords: Information and communication technology, small ruminants farming.

Introduction

Information and communication technologies (ICT) play a significant role in all aspects of modern society. According to Roztocki, Soja, and Weistroffer (2019), ICT has changed not only the way in which people communicate with each other but also the way they find needed information, work, conduct business, interact with government agencies and manage their social lives. Wu, (2021) added that information and communication technology (ICT) has enhanced learning by greater heights over the last decades while Nyarko and Kozári (2021) further emphasized that global networks of ICTs offer a transformative opportunity even for rural populations, enabling them to participate as both producers and consumers. These technologies enable the rapid transfer of vast amounts of information, leading to advancements in numerous areas including agriculture.

Currently, the agricultural sector faces the challenge of increasing production to meet the needs of a growing and increasingly prosperous population, given the scarcity of natural resources and quick transfer of information required to meet up with this challenge. Brooks, Deconinck, and Giner (2019) noted that ICTs provide farmers with a convenient means of communicating with stakeholders such as researchers, agricultural extension officials, and fellow farmers, facilitating information sharing and enhancing productivity. Over the past decade, information and communication technologies (ICTs) have emerged as key tools for transforming agricultural systems in sub-Saharan Africa, as highlighted by the International Institute for Tropical Agriculture (IITA) (2020). Governments, development agencies, and donors rely on ICTs to unlock the potential for increased profitability, connect value chains, and stimulate economies in rural areas.

Small ruminant animal producers utilize ICT tools to streamline their production processes, as these tools have broad applications in various aspects of agriculture. Olajide and Akpan (2020) argued that farmers who engaged in small ruminant farming, such as sheep and goats, often encounter animal illnesses, and the services provided by ICT gadgets play a significant role in connecting them with stakeholders for prompt solutions in this domain. Das (2023) highlighted the importance of ICTs in areas such as record keeping, routine body weight checks, and animal identification. In the livestock industry, various practices, including photo identification, iris-identification, tagging, branding, tattooing, and muzzle printing, are used for animal identification. ICTs also play a crucial role in facilitating access to market information for rural populations, particularly in Nigeria, where there are significant seasonal price fluctuations coinciding with religious festivals, making timely information sharing crucial for marketing purposes, as indicated by the Food and Agriculture Organization (2020). Moreover, ICTs are vital in areas such as credit management, input supply, pest and disease management, feed composition, and post-slaughter handling. They can potentially enhance information availability to all players in the agricultural sector and reduce the associated costs (Bansal and Joshi 2019).

In this digital age, ICT devices have therefore become an integral part of daily life and have permeated every aspect of agriculture. Small ruminant farmers can operate more efficiently and productively by effectively utilizing ICTs, as they gain easier access to accurate and timely information at a reduced cost. However, not all farmers use these ICT gadgets effectively despite their numerous benefits. Moreover, even among the users, there seems to be limited utilization of these technologies (Anim-Dankwa 2021). Consequently, this study focuses on how small ruminant farmers in the study area employ ICT technologies and examines the relationship between farmers' socioeconomic characteristics and the use of ICT tools in small ruminant animal production,

Methodology

The study focused Gombe North senatorial district of Gombe state, Nigeria, which comprises five local government areas which are Nafada, Dukku, Funakaye, Kwami, and Gombe Local Government Areas. Gombe north is located between latitudes $10^{\circ} 13'N$ to $11^{\circ} 34'N$ and longitudes $10^{\circ} 30'E$ to $11^{\circ} 33'E$ (Aziza Goodnews, 2019).

The population for this study consists of all native sheep and goat keepers in the study area. Therefore, pastoral farmers who move their herds of sheep and goats from one region of the country or continent to another are excluded from the study. Among these

5 local governments areas, Dukku and Gombe have 11 wards each while the other three have 10 wards each. (Olaitan, 2023). Two wards were randomly selected from each local government area making a total of 10 wards and two villages were randomly selected from each ward making 20 villages. Six farmers were randomly selected from each village making 120 respondents which were interviewed for this study. Data were collected through an interview schedule. Nine ICT devices were chosen and their use was evaluated on a three point scale of frequently (2), occasionally (1), and never (0).

Consequently, the range of possible scores was $(120 \times 2) = 240$ to $(120 \times 0) = 0$. The cut-score was used to determine the farmers' level of ICT device usage. If a device received a score that is below the mean, it is assumed that the respondents do not use the gadget, and if a device received a score that is equal to or higher than the mean, it is assumed that the respondents do use the gadget. The decision rule was computed based on the assigned weight of the responses as follows;

$$2 + 1 + 0 = 3. \quad 3/3 = 1.0$$

Hence any response with a mean score below 1.0 is rejected as respondents do not use such gadget while mean scores ≥ 1.0 is accepted as respondents use the gadget. In order to confirm that the assumptions of normality, linearity, and homoscedasticity were not violated, preliminary analyses were carried out.

A reliability test was first carried out to determine the internal consistency of the constructs in order to analyze the influence of socio-economic characteristics on the use of ICT Gadgets, and a Cronchba alpha coefficient of .90 was found.

Results and Discussions

Respondents' extent of use of ICT gadgets

Table 1 indicates that radio and mobile phones with weighted means of 1.51 and 1.53 respectively were the only ones with weighted mean above 1. This means that the respondents use these two ICT gadgets to share information about small ruminant animal production. The other gadgets with their respective weighted means include Televisions (0.061), Desk top (0.022), Laptop (0.30), Print media (0.10), DVD (0.06) and Cameras (0.09) were virtually not used by respondents in information sharing in small ruminant animal production. This is in line with the findings of Mansour (2023) and Fidelugwuowo (2023) who identified mobile phones and the radio as the most important ICT tools used by farmers in information sharing. Mobile phone as the most important tool used by farmers was also revealed by Anand, Prakash, Singh and Yedida (2020).

Table 1: Distribution of respondents based on extent of use of ICT gadgets

ICT gadget	Weighted mean
Radio	1.51
Television	0.61
Mobile Phone	1.53
Desk top	0.22
Lap top	0.30
Print mediaz	0.10
DVD	0.06
Camera	0.09

Source: Field survey 2022

Relationship between respondents' extent of use of ICT gadgets and their socioeconomic characteristics.

Table 2: Spearman's rho correlations results between total extent of use of ICT gadgets in small ruminant animal production and socio-economic characteristics of respondents.

Variables		Spearman's rho	Gender	Age	Marital	No. Dependnts	HEL	Farm size	Years of exp	No. of Secondary occupations
Spearman's rho	Correlation coefficient	1.00	.862**	.447**	.205*	.298**	.968**	.870**	.460**	.930**
	Sig.2 tai		.000	.000	.025	.001	.000	.000	.000	.000
	N	120	120	120	120	120	120	120	120	120

**correlation is significant at the 0.01 level (2- tailed)

*correlation is significant at the 0.05 level (2- tailed)

Source: Field survey, 2022

The association between respondents' socioeconomic traits and the total extent of their use of ICT devices was tested using Spearman's rho coefficient.

The result showed that

the use of ICT devices and various socioeconomic traits of respondents were significantly positively correlated, as shown in Table 2. Respondents; sex was found to have rho value of .862, the highest educational level .968, farm size .870 and number of secondary occupations .930. This indicates that as gender increased by one unit, the use of ICT will increase by .862 units meaning that men are more likely to use and adopt ICTs in small ruminant animal production than women. These findings support those of Mdoda and Mdiya (2022), who discovered that men are 0.3 times more likely to use and adopt ICTs than women. The results on table 2 also indicate that as educational level increased by one unit, ICT usage increased by .968 units. This means that farmers with higher educational levels tend to have higher usage of ICT gadgets. This goes in line with

the findings of Muhammad et al (2019) who concluded that the educational level of the farmers had a positive and significant relationship with ICT usage. The results in Table 2 further revealed that farm size positively correlates with ICT gadgets usage. It showed that as farm size (the number of small ruminants kept) increased by one unit, ICT usage also increased by .870 units. This also goes in line with the findings of Achichi et al (2023) who reported that property size was all significant at the 5% level of probability, according to a logistic regression analysis of socioeconomic characteristics influencing ICT usage. Similarly, the results suggest that an increase in number of secondary occupations by one unit leads to increase in ICT usage by .930 units which. This means that farmers who engage in more secondary occupations are likely to use more ICT gadgets than farmers who engage in less number of occupations. The results further suggested that years of experience had a medium positive correlation of .46 meaning an increase of one unit of years of experience leads to increase in use of ICTs by .46 units in line with Mousavi, Farhadian, Fami and Chizai (2018) who also identified job experience among the factors affecting using the ICTs by farmers. However, a weak but positive correlation of .205 and .295 were found between marital status and the number of dependents respectively.

Conclusion and Recommendations

The results of this study indicate that although radio and mobile phones are the most commonly used ICT devices by small ruminant farmers in Gombe North senatorial district of Gombe state, their use alongside other ICT devices in information sharing is grossly affected by their gender, educational level, farm size and number of other secondary occupations.

Farmers should make efforts for to acquire further education through variety of means including adult education, self study, farmer unions and other social interactions. Moreover, as more and more occupations expose a person to need of more information, farmers should integrate more enterprises in to their farming activities in order to facilitate more usage of ICT gadgets in information sharing as well as get them involved in more economic activities.

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