

Full-Length Research Paper

Rural Livestock Farmers Perception of Ecological Niches of Information and Communication Technology Devices in Livestock Production, Management and Improvement in Imo State, Nigeria

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ABSTRACT: The study investigated rural livestock farmers' perception of Ecological Niches of Information and Communication Technology (ICT) tools in livestock production, management and improvement in Imo State, Nigeria. Some objectives of the study include the identification of the various information and communication technology devices used by livestock farmers in the study area, identify the functions of ICT devices in livestock production, management and improvement. Data were collected through questionnaire distributed to 150 ICT-User rural livestock farmers randomly selected from a list of 1500 livestock farmers in Imo State, Nigeria. Percentages, presented in frequency distribution tables, mean scores were used to analyze the data. Results showed that the ICT tools available to the rural livestock farmers include mobile phones (91.3%), radio (56.6%), television (61.3%) and the internet (60%). With an acceptable mean score of 2.50, ICT tools play vital functions in livestock production, management and improvement. Such niches include reduced cost of production (M=2.80), facilitate livestock health care (M=3.31), track where about of animals (M=2.90), provision of technical advice (M=3.10), information on feeds/feeding (M=2.80), record keeping (M=2.80), forecast incidence of diseases (M=3.41), among other functions. The above underscores the importance of information communication technologies in livestock agriculture and the business of farming in general.

Keywords: ICT, livestock, management, farmers, production

INTRODUCTION

Agriculture is a significant element of Nigeria's economy, with livestock playing an important role. Increased food production, farm energy, manure, fuel, transportation, nutritional security, and incomes are all benefits of livestock farming in both urban and rural populations (Tewe, 1997). Livestock accounts for one third of Nigeria's agricultural gross domestic product (GDP). In 2010, livestock production contributed substantially to Nigeria's economy, accounting for about 11% of the total GDP (Encyclopedia of the Nation). The year 2010 was a good year for livestock production. In the third quarter of 2021, the contribution of livestock production to Nigeria's

GDP experienced an increase by 0.12 percent compared to the same period of the previous years, (Statistical Research Department, 2022). Ecological niche is a semantic used for function or role. It is used interchangeably with function in this study. Livestock systems cover over 30% of the planet's ice free terrestrial surface area and are a valuable global asset worth at least \$1.4 trillion (Steinfeld, 2006). Long market chains in the livestock sector employ at least 1.3 billion people worldwide and directly support the livelihoods of 600 million poor smallholder farmers in developing countries (Thornton et al., 2006). Poor farmers, consumers,

traders, and laborers all over the developing world rely on livestock to maintain their livelihoods. Enhancement of livestock production systems has the biggest influence on sustainable development aimed at helping the disadvantaged. Animal diseases are a major stumbling block: poor people's animals are particularly susceptible to disease due to the high cost, lack of, or unsuitability of animal health and production inputs (FAO, 2010). Livestock farming is a vital aspect of the national economy as well as the economics of states and municipalities. The production of livestock, as well as other commodities, has a ripple effect throughout the economy, resulting in jobs, production in allied industries, taxes paid to local, state, and federal governments, indirect impacts from input supply purchases, and induced impacts from household spending across the state. Nigeria's cattle industry accounts for the majority of the country's total livestock cash income. It has contributed an average of 12% of total Nigerian livestock cash income during the last decade (NBS 2010). In spite of all these, livestock production has not been taken seriously as part of the contributor to Nigeria economy as it is supposed to be and this has led to the study. One major factor here is the lack of information and proper knowledge base of the farmers. The use of modern information tools becomes necessary. ICT therefore presents itself as the solution.

ICT could assist Nigerian farmers in efficiently accessing and disseminating current information. Joining online farmer groups, advertising in local farmers' markets that may host a neighborhood website, and joining social network sites like Facebook to build community interest in the farmer's activities are all examples of innovative ways to reach out to buyers and customers (Jones 1997). Farmers can use their savings in a variety of ways thanks to ICT, with many reinvesting extra cash in their enterprises or paying for their children's schooling (Jama et al., 2004).

In Nigerian communities, ICT deployment in livestock is expected to be fragmented and light, with disparities based on the level and quality of telecommunication services, individual ability and demographic characteristics, and the scale of enterprises with which those individuals are affiliated, among other factors. Farmers who are well-educated or involved in large-scale farming, for example, are more likely to use ICT than others.

Farmers might also use mobile phones and other forms of ICT to notify clients about product availability or to discuss and negotiate rates. Many farmers live far away from their farms and may need to communicate with individuals in charge of them on a frequent basis to keep up with farm conditions. In terms of education, farmers might learn how to manage farms, manufacture feeds, and handle infections and other issues by doing so,

surfing the web or connecting with their veterinarian, fellow farmers, and others.

The potential benefits of ICTs to farmers and farm processes call for need to understand factors that might influence the use of the technologies by farmers. Similar studies existed by authors like Bayes, (2001) and Dao, (2004), but little or none is in existence in Owerri the capital of Imo state and other semi urban areas of the state where livestock production is domiciled.

However, interactions with agricultural extension workers and agro-based entrepreneurs as well as literature sources (Agwu et al., 2010) show that cost of the technology, lack of training, trust level in ICT, lack of ICT proficiency, lack of technological infrastructure and non-awareness and unwillingness to use new technologies as well as inadequate power supply could be influencers of use of ICT by farmers in many Nigerian communities.

This evidence emanates mainly from general observations, with a few studies based on the opinions of farmers who are directly involved with the use of the ICT. Furthermore, there are no streamlined studies that show how relevant these general factors are to livestock farming in any Nigerian community with their unique agricultural processes and demands.

The broad objective of this study was to examine the ICT devices used in livestock production, management and improvement in Imo State, Nigeria and the vital roles the tools play in improving livestock farming generally. The specific objectives were to:

- (i) identify the ICT devices used by livestock farmers to help them in their livestock farming in Imo state.
- (ii) access the ecological niches of ICTs in the production of livestock in the study area.
- (iii) ascertain the ecological niches of ICTs in the management of livestock by the farmers in the area in question, and
- (iv) access the ecological niches of ICTs in the improvement of livestock breeding by the farmers in Imo state.

METHODOLOGY

Imo State is made up of twenty-seven (27) Local Government Areas. It lies within longitude 6°50E to 3.3SE and latitude 4°30N to 6°30N (IMSG,2000). The state is divided into three Agricultural zones namely Okigwe, Owerri and Orlu (ADP, 2003). It lies within the tropical rain and evergreen forest with a tropical climate that is humid all year round. The rainy season spans from March to October and bimodal with a two week break (in rainfall) in August. The main annual temperature is

between 50% and 60% during the dry season. The major arable crops grown are cassava, yam, plantain/banana, maize, melon, sweet potato and vegetable such as telfera, okro, pepper and tomatoes, Farm holdings in Imo State ranges from 0.3 has to 1.0ha (ADP, 2003). The two main source of data were used in this study namely, Primary and secondary sources. Primary data were obtained from the field investigation while secondary were obtained from textbook, internet, journals, information from library etc. Purposive sampling technique was used in selecting the sample for this study. All ICT-user rural livestock farmers in Imo State constituted the population of the study. The Agricultural Development Programme (ADP) office in Owerri, the state capital, provided a list of 1500 rural livestock producers who use ICT. A total sample size of 150 ICT-user rural livestock producers was chosen from this list. The data was evaluated using descriptive statistical tools like percentages in tabular representations and the mean. This was used to analyze objectives 1 of the study. Objective 2 was achieved on a 4-point Likert type scale of Strongly agree (SA), Agree (A), Disagree (D), and Strongly disagree, assigned score of 4+3+2+1. This was divided by 4 to give a discriminating mean index of 2.50 as the acceptable score. It is specified mathematically as $4+3+2+1 = 10/4 = 2.50$

RESULTS AND DISCUSSION

Information and communication technology devices used

Table 1 showed that 91.3% of the respondents own and make use of mobile phones to share, obtain, disseminate and transfer information. 56.6 percent of the respondents make use of radio, 61.3 and 41.3 percent respectively use TV and Facebook. It can also be seen that laptops, digital camera and CD-ROMS are not widely used by the respondents as only 37.3, 14 and 16.6 percent were aware of such ICT devices. This implies that information can easily be transferred among respondents as the information and communication technology devices are common in the area. These data support Mundi (2011) assertion that, despite the fact that mobile phones are versatile gadgets, voice calls still reign supreme, particularly in rural areas. Aside from that, farmers prefer voice calls over other mobile phone services. Because voice communication is the most fundamental function, it just necessitates a basic level of literacy (Ahmed and Lurent, 2009). ICTs have become more incorporated into the broadcast of agricultural information throughout Africa, according to Gakuru et al. (2009). Traditional types of ICTs, such as radio and television, have grown more common in the provision of advisory services

through producing agricultural-related programs. Farmers also cited cost effectiveness and timeliness (immediacy) as reasons for using phone calls, which mainly aligns with Mittal and Tripathi (2009) beliefs that communication expenses can be reduced by using voice calls. Farmers can have access to timely, high-quality information by using mobile phones. Without a doubt, farmers who use mobile phones save transportation costs, time, and reduce the perishability of some farm produce, which is unquestionably important in agribusiness. Many crops are extremely time-sensitive, so farmers who use mobile phones save money, time, and reduce the perishability of some farm produce (Muto and Yamano 2009).

Perceived niches of ICTs in livestock production

Table 2 showed the perceived functions of information and communication technologies in livestock production. These include; to reduce the cost of livestock production (M =3.22), to facilitate livestock health management (M=3.31), data base storage used in artificial insemination (M=3.21), to channel information to consumers who are difficult to reach (M =2.9), to include small holders in supply chain (M=2.9), to enable two way communication with livestock experts (M=3.0) to checkmate and information on disease (M=3.4), to monitor vaccination schedules in livestock production (M=3.1) and to get rid of various animal diseases (M=3.2). However, the respondents did not agree that information and communication technologies help to monitor animal disease and surveillance (M=2).

The main advantage of using a mobile phone is that it may be utilized as a platform for exchanging information via phone calls, SMS messages, or even the Internet. The adoption of mobile phones increases access to information while also lowering the cost of obtaining it (Overa, 2006). Unlike the traditional method of agricultural extension, new agricultural practices such as soil preparation and planting, irrigation and weeding methods, cultivation, harvesting, and storage methods can be sent to farmers via text messages or voice calls on their mobile phones, rather than traveling to their locations to deliver face-to-face teachings (Aker, 2008). Substituting phone calls for travel improves safety while also saving time, money, and the perishability of farm goods for farmers (Muto and Yamano 2009). In terms of cost, geographic coverage, and convenience of use, mobile phones are the sole "accessible device" compared to other options (Aker and Mbiti, 2010).

Ecological niches of ICTs in livestock management

Table 3 reveals that ICT tools play the following functions in livestock management; to track whereabouts/location of animals (M =2.9), provision of technical advice

Table 1: Information and communication technology devices used.

ICT devices used	Frequency	Percentage
Mobile phone	137	91.3
Television	92	61.3
Radio	85	56.6
Internet	90	60.0
Face book	62	41.3
Digital camera	21	14.0
CD. ROMS	25	16.6
Laptop	56	37.3

*Multiple responses

Table 2: Perceived ecological niches of ICTs in the production of livestock.

Niches of ICT	SA	A	D	SD	Mean
To reduce the cost of livestock production	94	13	20	17	3.22
To facilitate livestock health management	57	83	9	1	3.31
Database storage used in artificial insemination	63	71	10	6	3.31
To channel information to consumers who are difficult to reach	36	85	20	9	2.93
To include small holders in supply chain	71	17	42	20	2.92
To enable two-way communication with livestock experts	48	72	20	10	3.01
To checkmate and provide information on diseases	61	85	3	1	3.41
Monitor vaccination schedules in livestock production	51	71	20	8	3.10
Monitor animal diseases and surveillance	22	100	37	26	2.21
Animal diseases diagnosis	34	99	9	8	3.1
To get rid of various animal diseases	64	62	14	10	3.2

Accepted mean =2.50

Table 3: Perceive ecological niches of ICT in livestock management.

Niches of ICT	SA	A	D	SD	Mean
Track whereabouts of animals	49	56	25	20	2.9
Provision of technical advice	51	71	18	10	3.10
Improved management of data and information	62	56	14	18	3.12
Animal health and breeding	72	61	9	8	3.31
Telemedicine	38	53	26	33	2.64
Gene mapping and development of new breeds	42	63	19	26	2.81
Dairy herd management	76	48	10	16	3.22
Provide information on feed/feeding	53	38	33	26	2.80
Provide farmers with reliable source of reference.	60	40	22	28	2.88
Set up productivity benchmark	38	50	48	14	2.7
Animal vaccination management	45	38	41	27	2.6
To develop models for better management	40	26	38	46	2.4
To act as an advisory service in livestock management	68	43	18	21	3.1
It facilitate payment online for livestock products	70	47	13	20	3.11

Accepted mean = 2.50

(M=3.1), improved management of data and information (M= 3.1). ICT tools are used in animal health breeding (M=3.31), dairy herd management (M=3.22) provide information on feed/feeding (M=2.80), provide farmers with valuable source of reference (M=2.88), set-up productivity benchmark (M=2.70), animal vaccination management (M=2.63), act as advisory service in livestock management (M=3.1), it facilitates payment

online for livestock products (M=3.10). ICT may be a powerful tool for communicating massive volumes of useful information to communities about markets, technologies, prices, successful experiences, credit facilities, government services and regulations, weather, crop, livestock, and natural resource protection. Knowledge and information gained can have a significant impact on agricultural production and food security

Table 4: Perceived ecological niches of ICTs in the improvement of livestock breeding.

Niches of ICT	SA	A	D	SD	Mean
Store genetics information of animals	43	62	29	16	2.9
Increased income from production	52	63	15	20	3.0
To keep record of individual animal	48	54	26	22	2.8
Act as notification to task or reminder	38	43	39	30	2.5
To forecast incidence of disease	76	61	11	2	3.4
Help in transporting breeding material	53	43	37	17	2.8
To keep data on livestock resources	73	45	21	11	3.2
To store information on the population of livestock	47	68	13	22	2.9
To keep time schedule in livestock farming	38	53	38	21	2.5
Facilitate production of quality and healthy livestock	63	43	26	18	3.01
Aids in technology dissemination	76	48	17	9	3.2
Gives insight on control of parasite and infectious disease around	50	38	42	20	2.7
Reduce the energy utilization and stress therein	61	48	32	9	3.0
Help farmers connect/sell their products	72	42	28	8	3.1
Increase farmer bargaining power	38	53	38	21	2.5
Help me farmers make choice about livestock products	60	38	36	16	2.9
Increased performance of farm animal	62	47	27	14	3.0
Timelines of sale of livestock products	53	55	33	9	3.0
Increased income from production	71	46	21	12	3.2

Accepted mean = 2.50

interventions and increasing agricultural productivity. Media such as the Internet, web-based means, mobile telephone and computer-mediated networks among others are being used in a number of initiatives in Africa to provide development solutions interventions and increasing agricultural productivity. Media such as the Internet, web-based means, mobile telephony and computer-mediated networks among others are being used in a number of initiatives in Africa to provide development solutions (Girard, 2003; Munyua, 2008). Modern ICTs have the potential to play a significant role in communicating knowledge and information to agricultural communities, delivering education modules, gaining access to inputs, markets and market prices, credit, conducting business, facilitating networking and strengthening partnerships, and scaling up development inter linkages.

Ecological niches of ICTs in livestock breeding improvement

Table 4 reveals the following niches of information and communications technologies in livestock improvement; to store genetic information of animals (M =2.9), increased income from production to keep record of individual animal (M=3.0), act as notification to task or as reminder (M=2.8), to forecast incidence of disease (Mean=2.5), help in transporting breeding material (M=2.8), to keep data on livestock resources (mean=3.4), to keep time schedule in livestock farming (M=2.7), facilitate production of quality and healthy livestock (mean=3.0), aids in technology dissemination (M=3.2),

gives insight on the control of parasitic and infectious diseases around (M=2.7), reduce the energy utilization and stress there in (M= 3.0), help farmers connect and sell their products (M=3.1) help farmers make choice about livestock (M=2.9) increase the performance of farm animal (M= 3.0), timeliness of sale of livestock products (M=3.0), increase income from production (M = 3.2). Nevertheless, the respondents did not agree that ICT helps farmers to increase their bargaining power (mean = 2.4).

Conclusion

Everything is connected to the digital world, including farming and agriculture. Livestock technology can help increase or improve animal and livestock productivity, welfare, and management as more dairy herds are linked with sensors to monitor health and boost output. There is this concept of the "connected cow" by Taylor and Ku (2019), where individual wearable sensors attached on cattle can measure their daily activities and health issues while also offering data-driven insights for the whole herd. In all of these, data are being transformed into useful, actionable insights for producers to look at quickly and easily in order to make timely management decisions. The result from this study showed that the farmers can ascertain the function of information and communications technologies in livestock production, management and improvement. Information and communication technologies help livestock experts to exchange and share ideas among themselves. It also helps them to transfer information to non-livestock farmers to aid in the

marketing of their products. These information and communications technologies are created for the livestock farmers to acquire more knowledge about information and communications technology. However, the study suggested that livestock extension personnel should step up their awareness creation and advocates on livestock farmers about adopting modern ICTs in the production and management of their livestock for utmost improvement and more income generation.

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