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ASSESSING THE USE OF ICT IN AGRICULTURAL EXTENSION SERVICE DELIVERY IN CROSS RIVER STATE, NIGERIA.

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Abstract

Dearth of extension agents due to lack of employment, poor funding, understaffing and the consistent use of the conventional extension system are presiding issues facing the extension service organizations in Nigeria and Cross river state agricultural development programme (CRADP) is not an exception. This study therefore sought to assess the use of ICT in extension service delivery in Cross river state, Nigeria. The analysis was based on primary data collection using a set of structured questionnaire personally administered to 64 extension agents who were selected through a census sampling technique that constituted all members of the population due to the limited number of extension agents in the a Cross river state. The mean age of the respondent was 51years with 59.5%

within the age bracket of 51years and above. 75.0% of them had tertiary education and majority (M =28.1) of the extension agents have gained professional experience of over 21years and above; most of the ICT tools used were personally owned by the agents such as smart phones (M=71.9), Memory card (M=75.0), Television (M= 71.9), Radio (M=68.8), Laptop (M=54.7) and DVD (M=43.8). The commonly used ICT tools were; Radio, laptop and memory card with a uniform mean score of (M=1.4) followed by television, video camera and tablet with GPS also with a uniform mean score of (M=1.3). Marital status (X^2 =7.239; P<0.05) had significant relationship with the use of ICT by extension agents which implies that as more extension agents get married, the use of ICTs increase, which means marital status positively influence the use of ICT tools.

Key words: ICT, Extension agents, Extension services

Introduction

Agriculture is the pivot around which most African countries' economies revolve. It is the primary source of employment and income for a large portion of the population, contributes to the gross domestic product, and is necessary for the production of value and wealth (Kolawole, Isitor, & Owolabi, 2016). The sector is known to be one of the largest in the Nigerian economy, accounting for approximately 30% to 40% of the gross domestic product between 2000 and 2010, as well as being a major employer of labor. It is dominated by small-scale farmers who live in rural areas and participate in agricultural operations mostly for sustenance and to a lesser extent for commercial purposes. (Ekerete & Ekanem, 2015).

Agriculture is incorporated into extension as a service or system that helps rural farmers improve agricultural methods and techniques, increase production efficiency and revenue, improve their quality of life, and raise social and educational standards in rural areas (Balasubramanian, 2019). It major stakeholders are farmers, farmers' organizations, extension organizations, NGOs, educational institutions, research institutions, private companies, markets,

and policymakers who play the roles of informing service providers of what inputs are appropriate and needed in affected areas of farmers communities and which of this input could be locally sourced (Van Loon, Woltering, Krupnik, Baudron, Boa, & Govaerts, 2020).

Historically, extension service operates in the conventional ways of using the training and visit (T & V) system, farmer field school, to reach out to farmers as these system entails that an extension agent have the primary responsibility of linking up with researchers to acquire knowledge and disseminate it to farmers through training on the farm on regular and continuous basis (Baloch, & Thapa, 2019). Despite the effort, resources, and modifications, the extension system is still practiced unsystematically in many region of the federation due to challenges such as lack of staff, insurgency, banditry, communal conflict, no means transportation, increase in transportation costs, failure of farmers being available for contact with extension agents, farmers disappointment to be present at meetings, language barriers, and inability to cover the recommended agent-to-farmer ratio, among others (Mbagwu, 2021).

As previously stated, the T&V system's limitations have some repercussions on the Nigerian extension system, as a decline in the frequency of regular training for extension personnel or the inability to provide such trainings means that employees may lack the skills and expertise to teach farmers (Suvedi, Ghimire, & Kaplowitz, 2017). In the same vein, there is a drastically reduction of extension worker in most of the ADPs, around different states of the federation prior to numerous reasons, distinguished amongst which is poor funding to pay salaries and provide logistics, however, leveraging on Information and Communication Technologies (ICT) offers great opportunity in mitigating most of the setbacks. Using ICTs, agricultural outreach can reach a larger number of farmers, resource and capacity issues can be solved, information flow is improved, people in rural areas are better connected, questions about farm issues can be answered with the benefit of receiving feedback over the phone, and market prices and weather forecasts can

be obtained (Perez, Neubauer, Marshall, Philip, Miguel-Cruz, & Liu, 2022).

More so, from the time when there was an outbreak of the new coronavirus in country, rural farmers faced the challenge of accessing timely agricultural extension services for sustaining their livelihoods due to movement restrictions and social distance regulations. These control measures have limited agricultural extension agents face-to -face contact with rural farmers who may require extension services; as a result, the food security and well- being status of these farmers may be threaten (Bidemi, 2020). The use of ICTs offers a possible alternative to mitigate disruptions in domestic food supply chains, especially in crisis times, such as the pandemic.

Recognizing the significance, agricultural extension personnel can make use of different ICT tools to disseminating appropriate and timely information to rural residents about better agricultural innovation in order to boost agricultural production and income (Okello, Feleke, Gathungu, Owuor, & Ayuya, 2020). It can be used to assist farmers in communicating effectively, overcoming time and space constraints, and empowering farmers by providing information and knowledge, earning and learning opportunities, boosting government accountability, improving competency, and allowing citizens to voice their concerns and participate actively in decision-making processes (Ekerete *et. al.*, 2015).

Objectives of the study

i. describe the socio-economic characteristics of the respondent in the study area
ii. identify the ICT tools available, ownership, functionality and serviceability for extension service delivery in the study area
iii. identify the ICT tools used by extension agents for extension service delivery in the study area

Research Hypothesis

H_0: There is no significant relationship between selected socio-economic characteristics of the extension agents and ICT use in extension service delivery.

Materials and Methods

Study Area

The study was conducted in Cross River state, Nigeria. The state covers a region of 17,802km with a vast populace of above 2 million individuals. It lies within Longitudes 8º15' and 8º25' East of the Greenwich Meridian and Latitudes 4º40' and 5º05' North of the Equator. The state is confined by states like, Abia, Benue, Akwa-Ibom, Ebonyi, as local boundaries with Republic of Cameroon as international boundary. The main profession of the rural inhabitants is farming and fishing. The state consist of three agricultural zones which are; Calabar, Ikom, and Ogoja. Calabar zone consist of six local government areas (Calabar south, Calabar municipal, Odukpani, Biase and Akpabuyo). The zone has a population of 371,022 people according to the 2006 census, and it has a tropical monsoon climate with a ten-month rainy season and a two-month dry season. In the city, the harmattan is significantly less severe. Calabar's agricultural zone spans 406 square kilometers and has a population density of roughly 910 people per square kilometer (2400sq m). The temperature in the area is rather steady, ranging from 25 to 28 degrees Celsius. Ikom zone is a tropical rainforest and is recognized for its rich food supply in arable and cash crops production. The area is greatly populated with Cocoa dealers and consist of six local government areas (Abi, Boki, Etung, Ikom, Obubura and Yakurr) while Ogoja zone is made up of five local government areas (Ogoja, Obudu, Obanliku, Bekwara and Yala). Data/records of extension agents at Cross River Agricultural Development Programme (CRADP) indicate that there are only sixty four (64) registered extension agents in Cross river state.

Population for the study and Sampling procedure

The study adopted a census sampling procedure where all members of the population are selected. The population for this study consisted of all extension agents in Cross River Agricultural Development Programme (CRADP). This is due to the limited number of extension agents in the study area. The sample frame which is the list of all extension employees in the organization consists of 64 extension agents spread across the three agricultural zones (Calabar, Ikom and Ogoja) as obtained

from CRADP. Thus a sample size of 64 respondents (Extension agents) was used for the study. The distribution of extension agents sampled from their zone is shown in table1

Table 1 Distribution of sample of extension agents in CRADP

CATEGORY	CALABAR	IKOM	OGOJA	TOTAL
EAs	15	8	12	35
BESs	4	3	3	10
ZEO/SMS	9	4	6	19
Total	28	15	21	64

RESULTS AND DISCUSSIONS

Socio-economic characteristics of respondents

Table 2: Socio-economic characteristics of Extension Agents

Variables	Percentage	Mean
Male	68.8	
Female	31.3	
Marital status		
Single	10.9	
Married	81.3	
Widow	7.8	
Age		**51.06**
<30	1.6	
30-40	3.1	
41-50	35.9	
51 and older	59.4	
Educational level		
Secondary education	25.0	
Tertiary education	75.0	
Working experience		**24.44**
<5years	6.3	
5-10years	10.9	
11-15years	9.4	
16-20years	17.2	
21-25years	28.1	
26-30year	28.1	

Source: Field survey 2022

Table 2 shows that both male (68.8%) and female (31.3%) are greatly involved in the delivery of extension services. This implies that the agricultural extension system is predominated by male counterpart. This corroborate with early findings of Nyarko and Kozari (2021) which assume that for every five (5) extension employees you encounter, one (1) is a female extension worker, agreeing to the fact that males predominate in agricultural extension operations. Also because farming is seen as men domain and so extension professionals are mainly male to serve the male farmers who are in the majority. This also corroborates with the findings of Olaolu, Agwu, Ivande & Olaolu (2018) which states that more male was involved in agricultural extension work then their female counter parts. Most of the respondents (81.3%) are married and over (10.9%) of them are single. This means that most of the extension agents were responsible and had families to take care of. This is in line with the findings of (Ayotunde, 2021) which states that clienteles are positively disposed to married extension agents as society places high level of respect on the status of married people

who are expected to be responsible in carrying out their duties.

Also table 2 shows that the mean age of extension agents is 51years of age and (59.8%) of them are within the age bracket of 51 and above, this implies that they are advance in age, hence there may be too old and weak to reach out to farmers in the course of carrying out their extension duties. This is corroborates with the early findings of Olaolu *et. al.,* (2018) which states that extension workers working in extension services were advanced in age, which is thought to have a negative impact on their interest in the use of ICT, and there is a need for younger people to be employed/deployed into extension since these younger ones are predicted to be more interested in the use of ICT tools and can explore the advantages more than the older ones.

The educational attainment of the respondents reveal that all the respondents have above the primary education with majority (75%) as tertiary degree holders while (25%) have secondary school certificates. This signifies that the literacy level extension workers in cross river state is high, which can contribute positively to their understanding and ability to apply ICTs in extension service delivery. This corroborate with the findings of (Ayotunde, 2021) which buttressed that this level of educational qualification foretells to be the dominant educational qualification for employment entry into the public extension service organizations. It also supports the earlier findings of (Mustapha, Man, Shah, Kamarulzaman, & Tafida, 2022) which state that extension personnel with high educational standard can skillfully use any of the ICTs tools available to them.

Furthermore table 2 captured that majority (28.1%) of the respondents have been working for 21 to 30years, while (17.2%) have been working for 16-20years, also (10.9%) have 5-10years of experience followed by (9.4%) who have 11-15years of professional experience and just a few (6.3%) of them have less than 5years working experience. The mean value for professional experience is (24.44yeras), these infers that the extension agents have acquired adequate experience in the field and have advantage in utilizing their skills with the use of ICTs. This corroborate with the findings of (Kolawole *et. al*., 2016) which states that

extension staff with good working experience can make their wealth of experience bear on their jobs as it has the tendency of making them to be more receptive to better ways of using ICTs in rendering essential services as well as in the disseminating of their extension obligations to their clienteles.

OWNERSHIP, FUNCTIONABILITY AND SERVICEABILITY OF ICT TOOLS

TABLE 3: ICT Tools Availability, Ownership, Functionality and Serviceability

ICT TOOLS	OWNERSHIP				FUNCTIONALITY				SERVICEABILITY			
	Personal		Institutional		Functional		Not functional		Serviceable		Not Serviceable	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Conventional Tools												
Studio	3	4.7	8	12.5	6	9.4	5	7.8	6	9.4	5	7.8
Radio	44	68.8	7	10.9	46	71.9	5	7.8	43	67.2	7	10.9
Audio record Player	6	9.4	8	12.5	11	17.2	3	4.7	10	15.6	4	6.3
Landline Phone	5	7.8	6	9.4	2	3.1	9	14.1	2	3.1	9	14.1
Television	46	71.9	3	4.7	45	70.3	4	6.3	36	56.3	13	20.3
Video Camera/ Camcorder	14	21.9	6	9.4	16	25.0	4	6.3	14	21.9	6	9.4
Slide Projector	3	4.7	13	20.3	9	14.1	7	10.9	10	15.6	6	9.4
Film Projector	3	4.7	11	17.2	8	12.5	6	9.4	7	10.9	7	10.9
Public Address system	4	6.3	10	15.6	7	10.9	7	10.9	7	10.9	7	10.9
Modern Gadgets												
Digital Camera	11	17.2	6	9.4	13	20.3	4	6.3	13	20.3	4	6.3
Smart Phone	58	90.6	1	1.6	59	92.2	-	-	57	89.1	2	3.1
Desktop computer	8	12.5	7	10.9	7	10.9	7	10.9	4	6.3	10	15.6
Laptop	35	54.7	6	9.4	32	50.0	9	14.1	33	51.6	8	12.5
Multimedia Projector	-	-	9	14.1	3	4.7	7	10.9	4	6.3	6	9.4
DVDs	28	43.8	2	3.1	27	42.2	3	4.7	25	39.1	5	7.8
Flash drive	24	37.5	3	4.7	25	39.1	2	3.1	24	37.5	3	4.7
Memory Card	48	75.0	-	-	48	75.0	-	-	44	68.8	4	6.3
Tablet with GPS	20	31.3	5	7.8	23	35.9	2	3.1	18	28.1	7	10.9

Result in table 3 captured several ICT tools based on their ownership, functionality and serviceability. In terms of ownership, Smart phone, memory card, television, radio, laptop and DVDs were ICT tools with high percentage of personal ownership possessed by extension agents with smart phone

(71.9%) as the most commonly owned conventional tool. However, slide projector (20.3%) tops the list in ownership by the institution. This indicates that most of the ICT tools used by extension personnel were their personal tools with smart phone as the most regular, this could be because the extension agents in the study area can afford smart phone as it is cheap and easy to maintain. However the institutionally owned tool with the highest percentage is the slide projector (20.3%). This corroborate with the early findings of (Osiesi, Yahya, Sanni, & Okorie, 2021), which affirmed that government channel more resources to the provision of slide projector other than smart phone, memory card, television, radio, laptops and DVDs. Furthermore, among the (90.6%) of the smart phone available, (89.1%) are serviceable, among the (75.0%) of memory card available, (67.2%) are also serviceable, followed by radio (67.2%), television (56.3%) and laptop (51.6%) that were also serviceable. This implies that most of the ICT tools available and personally owned were also functional and serviceable than those owned by the institution.

ICT TOOLS USED

TABLE 4: ICT tools used by extension agents

ICT TOOLS	Std. Dev	Mean	Rank
Conventional Tool			
Audio record Player	0.40	1.2	7th
Film Projector	0.39	1.1	13th
Landline Phone	0.21	1.0	16th
Public Address system	0.47	1.2	7th
Radio	0.50	1.4	1st
Slide Projector	0.44	1.2	7th
Television	0.46	1.3	4th
Video Camera	0.47	1.3	4th
Modern Gadgets			
Desktop computer	0.36	1.1	13th
Digital camera	0.45	1.2	7th
DVDs	0.45	1.2	7th
Flash drive	0.47	1.2	7th
Laptop	0.52	1.4	1st
Memory Cards	0.50	1.4	1st
Multimedia Projector	0.36	1.1	13th
Tablet with GPS	0.49	1.3	4th

Result in table 8 indicates that radio, laptop and memory card with a uniform mean score of (M=1.4) ranked first as the most used ICT tools by extension agents in the delivery of extension services to their clientele. The also showed that television, video camera and tablet with GPS also with a uniform mean score of (M=1.3) ranked forth, followed by audio record player, slide projector, Public Address System (PAS), digital camera, flash drive and DVD with a uniform mean of (M=1.2) ranked

seventh while film projector, desktop computer and multimedia projector ranked thirteenth and landline phone (M=1.0) ranked sixteenth as the least ICT tool used by extension agents in the delivery of extension services to their audience.

More so, radio amongst other ICT tools seems to be the most widely used tool by extension agents, this could be because radio is affordable and easily accessible by both the extension agents and farmers. This corroborate with the early findings of Obeng and Mintah (2019) who reported that radio stations are located in various communities and have made communication more convenient and accessible, also several FM stations have links with communication centers that have been established in communities. However these communication centers help in broadcasting programmes aired by the FM station in both English and local languages and can thus be used effectively for extension services delivery. Furthermore, the reason for the greater use of laptops and memory cards by extension agents implies that it enables extension agents to access information on the internet and store relevant information at any given time.

Relationship of Some Socio-Economic Variables and the use of ICT

TABLE 5**:** Chi-square test on the link between various socio-economic characteristics and the usage of ICT in agricultural extension service delivery in Cross river state.

INDEPENDENT VARIABLES	X^2	DF	P-value	REMARK	DECISION
Age	4.028	3	0.258	NS	H_0 Accepted
Educational level	2.523	1	0.112	NS	H_0 Accepted
Marital status	7.239	2	0.027	S*	H_0 Rejected
Sex	1.557	1	0.212	NS	H_0 Accepted
work experience	5.955	5	0.311	NS	H_0 Accepted

*= Significant at 0.05%

Table 4 captures the relationship between some socio-economic characteristics of the respondents and the use of ICT in extension service delivery. The result reveals that marital status (X^2 =7.239, P<0.05) has significant relationship with the use of ICT by extension agents, so therefore the null hypothesis is rejected. This implies that as more extension agents get married, the use of ICTs increase, which means

marital status positively influence the use of ICT tools. This agrees with the early findings of Ojo & Oluwatusin (2017) which states that marital status positively relates to ICTs use and it uses increases as respondent get married because it will affect their information gathering from their children who could be ICTs compliant. More so, with marriage, they are more engaged and can leverage on ICT in reaching out to many clienteles and through financial support from their spouse they can afford to subscribe their ICT tools to do their work effectively. On the other hand Age (X^2 =4.028, P<0.05), Sex (X^2 =1.557, P<0.05), Educational level (X^2 =72.523, P<0.05), Work experience (X^2 =5.955, P<0.05), Designation (X^2 =9.086, P<0.05), and Attending ICT training (X^2 =2.202, P<0.05) had no significant relationship with use of ICT in extension service delivery. This implies that the null hypothesis is hereby accepted and that the use of ICT by extension agents is irrespective of their Age, sex, educational level, work experience, designation and attending of ICT training but their marital status. This result coincides with that of Nwaogu and Akinbile (2018) which states that sex and educational level were not significantly related to ICT use by extension officers in extension service delivery.

CONCLUSION AND RECOMMENDATION

This study was conducted to assess the use of ICT in extension service delivery in Cross River State. Using both descriptive and inferential statistics, the findings of this study are supported by empirical data, the study revealed that majority of the respondent were advanced in age, married and had formal education. It also revealed that all respondent made used of the ICT tools available to them and most of the ICT resources used were personally owned by them with focus on smart phone, radio, memory card and laptop as they ranked next to each other. However, the extension agents' most notable years of working experience predisposes them to being more ICT inclined in the use of ICTs for their extension work. This tends to make them highly relevant in disseminating agricultural information effectively and promptly irrespective of dearth of extension personnel in their various organizations. Furthermore, the

two highest educational qualifications which are secondary and tertiary education foretell to be viable platforms for employment entry into the public and non-public organizations by extension practitioners for optimum performance in their extension work. The extent of utilization of ICT tools was greatly influenced by ICT tools available and accessible to extension practitioners in their extension organizations, these greatly inhibit the use of ICTs for valuable extension delivery to their clienteles. High cost of getting ICT gadgets, poor rural infrastructures that inhibit the use of these gadget and poor budget allocation to purchase these gadgets were the most prominent constraints that limited extension agents' access to the use of ICTs in extension service delivery. Since marital status is significant to ICT use in extension service delivery, it is therefore concluded the more extension personnel get married it will positively skyrocket the use of ICT by extension agent in delivering their duties.

The following suggestions were made based on findings from this study.

- Availability of ICT tools is very paramount to the disseminating activities of extension practitioners in all the various agricultural extension organizations. Therefore ICT tools like computer, projectors, intercom, scanners, CD ROM, audio recorder and the likes should be made available and readily accessible by the organizational management to their extension practitioners. This could be done by ensuring the provision of basic office equipment which cut across several ICT tools and consistent supply of electricity be made available to accessing these ICT tools for their extension work. For example construction of high-voltage solar generating power could conveniently substitute the use of generators in agricultural firms by the state management.
- Most of the ICT tools used by the extension agent cut across the conventional tools such as radio, television, slide projector and the likes with preference to the

modern gadgets, it is therefore recommended that the organization organizes training workshop for incumbent/newly employed extension personnel on ICT usage and be introduce to the use of modern ICT tools. This will bring the extension staff irrespective of their qualification up to date on the use and application of ICT for improved extension service delivery in Cross river state.

- Due to high cost of ICT gadgets, there is need for upward review of the salaries of extension agents, because an increase in income would guarantee better chances of personal acquisition of ICT gadgets for the staff. Also the government should incorporate a scheme of monthly deduction so as to empower the extension officers with valuable ICT gadgets because they may find it difficult to save up to the amount of purchasing these gadgets as they may be faced with other domestic finances.
- The mean age of the respondent was 51years which implies that they are advanced in age and may be weak to cover the recommended extension ratio gab and they are also close to the retirement age, hence it is recommended that young and vibrant extension workers be employed because it is noticeable that the young employees have greater urge for ICT use and are versatile in the use of several ICT tools which is a positive edge for improving extension service in Cross river state.
- Agricultural Extension Services Organizations can improve their use of ICTs for dissemination purposes by ensuring that their clients provide appropriate positive feedback on agricultural innovations disseminated to them via these tools. This will encourage their clients to adopt subsequent innovations on a consistent basis, as well as full consolidation of using these technologies effectively for dissemination purposes.

REFERENCES

Ayotunde, O. O. (2021). Utilization of information and communication technologies for agricultural extension service delivery in public and non-public organizations in southwestern Nigeria.

Balasubramanian, V. (2019). *The Future of Smallholder Rice Farming In Asia: Emerging Issues, Challenges, and Opportunities*. LAP LAMBERT Academic Publishing.

Baloch, M. A., & Thapa, G. B. (2019). Review of the agricultural extension modes and services with the focus to Balochistan, Pakistan. *Journal of the Saudi Society of Agricultural Sciences*, *18*(2), 188-194.

Bidemi, O. A., (2020). COVID-19 Pandemic-Accelerating the Use of Digital Agricultural Extension Tools in Nigeria.

Ekerete, B. I., & Ekanem, J. T. (2015). Assessment of Information and Communication Technology Utilization by Agro-Processors in Ikono Local Government Area of AkwaIbom State, Nigeria. Asian Journal of Agricultural Extension, Economics & Sociology 5(1): 22-28, 2015; Article no.AJAEES.2015.035 ISSN: 2320-7027.

Kolawole, E. A., Isitor, S. U., & Owolabi, A. O. (2016). Determinants of training needs of extension personnel of agricultural development programme (ADP) Ekiti state, Nigeria. *Agro-Science*, *15*(3), 13-17.

Mbagwu, I. H. (2021). *Importance of government intervention in small scale farming to improve on food security: A case study of Enugu State Nigeria* (Master's thesis, Eesti Maaülikool).

Mustapha, S., Man, N., Shah, J. A., Kamarulzaman, N. H., & Tafida, A. A. (2022). Factors Influencing the Adoption of ICT'S in Extension Service Delivery among the Extension Agents in North-East, Nigeria. *Sarhad Journal of Agriculture*, *38*(1), 149-159.

Nwaogu, F. K., & Akinbile, L. A. (2018). Competencies of agricultural development programme personnel in extension service delivery in Oyo and Ogun States Nigeria. *Journal of Agricultural Extension*, *22*(3), 40-52.

Nyarko, D. A., & Kozári, J. (2021). Information and communication technologies (ICTs) usage among agricultural extension officers and its impact on extension delivery in Ghana. *Journal of the Saudi Society of Agricultural Sciences*, *20*(3), 164-172.

Obeng, F. K., Gumah, S., & Mintah, S. (2019). Farmers' perceptions of information and communication technology (ICT) use in extension service delivery in Northern Region, Ghana. *Ghana Journal of Science, Technology and Development*, *6*(1), 21-29.

Ojo, O. S., & Oluwatusin, F. M. (2017). Determinants of ICT-based market information services utilization among small-sized agro-based marketers in Nigeria. *World Rural Observations*, *9*(1), 72-81.

Okello, D. O., Feleke, S., Gathungu, E., Owuor, G., & Ayuya, O. I. (2020). Effect of ICT tools attributes in accessing technical, market and financial information among youth dairy agripreneurs in Tanzania. *Cogent Food & Agriculture*, *6*(1), 1817287.

Olaolu, M. O., Agwu, E. A., Ivande, P. D., & Olaolu, T. A. (2018). E-readiness of public extension personnel for service delivery in Benue State, Nigeria. *Journal of Agricultural Extension*, *22*(2).

Osiesi, M. P., Yahya, O. A., Sanni, K. T., & Okorie, N. C. (2021). Assessment of undergraduates'perception on ict availability, accessibility and use in the federal university oye-ekiti, ekiti state, nigeria. *Assessment*.

Perez, H., Neubauer, N., Marshall, S., Philip, S., Miguel-Cruz, A., & Liu, L. (2022). Barriers and Benefits of Information Communication Technologies Used by Health Care Aides. *Applied Clinical Informatics*, *13*(01), 270-286.

Suvedi, M., Ghimire, R., & Kaplowitz, M. (2017). Farmers' participation in extension programs and technology adoption in rural Nepal: a logistic regression analysis. *The Journal of Agricultural Education and Extension*, *23*(4), 351-371.

Van Loon, J., Woltering, L., Krupnik, T. J., Baudron, F., Boa, M., & Govaerts, B. (2020). Scaling agricultural mechanization services in smallholder farming systems: Case studies from sub-Saharan Africa, South Asia, and Latin America. *Agricultural system*

s, *180*, 102792.