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Agricultural Extension Workers' Use of Electronic Tools in Delivering Farm Information During Pandemics, Disasters and Emergencies in Imo State, Nigeria

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Abstract: *This study examined the use of electronic tools to deliver farm information during pandemics, disasters and emergency situations in Imo State, Nigeria. Purposive sampling technique was used to select 130 extension staff of the Imo Agricultural Development Programme (Imo ADP). Data were collected with the aid of questionnaire and analyzed using percentages and frequency counts. Results show that droughts (83.3%), pests and diseases outbreaks (96.2%), floods (98.4%) and wildfires (97.6%) were some of the farm disasters and emergencies in the study area. The available electronic extension tools included internet (93.1%), zoom (96.1%), U-tube (92.3%), mobile phones, television and radio (100%).. However, Zoom (92.0%) video/films and camera (84.6%), Whatsapp (90.9%) Mobile phone (98.4%) were electronic tools mostly used. The challenges faced in the use of these tools were low bandwidth(98.4%), cost of acquiring software(84.6%) and speed of changes in computer technology(96.1%).Based on the above, we recommend that government at all levels and other stakeholders in communication sector improve connectivity, reduce costs of hard and softwares. Extension workers should be trained and retrained in use of electronic tools*

Keywords: *Agriculture, extension workers, electronic tools, Emergency, Pandemic, disaster.*

Introduction

Extension and Advisory Services (EAS) play an important role in equipping people and communities with knowledge and technical resources to improve their lives and livelihoods. EAS empower people, promote economic growth, foster beneficial communication, require and promote collaboration, and work to reduce poverty(GFRAS,2019). As such, EAS are well-positioned to help communities experiencing a crisis as they have supported responses to many crises in the past, such as natural disasters and epidemics like HIV/AIDS, Ebola, Avian Influenza, malaria, and, more recently during the COVID-19 pandemic(DLEC,2020).

EAS prepare communities for negative events as they serve as a bridge between information sources and the stakeholders with which they engage. While no one uniform EAS model exists, it is this bridging role that has enabled EAS to offer value in communities by providing clientele with the information, skills, and strategies to enhance their economic and social futures. As fundamentally relational institutions, EAS often serve as connectors and communication conduits between the many actors operating in communities.

In times of crisis, EAS use their long-standing relationships in communities to assess immediate needs and relay relevant information to others involved in the response. EAS can

educate communities about the current outbreak and advise on immediate precautions, complete rapid assessments of damage or incidence and communicate that to relevant agencies, and identify and address market and supply chain disruptions in collaboration with others (FAO,2020a,b). EAS undertake these activities while being sensitive to social issues such as the disproportionate impact on vulnerable populations such as women and children. Given their access to field-level data and trusted relationships, EAS are often relied upon by governments to provide objective information used in informing government response.

In this age of digital technology, not only extension staff but also farmers are naturally attracting interest and attention in the use of ICT in the agricultural sector. That is because ICTs are now being used in different ways for social interaction. However, farmers need to be well trained and equipped with the advantages hidden in ICTs that can be used to keep them informed about a set of threats and emergencies such as weather fluctuations, natural disasters, price uncertainties, personal risks, abrupt institutional and policy changes that strongly influence decisions on input use, investment and technology adoption (Muhammad *et al.,* 2018).

Specifically, different ICTs are attracting the attention of various development sectors in Nigeria as they are convenient, speedy, and resourceful. Conversely, due to a lack of understanding and information about its potential position in managing agricultural risks and emergencies, the digital-based agricultural sector is less focused. Khan *et al.* (2020) have pointed out that current (traditional) extension methods, such as person, community, and mass communication methods; need to be grafted into ICTs to make knowledge accessible to all players in an effective, fast and efficient manner. Ultimately, it will strengthen the conventional extension system. Tata and McNamara (2018) conducted a study in Kenya, emphasizing the need to integrate ICTs into the agricultural extension system through government-level investments. Notably, failure to adopt ICTs in agricultural extension may lead to underperformance of digital technology for improved extension service delivery, especially in the management of agricultural risk and emergency.

The provision of quality agricultural extension services in Nigeria is constrained by an unfavourable staff-to-farmer extension ratio, a poor link between research and extension-farmers, a limited budget, lack of motivation towards extension personnel makes the extension service ineffective, insufficient aids needed to disseminate information, poor transportation networks and logistics, large area of coverage and lack of implementation of agricultural extension policy (Apantaku *et al.* 2016). It can be inferred from these difficulties that, over the years, the net result has been the failure of the extension service to reach its intended clientele effectively. Excessive, if not complete, reliance on traditional face-to-face extension strategies for interacting and exchanging agricultural information and expertise with clients has further exaggerated the situation. The time has come for the adoption of more innovative ways of reaching out to clientele in an efficient and cost-effective way.

While the pandemic presents many challenges, it also creates opportunities for digital tools to better serve farmers, as well as be adapted to assist public health responses, and prepare for new agricultural needs that arise (FAO, 2020a). Agriculture digitization offers ways to reduce the negative effects of agri-food supply chains and to help farmers receive the financial support and agricultural inputs they need to grow and sell their produce (FAO, 2020b). Digital innovations also make agriculture more attractive to young people, while productivity increases have also been seen by new collaborative arrangements (Saiz-Rubio & Rovira-Más 2020).

According to Babu (2020), risk and emergencies such as disease outbreaks take a toll on the extension system by directly affecting personnel and farmers functions in the short-term. Such disruptions during the growing season can cut off the flow of information to farmers, resulting in a decrease in crop production, livestock and fish production systems. In the short term, the role of extension staff is altered as the emphasis shifts from providing training on new technological innovations to gathering and disseminating information on the outbreak of disease and its effects on farmers (Babu, 2020).

Collectively, these short-term changes can affect the productivity of agricultural systems and lead to lower food and nutrition security (Savary *et al.,* 2020). When Avian Influenza affected parts of Africa, the extension system had a transfer mode to understanding the knowledge and practices of farmers (Elelu, 2017). During the Nigerian Bird Flu, extension personnel were involved in helping the poultry workers reduce the spread of the disease (Okpukpara, 2016). This is an example of the productive deployment of extension workers in the time of disease outbreak.

The deployment of digital technology during an emergency also plays a role in contributing to desperately needed changes to enable and help smallholder farmers to respond to the challenges of food security, market growth, climate change, and outbreak of diseases. According to Ferri *et al.* (2020), as they can significantly increase both person-to-person contacts and their access to information; digital technology will fill the information gap left by public extension during crises and emergencies. This is particularly helpful because most farmers are often poor in terms of resources and there are not enough extension workers to reach out to them. For example, digital tools, such as mobile technologies, may be used to broaden the scope of agricultural extension services by allowing farmers to contact technical agricultural advice hotlines or to access market information, such as market locations and prices. The specific objectives therefore were to – identify types of farm disaster in the study area; ascertain availability and use of E-resources in delivering services in the area.

Methodology

The study was carried out in Imo State Agricultural Development Programme (IMO ADP). Imo State lies between latitude 5°12 and 5°56' North of the Equator and between longitudes 6°38 and 7°25' east of the Greenwich meridian. It is bordered by Abia State on the east, by the River Niger on the West, by Anambra State to the north and River State to the south (IMSG, 2001). Imo State occupies a land mass of about 5,530 km2 with a total population of approximately 5,275,703 persons in 2016, projected from 2006 census figure (NPC, 2006). The State has two dominant seasons, that is, rainy and dry seasons. The population of the study consists of all extension technical Officers, total of 130 extension officers. Data collected with questionnaire were analyzed using descriptive statistics. This includes use of percentages presented in frequency distribution tables to achieve all the objectives of the study.

Results and Discussion

Pandemics, Farm Disaster and Emergencies

Several situations constitute disaster and emergency in the farm. Table 1 shows that unexpected drought (83.8%), pests and diseases (96.2%), floods (98.4%), wild fire (97.6%), erosion (95.3%), all constitute disaster in the farm. Other situations include thunder and lightning strikes (68.4%), heavy wind storms (72.3%), power failure (84.6%), accidental poisoning (64.6%),erosion menace(95.3%),heavy winds(72.3%), and earth machine accidents(75.3%) are disaster situations and emergencies. Agricultural emergencies are of two types: **natural:**

tornadoes, hurricanes, wildfires, floods, severe winter storms, severe dust storms, lightning strikes, earthquakes, **Man-made:** wildfires, explosions or fires, animal handling incidents, grain entrapments, power failures, rotating and moving equipment incidents, (Power take-off shafts, screw conveyors/augers),chemical releases or spills, amputations, vehicle incidents, (turnovers, rollovers), workplace violence and accidental poisoning (Sperling,2008;McGuire and Sperling, 2013). Others are earthquakes, landslides, flood, drought, fires, and hail storms are some of the natural calamities that occur every year, at any point, and anywhere, causing threats to the livelihoods of smallholder farmers and their food security. Disasters can cause loss of human and animal life, field crops, stored seeds, agricultural equipment/materials, and their supply systems (e.g. infrastructure)as well as associated indigenous knowledge, thus disrupting not only the immediate growing season butalso future seasons (Sperling,2008;McGuire and Sperling, 2013).

Table 1: Farm Disaster and Emergencies

Farm Disaster and Emergencies	Frequency	Percentage
Unexpected drought	109	83.8
Pest and diseases outburst	125	96.2
Floods	128	98.4
Wild fire/Bush burning	127	97.6
Erosion menace	124	95.3
Heavy wind storms	94	72.3
Thunder and lightning strikes	85	68.4
Power failure	110	84.6
Chemical release/spills	107	82.3
Accidental poisioning	84	64.6
Work place violence	76	58.4
Earth machine accidents	98	75.3

Field survey, 2022

Availability and Use of E-extension tools

Table 2 showed that various e-tools exist for delivering advisory services to farmers. These include mobile phones (100%), radio, television (100%) each, GPS (95.3%), remote sensing equipment (95.5%), Emails (83.8%), telegram app (98.4%), whatsapp (98.4%), facebook (87.6%), internet (93.1%), blogging (91.5%), webinar (82.3%), zoom (96.1%), video/films (84.6%), U-tube (92.3%) among others. In a study on Extension Agents' Use of Mobile Phone Applications for Agricultural Extension Service Delivery in Ebonyi State Agricultural Development Programme, Nigeria, (EBADP) Ezeh etal., (2021) posited that the predominant mobile apps that have been used for extension service delivery in EBADP were: WhatsApp (76.0%), and Facebook (53.0%). However, Instagram (11.0%), and telegram (11.0%) are applied by few for agricultural extension service delivery in EBADP. Unfortunately, the finding shows that besides social media mobile apps, the government and management of EBADP have not been able to develop any specific mobile apps for agricultural extension service delivery in EBADP.

This situation is worrisome considering that other African countries like Kenya, Botswana, Uganda, Tanzania and the Ivory Coast are already harnessing the gains of mobile apps in agricultural sector (Costopoulou *et al*., 2016; Kumar and Karthikeyan, 2019), Nigeria appears to be lagging behind. This is apparently due to the absence of clear-cut government policy on the use of mobile apps for public agricultural extension service delivery in EBADP. Trendov, Varas and Zeng (2019) concurred to the

above assertion by stating that the lack of clear cut regulatory and policy framework for e-agriculture is the major impediment to the actualization of the global digitalisation process

Table 2: Availability and Use of E-extension tools

E-agric Extension tools	Availability Percentage	Use Percentage
Internet	121 (93.1)	84 (64.6)
Wikis	104 (80)	40 (30.1)
Blogging	119 (91.5)	34 (26.3)
Webiner	107 (82.3)	30 (23.1)
Twitter	94 (72.3)	45 (34.6)
Zoom	125 (96.1)	120 (92.3)
Microsoft teams	117 (90)	30 (23.0)
Google meet	89 (68.4)	28 (21.5)
Google classroom	97 (74.6)	29 (22.3)
Video/films/cameras	110 (84.6)	110 (84.6)
U-tube	120 (92.3)	47 (36.2)
Facebook	114 (87.6)	79 (60.7)
Whatsapp	128 (98.4)	117 (90.9)
Telegram app	128 (98.4)	31 (23.8)
Mobile phones	130 (100)	128 (98.4)
Television	130 (100)	-
Radio	130 (100)	-
GPS (Global positioning system)	124 (95.3)	-
Remote sensing equipment	124 (95.3)	-
Emails	109 (83.8)	84 (64.6)

Field survey, 2022

Challenges of Using Electronic Extension Tools

Previously we noticed that there is a low usage of several electronic tools for extension delivery in times of emergencies and disasters. The table 3 shows the reasons/factors responsible for the low usage. These factors include, lack of experience in handling electronic tools (89.2%), low bandwidth (98.4%) or low connectivity, inequality in access to electronic tools by extension staff (76.2%), high cost of purchase of hardware (97.6%), cost of acquiring software /apps (84.6%), require new skills and knowledge (90.5%), lack of training on ICT tools (77.6%), among other challenges. This is consistent with Gichamba, Wagachu and Ochung (2017) that technical and detailed language on the platform, lack of Internet bundles to access the online platforms, poor or complete lack of internet access, poor usability of the e-tools among others. This finding conforms to that of Shanthya and Elakkiya (2017) who reported that lack/inadequate training programmes for extension agents has contributed to their inability to use mobile apps for extension service delivery. Cost has been identified as a major hindrance to smartphone ownership in developing countries (International Telecommunication Union (ITU), 2018). Jayanthi and Asokhan (2016) observed that the absence of public sector infrastructure such as power supply, and internet facilities impede access to ICTs such mobile apps. The absence of clear-cut institutional policy for the use of mobile apps for extension service delivery is a hindrance to digitalization of extension service delivery. According to Trendov *et al*. (2019), the failure of government in most developing countries to fashion out clear cut regulatory and policy framework for e-agriculture undermines the actualization of the global digitalisation process. Government policy should focus on providing the basic

conditions that are necessary for the use of mobile phone apps in agricultural extension. These include: infrastructure and connectivity (mobile subscriptions, network coverage, internet access, and electricity supply), affordability, and improving ICT education.

Table 3: Challenges of using Electronic Extension tools in Imo state

Challenges	*Frequency	Percentage
Lack of experience in handling tools	116	89.2
Low band width/connectivity	128	98.4
Inequality in access to electronic tools	103	79.2
Speed of changes in computer technology	125	96.1
High cost of purchasing hardware	127	97.6
High cost of maintaining the system	98	75.3
Cost of acquiring software/apps	110	84.6
High cost of access to internet	104	80.0
Expense updating the app	123	94.6
Require new knowledge skill	117	90.0
Lack of training on ICT tools	101	77.6

Field survey, 2022. *Multiple response.

Conclusion

Information is most valuable during emergencies and disasters. Everyone needs it to make decisions, save live and adjust. Information, timely and transparent, generates trust and credibility. Farm disasters abound which limit extension work. This includes floods, erosion menace cutting off across roads, heavy wind storms, epidemics among others. To reach farmers, extension workers use mobile phones, videos, Whatsapp, zoom meetings to connect farmers and solve their problems.

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