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Perception of Utilization of Digital Technologies Among Arable Crop Farmers in Imo State, Nigeria

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Abstract
The study assessed arable crop farmers' perception of the use of digital technology in Imo State. A multi-stage sampling procedure was used in selecting the 120 arable crop famers. Data were collected using questionnaires and analysed using means, percentages and correlation analysis. Results showed that A mean score of ($\bar{x}$ = 3.0±0.45) and ($\bar{x}$= 3.5±0.71) on a five-point Likert-type scale showed that respondents had a positive perception of the use and relevance of digital technologies for arable crop production, respectively. The major challenges to the utilization of digital technologies were lack of digital skill (77.78%), poor digital infrastructure (75.00%) and high cost of digital tools (75.00%). There was a positive and significant correlation between the level of education (r=0.502), farm income (r= 0.442) and farming experience (r= 0.334) and utilization of digital technologies). Arable crop farmers in the state appreciate the need for digital technologies. Government should subsidize the cost of digital tools and improve the digital infrastructure

Keywords: Arable crop digitalization, Digital technologies.

Introduction
Digitalization is the modern paradigm for enhancing agricultural production all over the world as countries seek to incorporate better production approaches. All aspects of agriculture (including arable crop production) are becoming more knowledge-intensive making it necessary that farmers must have access to accurate information targeted to farm areas and operational conditions which are essential in assisting farmers' production efficiency. This has given rise to the fading of traditional patterns of service delivery as indigenous knowledge is transformed into new ways of doing things.
The majority of the rural dwellers in Sub- Saharan Africa rely on arable crops for their food security, poverty reduction and economic enhancement (Mbagwu,et al, 2018).Such arable crops as maize, rice, potato and yam constitute the core sources of nutritional energy for rural dwellers in Nigeria. Farmers in Imo State cultivate the

bulk of these arable crops for local consumption as well as for other regions. Unfortunately, arable crop production in Nigeria is facing severe challenges in improving production with the reduction of the natural resources required for production.

It is pertinent to observe that the COVID-19 pandemic has further highlighted the gap between agricultural stakeholders who have access to digital technologies and those who do not. Digital technologies have positively impacted on agricultural production globally. These impacts are majorly felt in the aspects of information dissemination, climate change adaptation and mitigations etc. Unfortunately, the level of utilization of digital technologies among arable crop farmers in Nigeria seem very low. Previous studies focusing on digitalization highlighted that irrespective of the documented increase in agricultural productivity arising from digitalization, farmers' unwillingness to utilize these technologies can constrain its adoption (Fuglie,et al, 2020; Jellason,et al, 2020). This has been attributed to low level of awareness, absence of insurance for risk management, lack of technical know-how as well as inappropriateness of these technologies (Bolfe.et al, 2020) Also, not much studies have been conducted as it relates to arable crop farmers' perception of the use of digital tools in Imo State. Given this background, this study sought to among other things ascertain the respondents' perception of the use of digital tools for arable crop production, describe their perception of the relevance of digital tools in their farm practices, determine the strategies to improve the utilization of digital tools for arable crop production as well as identify their challenges in the utilization of digital technologies on their farms.

Hypothesis

H_0: There is no significant association between the socio-economic characteristics of the arable crop farmers and their perception of the utilization of digital tools.

Methodology

The study was conducted in Imo State, Nigeria. Imo state is situated in the rainforest belt of Nigeria located within latitude $4^0 45^1$N and $7^0 15^1$N and longitude $6^0 50^1$E and $7^0 25^{'}$ E with a population of 5, 508, 756 (National Bureau for Statistics (NBS), 2016). The multi-stage random sampling procedure was used in the selection of arable crop farmers from the three geographical zones of the state. Ohaji –Egbema and Oguta Local Government Areas were selected from Orlu zone; IsialaMbano and Okigwe L.G. A were selected from Okigwe zone while Aboh-Mbaise and Ikeduru L.G.A . The third stage of the sampling was the random selection of food crop farmers from two rural communities in each of the selected L.G.As. The final stage was the random selection of 12 arable crop farmers from each of the twelve autonomous communities which gave a sample size of 144 respondents. Of these respondents, only 120 questionnaires were returned and used for the study.

A structured questionnaire was used to obtain data from the arable crop farmers. Data were collected on socio-economic characteristics such as sex, age, ownership of handset, access to internet services, level of education, marital status, access to farm credit, farm income and years of farming experience. Furthermore, data were collected on the respondents' perception of the digitalization of arable crop production which was measured using a 5-point Likert-type scale. Mean scores of

above 3.0 was adjudged as “accepted” while below 3.0 was adjudged as “rejected, its perceived relevance, strategies for improvement and challenges to the use of digital technologies in arable crop production.

Data analysis was done using frequency count, Likert-type scale and correlation analysis. The correlation analysis was used to ascertain the relationship between digital technologies and selected socio-economic characteristics of the respondents.

Results and Discussion

Perception of the Use of Digital Tools

Utilization of digital tools reduced their labour hours ($\bar{x}$ =4.3$\pm$0.67), reduced social interactions among farmers ($\bar{x}$=3.7$\pm$0.75), discouraged indigenous technology ($\bar{x}$=3.8$\pm$0.82) and may lead to confusion as a result of information overload ($\bar{x}$=3.6$\pm$0.94). Oke, et al, (2019) opined that over recent years, farmers rely on indigenous knowledge for enhanced agricultural production. Unfortunately, Rose, et al, (2021) postulated that increased adoption of technology may give rise to indifference towards local knowledge thereby disengaging the farmers from their landscape. Respondents accepted that the use of digital technologies aren’t sustainable ($\bar{x}$=3.0$\pm$0.77). Ajena (2018) and Schimpf (2020) had in a previous study highlighted that farmers questioned the sustainability of digitalization given that much of it is being sponsored. This fear may not be unrelated with the challenges that the Agricultural Development Program (ADP) in Nigeria is going through as a result of the withdrawal of the World Bank counterpart fund.

Table 1: Respondents’ perception of the use of digital tools for arable crop production

Items	Mean ($\bar{x}$)	Standard Deviation
Discourage indigenous technology	3.8**	0.82
Lead to unhealthy farm produce	3.7**	0.75
Reduce social interaction among farmers	3.7**	1.45
Save time spent on agronomic practices	4.3**	0.67
Enhance interest in agricultural information	3.9**	0.67
Digital technologies aren’t secured	3.6**	0.94
Use of digital technologies aren’t sustainable	3.0**	0.77
Lead to unemployment among rural households	3.2**	0.43
Too much information may be confusing	3.6**	1.02
High-frequency information isn’t needed in my farm	2.4*	0.56
Digitalization is a new form of colonization	2.9*	0.84
Pooled	**3.5****	0.71

Source: Field Survey, 2022

Also, respondents agreed with Saiz-Rubio and Rovira-Más (2020) that digitalization will enhance interest in agricultural information ($\bar{x}$=3.9$\pm$0.67) but rejected the assertion that the use of digital tools in arable crop production is a new form of colonization ($\bar{x}$=2.9$\pm$0.84). Foster and Graham (2017) and Murphy, et al. (2014) opined that digitalization may give advantage to stronger firms at the expense of weaker ones. According to Thatcher, et al (2016), the idea of integrating small-scale agricultural producers into the global agriculture value chain may lead to

dispossession. The increase in the use of digital inputs provided by foreign nationals by farmers may possibly encourage dependency. More so, production decisions may be decided by the vendors of the technology thereby denying the farmer autonomy.

Perception of Relevance

With a mean score ($\bar{x}$=3.4±0.21), Table 2 reveals that digitalization will be relevant for climate smart services, reduction in the cost of linking farm input actors ($\bar{x}$=3.2±0.43) and improve the livelihood of arable farmers ($\bar{x}$=3.1±0.78). Respondents were of the view that digitalization of arable crop production may neither support farm learning ($\bar{x}$=2.8±0.12) nor improve access to market and financial information ($\bar{x}$=2.9). This is first contrary to the findings of Wole-Alo and Oluwagbemi (2020) and Atanga (2020) that digitalization will increase farmer's engagement in marketing information and also disagrees with Fatty (2019) and Yousaf,et al,(2021) that COVID-19-related physical distancing measures has made it necessary for the extension officer to utilize digital tools for service delivery among farmers.

Table 2: Relevance of digitalization to arable crop production

Items	Mean ($\bar{x}$)	Standard deviation
Advisory and climate smart services	3.4**	0.21
Improved access to inputs	3.0**	0.81
Reduces cost of linking farm input actors	3.2**	0.43
Improved access to market and finance information	2.9*	0.98
Digital technology will support farm learning	2.8*	0.12
Improvement in livelihood	3.1**	0.78
Pooled	**3.0****	**0.45**

Source: Field Survey, 2022

Strategies for Improving the Digitalization of Arable Crop Production

In Table 3, the majority of the respondents agreed on the various strategies that would improve their access and utilization of digital tools including: provision of financial incentives to would be users (81.67%), creating more awareness among farmers (63.33%) and the involvement of the farmers in the innovation process (61.50%). This conforms with the findings of Agaba and Akpan, (2017) who also advanced that the formation of cooperative societies will improve farmers' use of digital tools. According to Malabo Montpellier Panel Report (MMPR), (2020) the lack of incentives towards digitalization has hampered the process as most rural farmers in Nigeria live below the poverty line while Bolfe,et al,(2020) has identified provision of insurance to manage risk as a plan of action to boost digitalization of agriculture. Affordability is the main barrier to smartphone ownership in the least Developed Countries (LDCs) (International Telecommunication Union (ITU), 2017). According to Fielke, et al. (2019), the increasing number of agritech firms within the Sub-Saharan African region will expand investment in digital agriculture including the creation of digital hubs.

Table 3: Strategies of improving access and use of digital technologies in arable crop production

Items	Percentage (n=120)*
Regulation of the use of digital technologies	56.67
Provision of financial incentives to would –be users	81.67
Emphasis on the acquisition of digital skill	45.00
Building human capacity will be crucial to building digital literacy readiness across the food system.	38.33
Establishment of digital hubs in rural areas	28.33
Proper awareness among farmers	63.33
Inclusion of farmers in innovation processes	67.50

Source: Field Survey, 2022*Multiple responses

Challenges to the Digitalization of Arable Crop Production

Respondents identified poor access to the internet (77.5%) and insufficient digital tools (77.0%) as the major challenges to the digitalization of arable crop production. This is in agreement with Agada and Akpan (2017), the United Nations Conference on Trade and Development (UNTCAD) (2021), Gillwald and Mothobi(2019) and Sidibe (2021) who identified poor infrastructure and internet services as hindrances to the digitalization of the agricultural sector.

Table 4 also agrees with Kim, et al, (2020), Paul et al. (2020) and Olaniyi. et al, (2013) that the poor status of digital literateness in sub-Saharan Africa is a challenge to digitalization. In view of this, skills for handling, surfing and analyzing data are supreme (Baumüller and Addom, 2020).

Ali, et al, (2015) identified negative attitude towards ICT as a challenge to ICT utilization among farmers and this agrees with 56.66% of the respondents. Some of these negative attitudes may include the fear of colonization as well as the discard of indigenous knowledge. Majharul (2012) identified peers and social network as the major factors that affect individual perception of technologies.

Lack of role models and mentoring (40.0%) and insufficient contact with extension (32.5%) did not constitute a major challenge for the respondents. Olagunju, et al, (2021) observed that with digitalization, significant number of farmers can be assisted even with very few extension staff.

Table 4: Challenges to digitalization of arable crop production

Items	Percentage (n=120)*
Negative attitude of household members towards digital technologies	56.66
Insufficient digital tools	75.00
Poor level of awareness of digital technologies	74.17
Lack of compatibility with current farm practices	63.33
Lack of digital skill	60.00
High cost of digital tools	75.00
Lack of role models and mentoring	40.00
Poor access to internet	77.50
Insufficient contact with extension services	32.50
Poor rural infrastructure	77.50

Source: Field Survey, 2022*Multiple responses

Association between the Socio-Economic Characteristics of the Arable Crop Farmers and their Perception of Use of Digital Tools

There exists a significant positive association between respondents' years of farming experience (r=0.334) and the use of digital tools for arable crop production Other socioeconomic variables with significant positive association with the use of digital tools were level of education (r=0.5020) and farm income (r=0.442) Otekhile and Verter (2017) and Okwu and Iorkaa, (2011) reported that as farmers advance in age, their likelihood of adopting improved farming practices decreases due to their aversion to risk. However, some respondents with higher years of experience in arable crop production may be at their active age considering that they may have started farming at a very early stage. In line with expectations, the more educated the arable crop farmers were, the more they utilized digital tools for their production. This aligns with Izuogu, et al, (2015) and Adebayo, et al, (2018) that education is an aid to improved farm practices. The null hypothesis is therefore rejected.

Table 5: Correlation of farmers' socioeconomic characteristics and utilization of digital tools for arable crop production

Variables	Access
Age	.156
Farm income	.442***
Farming experience	.334***
Level of Education	.502***
Access to farm credit	.172
Access to internet	.113

*** P≤0.05

Conclusion and Recommendations

Digitalization of arable crop production is a pointer to improved livelihood. Though farmers are aware of the gains of digitalization, they are scared that digitalization may relegate indigenous knowledge to the background. There are several factors affecting arable farmers' perception of the digitalization of farm practices. These factors may inhibit the effective digitalization of the agricultural system in Nigeria if ignored. Government should create more awareness on the utilization of digital tools in arable crop production to improve farmers' perception. Digital infrastructures in rural areas should be improved with the establishment of digital hubs by key actors in the digitalization process especially the digital network service providers for easy access among farmers. Finally, efforts must be made to ensure that digitalization in cooperates indigenous practices where it is possible.

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