Prevalence of Digital Technology Utilization by Mechanized Farms in Ekiti State

[1]Olufunke C. Olatunji, [2]Oluwatosin O. Fasina, [3]Abimbola T. Fanu, [4]Oluwaseun T. Bamigboye
[1]Department of Agricultural Extension and Rural Development, Federal University of Oye, Ekiti, Nigeria
[2]Department of Agricultural Extension and Communication Technology, Federal University of Technology, Akure, Nigeria
comfort.olatunji@fuoye.edu.ng | oofasina@futa.edu.ng | abimbola.fanu@fuoye.edu.ng | oluwaseun.bamigboye@fuoye.edu.ng

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ORIGINAL RESEARCH

Abstract— In the recent years, digital technologies have been revolutionizing the agricultural sector, including mechanized farming. However, the extent to which mechanized farmers in Ekiti-State, Nigeria, are aware of and adopting these tools is largely unknown. The study aims to fill the gap by investigating the level of awareness and adoption of digital tools utilization among mechanized farms in Ekiti State. 60 respondents were selected for the study using purposive and random sampling. The facts were scrutinized with descriptive and inferential statistics. According to the study, respondents had a mean age of 32.45 and 69% were men. The modal educational level was HND. The level of awareness is extremely high in drones (4.00) (and adoption of digital tools was quite high especially for Drones (4.00), GPS devices (4.00) and Sensor (3.33). The survey finalized that majority of mechanized farmers are already aware of digital tools and the adoption rate was slightly high especially in drones, sensors and GPS. Major challenges faced in the utilization of digital tools are financial constraints (33.3%), lack of technical expertise (16.7%), poor internet connectivity (50%).There's was high positive correlation (r 0.78, p=0.00) between the level of awareness and adoption rate of digital tools usage. It is however recommended that digital tools should be introduced to other mechanized farmers that are yet to be aware of the usage, so to improve the level of adoption to enhance the effectiveness on agricultural production.

Keywords— Agricultural production, Digital tools, GPS devices, Technology, Utilization.

1 INTRODUCTION

In most of jurisdictions, agriculture has played a significant role in economic growth. Small firms, major corporations, and significant multinationals all differ in this regard. Plants and animal husbandry are only a small portion of agriculture's productivity (Kamil *et al.*, 2017). Furthermore, it is a company that converts agricultural products into consumer items. Food processing, packaging, shipping, retailing, manufacturing, and home consumption are all part of the transfer of products to consumers. Farm machinery took the role of horses as automation changed farming more recently. Nowadays, especially in industrialized nations, technology is so widely used and accepted that it has become a need for every farmer. With yesterday's technology, there is not enough land on the planet to maintain the population as it is today. Technological devices and techniques that facilitate control as well as comprehension of the physical world are referred to as technology. Agricultural technology, sometimes referred to as agritech, is useful for precisely mapping, overseeing, and controlling agricultural decisions (Cropin,2023). Any technology's viability, accompanying risks and uncertainties, initial capital required, socioeconomic traits of farmers, and cultural/traditional views all influence adoption. Only if farmers accept the technology can productivity increases linked to technical advancements be realized. Technologies aid farmers in increasing productivity and harvests. Harvest automation, self-driving tractors, seeding and weeding, and drones are some of the major technologies that are frequently employed in agriculture. The management of poultry farms, dairy farms, and other types of animal farms is being revolutionized by technology, according to recent developments (Sengupta *et al.*, 2019).

Digital agriculture, also known as smart agriculture or e-agriculture, is a tool for the digital collection, storage, analysis and sharing of electronic agricultural data. Everything that is already available to the farmer, from farm management to financial matters, is selected and made more active for better results. Digital tools can help farmers evaluate their decisions from year to year. Analyzing satellite images and other remotely sensed data recorded throughout the year can provide definitive answers to all of these impasses. Data collected from the farm, layered with industry knowledge, provides better and more predictive analytics. Digitization has become a smart farm tools that can be a game changer for farm-level processes (Javaid, 2022; Klerkx, 2019).

Using digital tools, farmers can evaluate their field management decisions for the current year and make the

*Corresponding Author

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best autumn plowing and fertility management decisions for their farms. Digitization gives farmers the information they need for better planning and execution (Zhang, 2023). They can create a pre-harvest plan, know what problems have arisen this year and what the expected yield will be, and be ready to harvest in no time. Farmers will be more productive and efficient in their mid-season business decisions as digitization creates a performance foundation for available products and tools. These tools are essential for farmers to move from "wait and see" to proactive "plan, monitor, adapt and maximize" to improve their business (Abdulai, 2023).

The general objective is to determine farmer's awareness and adoption of digital tools by mechanized farms in Ekiti State. The specific objectives of the study were to;

i. ascertain the socioeconomic characteristics of respondents.
ii. assess the level of awareness of respondents to the use of digital tools.
iii. ascertain the level of adoption of digital tools usage.
iv. determine the problems encountered by respondents in the usage of digital tools.

2 METHODOLOGY

The study was conducted in Ekiti-State, selecting 3 mechanized farms in Ekiti State, whereby Abuad Farm Ado Ekiti, Chi-Africa farm Aramoko, and FarmCAS Ikere Ekiti. however, these farms were selected to explore the adoption of digital tools specifically in mechanized farming, which was believed to have a unique set of features and practices that differs from traditional subsistence farming. The selected farms are bigger in size and operation with more resources making them to likely adopt digital tools and provide valuable insights into adoption patterns. Simple random sampling was utilized in this study to choose the population. The sampling process involved two stages. Based on my area of interest and the goal of the research, the first stage entailed a selective sampling of the three farms listed above from three local government areas. Twenty (20) respondents were randomly chosen from each of the digital farms in the second stage to make up the required Sixty (60) respondents. To accomplish the stated goals, this study uses primary data and secondary data sources gotten from academic journals and articles that can provide valuable insights into digital tools adoption in mechanized farming. The structured questionnaire and interview schedule were used to collect the primary data from the respondents at ABUAD farm Ado-Ekiti, Chi-Africa farm Aramoko, and FarmCAS Ikere. Analytical tools such as descriptive and inferential statistics was used for this study; these includes frequency distribution, percentage, mean and standard deviation. Also correlation coefficient and chi-square were used to analyze the hypothesis.

3 RESULT AND DISCUSSION

This section presents an analysis of the findings of the study. It is centered on the evaluation and interpretation of the gathered data.

3.1 Socioeconomic Characteristics of Respondents in the Study

3.1.1. Age Distribution of the Respondents: According to Table 1's findings, respondents in the research region had a mean age of 32.47 years. It also reveals that a substantial portion of respondents (40%) were between the ages of 26 and 30 years, 6.7% were between the ages of 25 and 24, 6.7% were between the ages of 41 and 45, and the age ranges of 31 to 35 years and 36 – 40 years had 23.3% respectively. These results implied that the respondents were young, and are exposed to new technologies and capable of being aware and adopting digital tools in their agricultural activities. People of this age group constitute the major agricultural productive workforce.

3.1.2 Sex Distribution of the Respondents: According to the results in the table 1, men make up the majority of respondents (68.3%), while women make up 31.7%. This shows that more males are cognizant and involved in the adoption of digital tools than women in the study area. This may be due to general belief of the people that men are more likely to adopt digital tools than women. Additionally, research has demonstrated that men's and women's attitudes with men indicating greater interest and adoption while women indicating greater difficulty and low interest in using modern technology (FAO, 2011). By adopting a gender focus, we aimed to look at both sexes, their roles responsibility, problems and priorities.

3.1.3 Distribution of Respondents according to their Marital Status: The findings revealed that 85% of the research area's respondents are married, 15% are single.

Table 1: Distribution of Respondents According to their Socioeconomic Characteristics

Variables	Frequency	%	Mean
SEX			
MALE	41	68.3	
FEMALE	19	31.7	
AGE			
≤ 25	4	6.7	32.47
26 – 30	24	40	
31 – 35	14	23.3	
36 – 40	14	23.3	
41 – 45	4	6.7	
MARITAL STATUS			
SINGLE	9	15	
MARRIED	51	85	

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Source: Field Survey, 2023. Standard Deviation= 4.99 N=60

3.2 Frequency Distributions of Respondents According to Education Attained

The distribution of the respondents' educational backgrounds is shown in Table 2 as a result of the survey, according to the table, 15% of respondents had Ordinary National Diploma, 25% had Higher National Degree, 10% had Bachelor's Degree, while 10% had Postgraduate Degree. This indicates that majority of the respondents are well educated with the high percentage of HND holders who are well trained and exposed in the area of new technology. This agrees with Riddell (2012), who reported that education positively influence the adoption and usage of new technologies and FAO (2019), also indicates that level of education influence the adoption of modern agricultural technology.

Table 2: Distribution of Respondents according to level of education attained

Variables	Frequency	Percentage (%)
OND	15	15.0
HND	25	25.0
BSC	10	10.0
POSTGRADUATE	10	10.0
Total	60	100.0

Source: Field Survey, 2023

3.3 Level of Awareness of Digital Tools usage

Table 3 shows the average mean of 4.33. Hence, it means that majority of the respondents are strongly aware of sensor technology, they are aware of the usage of drones (4.00), GPS (3.95), precision nitrogen management (3.33), robot (3.00).

Table 3: Level of Awareness

TOOLS	Strongly aware (%)	Aware (%)	Moderately aware (%)	Slightly aware (%)	Not aware (%)	Mean
GPS DEVICES	(33%)	(33%)	(33%)	(0%)	(0%)	3.95
SOIL/WATER TEST TOOLS	(33.3%)	(0%)	0(0%)	(0%)	(66.6%)	2.33
DRONES	(33.3%)	(33.3%)	(33.3%)	(0%)	(0%)	4.00
ROBOT	(0%)	(33.3%)	(33.3%)	(33.3%)	(0%)	3.00
LIVESTOCK MANAGEMENT SOFTWARE	(0%)	(0%)	(33.3%)	(33.3%)	(33.3%)	2.00
SENSOR TECHNOLOGY	(33.3%)	(66.6%)	(0%)	(0%)	(0%)	4.33
PRECISION NITROGEN MANAGEMENT	(0%)	(33.3%)	(66.6%)	(0%)	(0%)	3.33

Source: Field Survey, 2023. Note: 5 strongly aware, 4 aware, 3 moderately aware, 2 slightly aware, 1 not aware.

3.4 Level of Adoption of Digital Tools

From table 4 the mean of GPS and drones is 4.00, this means that the level of adoption of GPS and drones by majority of the respondents is very high. The level of adoption of soil/water test tool (2.67), livestock management software (2.67), sensor technology (3.33) and precision nitrogen management (3.00) is moderately high, the level of adoption of robots (2.48) is low and the level of adoption of internet of things (1.67) is very low.

a. Dichotomy group tabulated at value 1. *Multiple responses

Source: Field survey, 2023

Note: 5 Extremely high, 4 Very high, 3 moderately high, 2 low, 1 very low

4 RECOMMENDATION

Given the potential benefits of digital tools for mechanized farming, adoption of digital tools should be encouraged among subsistence farmers as a major factor for the effectiveness and efficiency of agricultural production in this technological age. there is a clear need to increase awareness and adoption among farmers in Ekiti State. To achieve this, it is crucial to educate farmers about the advantages of digital technologies, provide support through training and resources, and encourage collaboration between stakeholders to address challenges related to adoption.

Furthermore, fostering innovation through pilot projects, technology showcases, that can help identify promising digital tools and strategies for mechanized farming. In addition, investment in rural infrastructure, such as broadband internet and electricity, can ensure that farmers have reliable access to digital tools and technologies.

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Table 4: Level of Adoption of Digital Tools

	Extremely high (%)	Very high (%)	moderately high (%)	Low (%)	very low (%)	Mean
Soil water test tools	33.3%	0%	0%	33.3%	33.3%	2.67
Drones	33.3%	33.3%	33.3%	0%	0%	4.00
Robots	0%	0%	0%	33.3%	66.6%	2.48
Livestockstock management software	0%	0%	0%	66.6%	33.3%	2.67
Sensor technology	33.3%	0%	33.3%	33.3%	0%	3.33
Precision agriculture	0%	0%	33.3%	33.3%	33.3%	1.67
Gps devices	33.3%	33.3%	33.3%	0%	0%	4.00

Finally, regular monitoring and evaluation of digital tool adoption can inform policymakers and practitioners about progress and emerging trends, allowing for evidence-based decision-making and continuous improvement in the adoption of digital tools in mechanized farming.

In summary, a multi-pronged approach that addresses awareness, support, collaboration, infrastructure, and monitoring can help to accelerate the adoption of digital tools in mechanized farming in Ekiti State, improving productivity, efficiency, and sustainability in the sector.

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