

ASSESSMENT OF FARMERS AND MARKETERS' USAGE OF DIGITAL TECHNOLOGIES IN CEREAL MARKETING IN SABON GARI LOCAL GOVERNMENT AREA, KADUNA STATE, NIGERIA
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Abstract

This study assessed farmers and marketers use of digital technologies on cereal marketing in Sabon gari local government area, Kaduna state. Using a survey-based approach, the paper assessed the use of digital platforms such as social media and e-commerce among cereal farmers and marketers, perceived impact of digital technologies on sales and income, factors influencing the use of digital technologies and constraints to the use of digital technologies. Findings highlight that 71.2% used mobile phones and 19.2% used social media. The perceived impacts of digital technologies were; improvement in sales and income (2.8), access to market information (2.8), and reduction in transaction cost (2.6). Factors that influence the use of digital technologies were age (-0.675), years of marketing experience (-0.730), cost of digital technologies (0.662) and amount of credit received (0.081). However, challenges such as limited internet access, digital literacy, and economic constraints are also identified. The study's insight can inform strategies to promote digital technology adoption and improve cereal marketing efficiency in the region. It is therefore recommended that farmers and marketers should form cooperative society in order to acquire digital technologies for adequate training on how to optimize the use of digital technologies in cereal marketing.

Key words: Assessment of farmers, marketers, usage of digital technology, cereal marketing

Introduction

Agriculture remains a crucial sector in Nigeria, contributing significantly to the country's GDP and providing employment for a large portion of the population. Cereals plays vital role in food security and income generation for farmers (Nwalieji, Uzuegbunam, & Okeke, 2017). Digital technology refers to the use of electronic devices and software applications to store, process, and transmit information in digital form (Adekunle *et al.*, 2016). In the context of cereal marketing, digital technologies can include mobile apps, e-commerce platforms, social media, and other digital tools that enable efficient and transparent marketing activities. Marketing is the process of identifying, anticipating, and satisfying customer needs and wants through the exchange of products or services (Kotler and Keller, 2016). Marketing involves the activities related to the distribution, pricing, promotion, and sale of cereals from producers to consumers. In recent years, digital technology has emerged as a transformative force in agriculture, offering tools and platforms to improve productivity, efficiency, and market access.

The integration of digital technology in agricultural marketing can help farmers connect with buyers, access market information, and receive timely updates on prices and demand. These technologies enable farmers to make data-driven decisions, optimize resource use, and streamline operations, ultimately leading to increased yields and profitability (Wolfert *et al.*, 2017). As the global population continues to grow the use of digital technology in agriculture is increasingly seen as a crucial strategy for ensuring food security and promoting sustainable

development. Studies have shown that farmers and marketers in developing countries are increasingly using mobile phones and social media platforms to access market information and connect with buyers (Aker, 2011; Jagboro, 2017).

Despite the promising benefits, the use of digital technology in agriculture varies significantly across different regions and among different types of farmers and marketers. Factors influencing use include the availability of infrastructure, access to knowledge and training, economic considerations, and cultural attitudes towards technology (Kshetri, 2017). In many developing countries, smallholder farmers and marketers often face significant barriers to use these technologies, including limited access to the internet, lack of technical expertise, and financial constraints. The perception of digital technology among farmers and marketers plays a critical role in its effective utilization. Studies have shown that farmers and marketers who perceive digital technologies as beneficial are more likely to use them (Venkatesh *et al.*, 2019). Additionally, social influence and the perceived support from government and agricultural extension services also impact farmers' willingness to embrace digital solutions. These farmers and marketers often face challenges in effectively marketing their cereal produce, which can lead to reduced incomes and suboptimal utilization of their agricultural resources (Brown & Kula, 2018). One potential solution to this problem is the use of digital technologies, which can help farmers and marketers access wider markets, obtain better prices, and streamline their marketing activities.

Studies have indicated that the slow uptake of digital solutions in agriculture is often due to a combination of socio - economic, infrastructural, and cognitive barriers (Liu *et al.*, 2020). These barriers can include limited access to the internet, insufficient technical knowledge, high costs of technology, and a lack of supportive policies and infrastructure. The problem of low usage of digital technology for cereal marketing among farmers and marketers in Sabon Gari LGA needs to be addressed because it prevents farmers and marketers from reaping the full benefits of digital transformation in agriculture. While digital marketing tools could potentially enhance market access and improve the financial returns of cereal for farmers and marketers, many farmers in the region seem unaware or unconvinced of the benefits. As a result, they continue to rely on traditional, less efficient marketing channels. The disconnect between the availability of digital solutions and their actual utilization by farmers and traders creates a gap that hinders progress toward improved agricultural marketing and economic empowerment.

Several challenges contribute to this gap. First, there is limited empirical data on cereal farmers' and marketers' perceptions of digital technology for marketing, particularly in Sabon Gari LGA. Without this data, policymakers and development agencies lack a clear understanding of farmers' and marketers' attitudes, their awareness of available digital platforms, and the specific challenges they face in using these technologies. Again, many farmers and marketers may lack the necessary digital literacy and technical skills to use these platforms effectively. This situation is exacerbated by limited infrastructure, such as unreliable internet connectivity and inadequate access to smartphones or computers, which restricts the ability of farmers and marketers to engage in digital marketing. Furthermore, there may be cultural or psychological barriers that affect farmers' and marketers' trust in digital platforms compared to traditional marketing methods. Given the rapid growth of digital platforms in Nigeria's agricultural sector, there is an urgent need to assess cereal farmers' and marketers' use of these technologies in order to identify the key barriers to their usage and to develop appropriate interventions. Without addressing these issues, cereal farmers and marketers in Sabon Gari LGA risk being

left behind in the digital revolution, which could result in loss of opportunities for market expansion and income growth. The specific objectives of the study were to describe types of digital technologies used in the study area, assess the impact of digital technologies on sales and income among cereal farmers and marketers, examine factors influencing adoption of digital technologies and assess the level of adoption of digital technologies among cereal farmers and marketers.

Literature Review

The concept of digital technology in agricultural marketing encompasses several aspects, including the use of mobile applications, e-commerce platforms, digital payment systems, and social media for the promotion, distribution, and sale of agricultural products. This approach has the potential to improve the efficiency, transparency, and accessibility of agricultural markets, thereby enhancing the incomes and livelihoods of smallholder farmers (Akanke, 2016).

The conceptual framework for this study also considers the factors that influence the perception and use of digital technology by cereal farmers and marketers. These factors may include the farmers' and marketers' level of education, access to information and communication technology (ICT) infrastructure, availability of digital extension services, and the perceived benefits and challenges of using digital technology in marketing

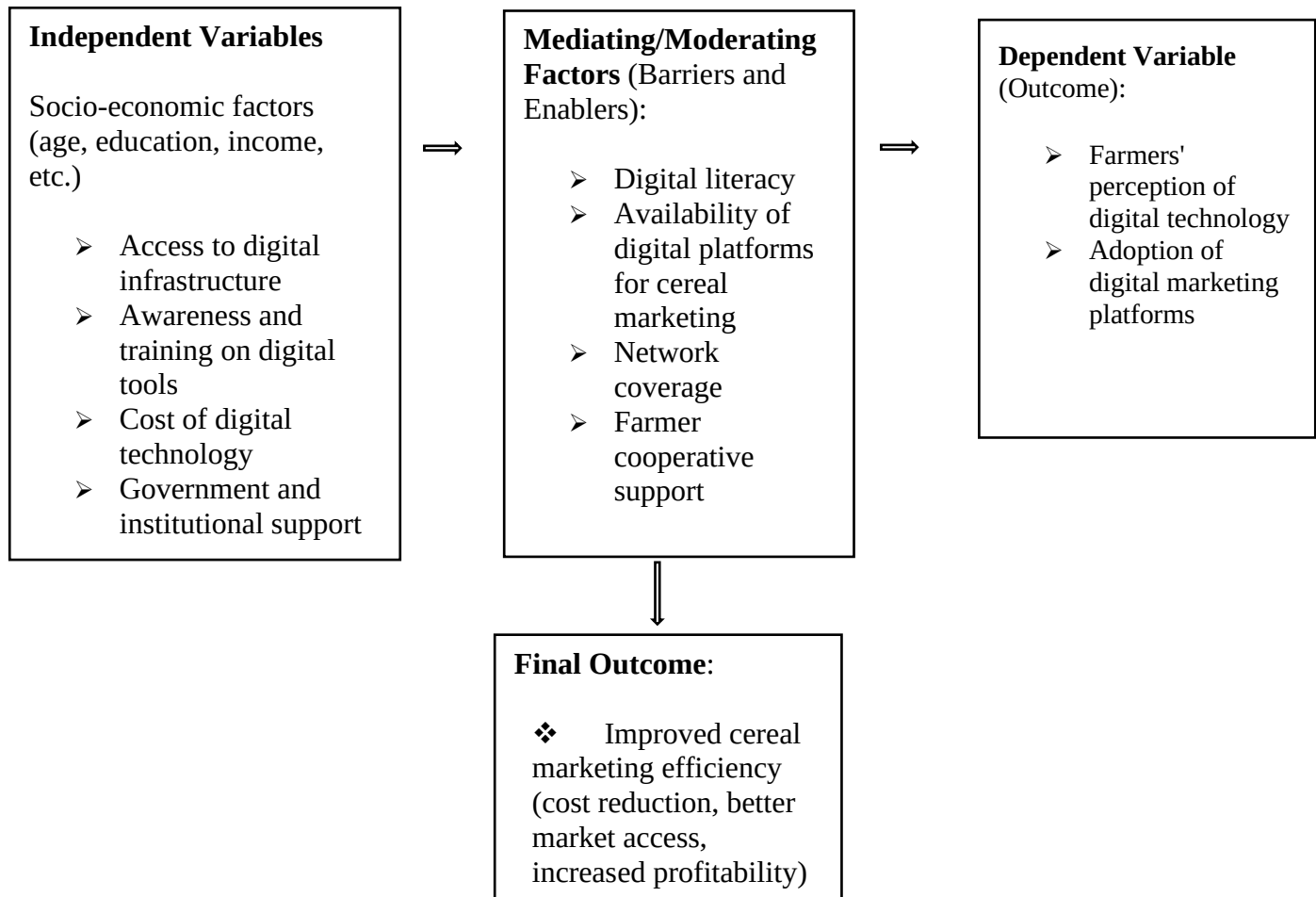
1. **Dependent Variable: Farmers' and marketers Perception of Digital Technology in Marketing:** This is the primary outcome of interest, focusing on how farmers and marketers perceive digital tools in marketing cereals. Key aspects include perceived usefulness, ease of use, and overall attitude towards adopting digital technology

2. **Independent Variables: Digital Literacy and Skills:** Farmers 'and marketers' ability to understand and effectively use digital tools, influenced by exposure to training programs and previous technology use. **Access to Digital Infrastructure:** Availability and affordability of mobile phones, internet connectivity, and digital platforms specific to agricultural marketing. **Economic Factors:** Farmers' and marketers' income, cost of technology adoption, and potential financial benefits derived from using digital platforms. **Social and Cultural Influence:** Community norms, peer influence, and the role of farmer and marketers' cooperatives or groups in encouraging or discouraging the use of digital technology. **Government Policies and Initiatives:** Influence of government programs (e.g., subsidies, digital literacy campaigns) and policies aimed at promoting digital adoption in agriculture. **Perceived Benefits:** Farmers' and marketers' views on the advantages of digital technology, such as broader market access, better pricing, improved efficiency, and reduced transaction costs. **Challenges and Barriers:** Barriers to adoption, such as lack of technical support, high costs, poor network coverage, and resistance to change

3. **Moderating Variables: Demographic Factors:** Variables such as age, gender, educational level, and farming experience that may influence the relationship between independent variables and farmers' and marketers' perceptions. **Type and Complexity of Digital Technology:** The nature of the technology (e.g., basic SMS-based systems vs. advanced apps) and its user-friendliness may moderate how farmers perceive its usefulness and ease of use.

4. Mediating Variables: Training and Capacity Building: Training programs and capacity-building initiatives that mediate the relationship between digital literacy and perception of technology. Trust in Digital Platforms: Trust in the security, reliability, and fairness of digital platforms that mediate the relationship between perceived benefits and overall perception.
5. Feedback Loop: Impact of Perception on Adoption: Positive or negative perceptions of digital technology may influence future adoption rates and subsequent perceptions, creating a feedback loop that affects overall technology penetration.

Diagrammatic Flow Chart of Conceptual Framework



Methodology

The study was carried out in Sabon-Gari Local Government Area of Kaduna State, which lies in the Northern Guinea savanna ecology. Sabon-Gari is located between longitude 7⁰ and 8⁰ East and latitude 10⁰ and 12⁰ North and the area have an average altitude of 675m above sea level. (Kaduna Agricultural Development Agency, KADA, 2018) with a projected population of 725,069 in 2023 at an annual growth rate of 3.2 percent (National Population Commission, NPC and National Bureau of Statistics, NBS, 2016). The major occupations of the people in the area are farming, fishing, trading and civil servant. The farmers of the area cultivate maize, rice, sorghum, millet, cowpea, soya beans, groundnut and cotton. These are cultivated during the raining season.

A two-stage sampling technique was employed for the study. The local government have eleven (11) wards namely, Anguwan gabas, Bomo, Dogarawa, Bawa, Chikaji, Hanwa, Jama'a, Muchia, Zabi, Jushi and Samaru. In the first stage, a purposive sampling technique was utilized to select five (5) wards out of the eleven wards in the Local Government Area. Namely: Samaru, Bomo, Hanwa Basawa and Dogarawa. In the second stage, a random sampling technique was used to select 39.94% of the farmers and marketers from these wards, resulting in a total of 125 respondents selected for the study. The proportionate allocation method of calculating sample size was employed as indicated in the formula:

Yamane formula

$$n = \frac{N}{1 + N(e)^2}$$

Where,

n = sample size

N= population

e = level of significant, which is 7%.

While 1 is constant.

The sample size was analyzed using Taro Yamane formula which is:

$$n = \frac{N}{1 + N(e)^2}$$

The data for the study was collected through a combination of primary and secondary sources of information. Primary data was collected using a structured questionnaire administered to the sampled cereal farmers and traders in the study area. While the secondary sources of information was obtained from relevant literature, government agencies and research institutions. Data was analyzed using descriptive statistics, and multiple regression models. Three-point Likert scale was used to gauge the perception of farmers and marketers with the bench mark of 2.00 mean.

The multiple regression models were specified as follows;

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + e$$

Where;

Y = Use of digital tech. X_1 = Age (years), X_2 = level of education (years of schooling), X_3 = years of experience (years), X_4 = cost of digital technology (N), X_5 = complexity (1= complex, 0= simple) X_6 = repair and services (1= repairable, 0= non-repairable), X_7 = Availability of network (1= available, 0= not available), X_8 = Amount of credit received (N)

Results and Discussion

Table 1: Digital technologies used by cereal farmers and marketers

Digital technologies	Frequency	Percent
Mobile phones	89	71.2
Social media	24	19.2
E-commerce platforms	20	16.0
Laptop	12	9.6
Desktop	05	4.0
Total	**	**

Source: Field Survey, 2024

** Multiple responses

Table 1 show that 71.2% of the farmers and marketers use Mobile phones to market cereals considering that Mobile phones are widely used in the world by individuals for communication and transactions. Studies have shown that farmers and marketers in developing countries are increasingly using mobile phones and social media platforms to access market information and connect with buyers (Jagboro, 2017). It has over 2 billion users worldwide, while the next is social media which has 19%, is also actively used because it is an educational tool which has videos on virtually different areas so as to help people gain insight and reduce the level of ignorance amongst people. Some of the social media tools mostly used are; Facebook, YouTube, twitter, WhatsApp, Telegram. Thirdly 16% of the farmers and traders make use of E-commerce via it one can reach a large population of people even from other countries aside Nigeria and this is quite helpful. E-commerce platforms and online market places are also being used to facilitate trade and improve market access (Kshetri, 2018). While 10% of the farmers and marketers make use of laptops with internet modem for connectivity.

Perceived impact of digital technologies on sales and incomes**Table 2: Perceived impact of digital technologies on sales and incomes**

Statement	HE	E	NE	WS	MS
Access to market information	300	50	0	350	2.8
Reducing transaction costs	270	40	15	325	2.6
Improving price discovery	240	80	05	325	2.6
Types of technology used	180	60	35	275	2.2
Level of adoption	150	60	45	255	2.0
	210	60	25	295	2.4
Specific market context					
	330	20	05	355	2.8
Improved sales and incomes					

HE= highly effective E= Effective NE= Not effective

The perceived impact of digital technologies on sales and incomes is presented on Table 2. It shows that access to market information (2.8) and improved sales and incomes (2.8) were perceived to have highest impact of digital technologies in marketing. This is beyond the benchmark of 2.0 and a strong indication that it is highly effective. Reducing transaction costs (2.6) was highly effective. Use of digital technologies reduces the costs of transacting business of cereals. Farmers and marketers can use mobile phones to communicate prices of cereals, know the quality of cereals offered for sale without travelling and also place order of the cereal to be transacted and make payments and confirm payments at no cost. The mean score was 2.6 which is above the benchmark of 2.0 indicating that using digital technologies can help reduce transaction costs considerably.

Improved price discovery had a mean score of 2.6, implying that the use of digital technologies can help farmers and traders to discover prices of cereals. Digital technologies facilitate communication with other traders in different locations. This agrees with the research of Goyal, (2010) who reported that the use of digital technologies can improve sales and income among farmers and traders by providing access to market information, reducing transaction costs, and

improving price discovery. However, the impact of digital technologies on sales and income can vary depending on factors such as the type of technology used, the level of adoption, and the specific market context (Overå, 2018).

Factors influencing the use of digital technologies in cereal marketing

Table 3: Factors influencing the use of digital technologies

Variables	Coefficients	Standard error	T-values
Constant	2.740***	0.771	3.55
Age	-0.675*	0.352	-1.918
Level of education	-0.115	0.281	-0.410
Years of Exp.	-0.730***	0.212	-3.433
Cost of digital tech.	0.662***	0.223	2.969
Complexity	0.126	0.172	0.732
Repairs & Services	0.196	0.146	1.342
Availability of network	-0.089	0.085	-1.051
Amount of credit	0.081***	0.014	5.786
R ²	0.732		
F-ratio	11.959***		

***= 1 % level of significance **= 5 % level of significance *= 10 % level of significance

The result of the estimated parameters is presented in Table 3. Of the four functional forms that were fitted, the double-log functional form was chosen as the lead equation because of a high coefficient of multiple determinations (R^2) values, highest number of significant variables and also agreement with a priori expectations. From the results, it is glaring that the coefficients for age, years of experience, cost of digital technologies and access to credit are statistically significant at various probability levels. More specifically, age, and years of experience are negatively signed and this implies an inverse relationship with the use of digital technologies in cereal marketing. This result is in line with a priori expectations and also plausible on the ground that older farmers and traders may not be keen to use digital technologies as their younger counterparts. An increase in the years of marketing will reduce the tendency to use digital technology in marketing cereals. The coefficients for cost of digital technologies and access to credit are positively signed and significant at 1% level of probability. This implies that as the cost of digital technology increases the probability of using digital technology will also increase. However this is not expected, because the cost is supposed to serve as discouragement to use digital technology. Increase in amount of credit received will result in increase in the use of digital technology. Cereal marketers can increase the usage of digital technology by leveraging on credit to acquire digital technologies. Studies have identified a range of factors that influence the adoption of digital technologies among farmers and traders, including age, education, access to infrastructure, and level of digital literacy (Duncombe, 2016; Jagboro, 2017).

Constraints to use of digital technologies in cereal marketing

Table 4: Constraints to use of digital technology in cereal marketing

Constraint	Frequency	Percentage
Technological constraint	87	69.6
Economic constraint	65	52.0
Socio-cultural constraint	50	40.0
Institutional constraint	45	36.0
Digital literacy gap	30	24.0
Resource constraint	25	20.0
Infrastructural limitation	14	11.2

The result on constraints in the use of digital technologies in cereal marketing is presented in Table 4. It reveals 70% of the farmers and marketers report having technology constraints in the use of digital technology. Some digital technologies are complex to use and may require technical knowledge to optimize its use. Furthermore, 52% expressed economic constraint as a major constraint. Most digital technologies are expensive and not affordable thereby limiting its use. The third major constraint was socio-cultural constraint. Some are not able to use digital technologies due to their culture and societal perceptions. The fourth constraint was institutional constraint. The lack of institutions that will train individuals on the use of digital technologies limits its use, coupled with places for repair and servicing of digital tools. The fifth constraint was digital literacy gap. Individuals lack digital literacy to optimize the use of digital technologies and may not efficiently use the technologies to their advantage.

Conclusion

The study concludes that there is high rate of utilization of digital technologies in cereal marketing among farmers and marketers in the study area. The impact of digital technologies on sales and income varied depending on the type of technology used and the level of usage. Factors that influence the use of digital technologies were; age, years of marketing experience, cost of digital technologies and amount of credit received. However, technology constraints, economic constraints, socio-cultural constraints and digital literacy gap were the major constraints.

Recommendations

It is therefore recommended that:

1. Farmers and marketers should form cooperative society to enable them acquire digital technologies;
2. Provide training on how to optimize the use of digital technologies in improving marketing of cereals.

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