



Mediating Role of Customers' Satisfaction In The Relationship Between E-Commerce Technology And Sustainability Of Agribusiness In Nigeria

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Date of Submission: 14-05-2024

Date of Acceptance: 29-05-2024

Abstract

The aim of this study is to examine the mediating effect of customer satisfaction in the relationship between e-commerce technology and agribusiness sustainability. The sample includes 133 poultry farmers from the rural area of Lagos State and using a snowball sampling procedure, data was collected from farmers through the use of a questionnaire. Using hierarchical multiple regression, this study established that e-commerce technology has a positive and significant effect on agribusiness sustainability with customer satisfaction mediating the relationship between the two variables. Based on the above findings, it is recommended that farm businesses should create a multichannel strategy to identify their clients' preferred e-commerce platforms, such as Facebook, Instagram, or WhatsApp, and make sure they are present there. Furthermore, future studies could consider the moderating role of computer literacy on the relationship between e-commerce technology and agribusiness sustainability.

Keywords: Agribusiness, Sustainability, Customers' Satisfaction, E-commerce, Technology

I. INTRODUCTION

The primary aim of all organizations is to effectively utilize their resources to achieve their objectives. The recent changes in the business landscape, driven by the global health pandemic,

have compelled organizations to focus on improving their sustainability. This emphasis on sustainability aligns with the 17 Sustainable Development Goals (SDGs), as emphasized by Ojokoh, Samuel, and Omisore in 2020. A critical aspect of sustainability, especially given the current global food insecurity, is the sustainability of agricultural businesses (Fan, 2020).

The world population is estimated to be 9.6 billion in 2050 (FAO, 2019). Given the limited food resources, the increasing population will create a situation where the food produced is insufficient to feed the people (UNDESA, 2017, 2018; FAO, 2019). Yet, about 88 per cent of farm businesses operate on a small-scale (FAO, 2018; Ecker, Brown & Andam, 2021). Most government initiatives and policies have been directed towards increasing the production of food crops such as rice, soybean, and maize. Despite this, agricultural productivity in Nigeria particularly, has declined over the years as a result of declining soil fertility, pest infestation and crop failure, reducing total crop production (Onogwu, Audu & Igbodor 2017).

The developed nations have been able to produce sufficient food that will cater for this population growth through agricultural intensification and technological adoption. However, the reverse is the case in less developed countries of Africa, where technological adoption is at a slow pace (Fan, 2020). This could expose



the people in these areas to untold suffering and hunger. Currently, globally, 821 million people are suffering from hunger (FAO, 2018). With the present productivity constraints, especially the low level of adoption of modern technology (digital technology) (Ecker *et al.*, 2021), it will be very difficult to keep farm businesses running and functional in Nigeria to meet the growth in need for food security.

There is evidence of the importance of e-commerce in the agriculture sector (Reddy & Kumar, 2021). To this effect, digitization of agriculture is inevitable as it increases productivity and total income generated from farm business, and the adoption of e-commerce technology will be germane in reversing this downward production trend in agricultural business in Nigeria (Awotide, Arega, Alene, Abdoulaye & Manyong 2015). E-commerce could transform agriculture's business process into more sustainable in terms of funding and distribution (Anshari, Almunawar, Masri & Hamdan 2019).

Empirical evidence on the effect of e-commerce technology on the sustainability of Agribusiness still needs further research. For example, even though several studies have examined e-commerce technology (Purba, Simanjutak, Malau, Sholihat & Ahmadi, 2021; Sun, Grondys, Hajiyev & Zhukov, 2021; Kilay, Simamora & Putra, 2022) on business sustainability, few studies have been conducted to examine the effect of e-commerce technology and its impact on customer satisfaction and sustainability in Nigeria agribusiness sector context. Therefore, this study seeks to examine the effect of e-commerce technology and customer satisfaction on agric-business sustainability in Nigeria. This study is divided into seven major sections. Section 2 provides relevant literature on e-commerce technology, customer satisfaction and agric-business sustainability. Section 3 presents the study hypotheses, section 4 explains the methodology, section 5 explains the results and discussions, section 6 details the conclusion, and section 7 presents the recommendation and future research directions.

1.2 Objectives of the Study

- i. Analyse the effect of E-commerce technology on agribusiness sustainability in Nigeria.
- ii. Determine the relationship between e-commerce technology and agribusiness

sustainability as it mediates customer satisfaction.

1.3 HYPOTHESES

H₀₁: E-commerce technology does not have a significant effect on agribusiness sustainability in Nigeria.

H₀₂: The relationship between e-commerce technology and agribusiness sustainability in Nigeria is not mediated by customers' satisfaction.

II. LITERATURE REVIEW

2.1 E-commerce technology and Agribusiness sustainability

E-commerce can be defined as a process of buying or selling products electronically carried out by consumers to companies or consumers with the help of computers and internet equipment. It is a tool for buying and selling products and services that take place through electronic networks. According to Amornkitvikai, Tham, Harvie and Buachoom (2022) e-commerce is anticipated to contribute to the achievement of the 17th Sustainable Development Goal, which seeks to improve the implementation mechanisms and energize international partnerships for sustainable development. Mndzebele (2016), stated that e-commerce offers businesses an opportunity to interact with international markets while also keeping up with the pressures of globalization and its associated difficulties.

The growth of e-commerce has led to an increase in farm-produced orders delivered to customers resulting (Chen & Bashir, 2022). However, this has led to high emissions of CO₂ and even greater traffic congestion in cities. The e-commerce delivery of B2C goods accounts for 61% of the current total e-commerce shipments, which has led to increasing environmental pollution (Arnold, Cardenas, Sørensen & Dewulf, 2018). The e-commerce sector in respect of farm produce must therefore emphasize sustaining the environment by pressuring logistic service providers (LSPs) to lower their cost-driven prices and provide other transportation alternatives where possible to support their businesses (Oláh *et al.*, 2018). While adopting e-commerce, it is equally important for farmers and agricultural companies to encourage business practices to be congruent and compatible with their initiatives for environmental responsibility. If sustainable agriculture business is not ensured, then there will be negative



consequences that may lead to the depletion of the ecosystem. Therefore, farmers and agricultural companies will need to adopt user-friendly features that will make customer relationships easier.

Empirical studies have also confirmed the influence on e-commerce technology and agric-business sustainability. For example, Purba *et al* (2021) examined the effects of e-commerce on agric-business sustainability (BS) of 120 Micro, Small and Medium Enterprises (MSMEs) during Pandemic Covid19 in Indonesia and the results show that e-commerce had a significant effect on the the agric-business sustainability. Sun et al (2021) also examined the effect of the e-commerce business model on the sustainable environment in China and found that the e-commerce business model has a significant effect on a sustainable environment. Furthermore, Kilay, Simamora and Putra (2022) examined the effect of the use of e-payment and e-commerce services on MSME supply chain performance of 164 MSMEs in Indonesia and the results demonstrate that there exists a positive and significant influence of both e- payment and e-commerce service variables on the performance of MSME supply chains in Indonesia.

2.2 Customers' Satisfaction

Satisfaction of customers' refers to the customers' perception of the actual acquisition of products and services compared to expected evaluations (Liu, Huang, Ho, Huang, & Hsieh 2020). Customers' satisfaction is also the level of the fulfilment of customers' needs and desires that occurs when a customer purchases goods or services based on his expectations and feelings of use (Zhu, Wei, Zhou, & Jiang 2022). Based on the perceived usefulness (PU) of the Technology Acceptance Model (TAM) founded by Davis (2013), e-commerce is understood in terms of the degree to which an individual perceives this technology to enhance their satisfaction. To improve customer satisfaction, e-commerce must enhance customer interaction with the merchant at the online contact point like a website and depends on the match between customer expectations and experiences (Wijaya, Rai, & Hariguna, 2019).

In the context of e-service, some studies have reported a significant effect of e-commerce on customer satisfaction. For example, Mitchev and Nuangjamnong (2021) examined the impact

of e-commerce on customer satisfaction and customer loyalty among online shopping platforms in Thailand during the COVID-19

pandemic and found that e-commerce dimensions have a significant, positive impact on customer satisfaction and loyalty. In addition, Dhingra, Gupta and Bhatt (2020) analysed the impact of online service quality of e-commerce websites on customer satisfaction and purchase intention and reported that there is a positive significant effect of online service quality of e-commerce websites on customer satisfaction and purchase intention.

Furthermore, Pasaribu, Sari, Bulan and Astuty (2022) examined the effect of e-commerce service quality on customer satisfaction, trust and loyalty and found service quality in the e-commerce industry has a positive effect on customer satisfaction. Solimun and Fernandes (2018) examined the role of customer satisfaction as a mediator in the interaction between service quality, service orientation, and marketing mix strategy. The results demonstrated that factors such as service quality, service orientation, and the marketing mix approach used by the business cannot all directly influence customer loyalty without also affecting consumer satisfaction. In the study of Khatoon, Zhengliang and Hussain (2020), the mediating role of customer satisfaction was established for e-banking service quality and customer purchase intentions.

2.3 Theoretical Review

The Technology Acceptance Model (TAM), initially developed by Davis Jr (2002) (Davis, 2013), is a widely used framework to understand the adoption of information technology. It has evolved into a prominent model in the field of technology adoption, emphasizing perceived usefulness (PU) and perceived ease of use (PEU) as essential factors in determining technology adoption. The model highlights perceived value, which relates to how much individuals believe a technology enhances their ability to perform tasks, and perceived ease of operation, referring to how easily a person perceives a technology to be. These two factors influence a person's attitude towards using technology, which in turn affects their behavioral intention. Although TAM is a robust model, it doesn't consider the role of social influence in technology adoption. Mathieson *et al.* (2001) addressed this by introducing the concept of psychological attachment, which reflects users' dedication impacted by social influences.

This attachment is influenced by three social processes: conformity (adopting behavior to gain rewards or avoid punishments), association (accepting influence to maintain satisfying



relationships), and internalization (when influence aligns with personal values). To further expand the model, Mathieson *et al.* (2001) included the notion of perceived resources, which encompasses personal capabilities and institutional resources necessary for technology adoption. This addition recognizes the broader context of technology adoption and how personal skills and available resources influence the feasibility and desirability of adoption.

For example, farmers who possess advanced mobile skills find it easier to adopt new systems due to their familiarity with mobile technologies. Perceived resources also play a role; those with more resources encounter fewer obstacles when adopting new systems. This explains why some farmers might not use certain systems despite their benefits due to perceived resource limitations. Furthermore, the model underscores the impact of technological attributes, like cost, adaptability, and network capability, on the perceived ease of operation and perceived value. If a service is expensive to use, farmers are less likely to adopt it, regardless of its value. On the other hand, adaptable, user-friendly and versatile services are more likely to be adopted as they are perceived as valuable and easy to use, facilitating adoption.

III. METHODOLOGY

In this study, a quantitative survey is conducted and a questionnaire is employed to collect data from poultry farmers who have

Hierarchical Multiple Regression was run to determine the mediating effect of customer satisfaction in the relationship between e-commerce technology and agribusiness sustainability.

Table 1: Reliability Analysis, Mean and Standard Deviation (SD)

Variables	No of items	Cronbach's Alpha	Mean	SD
E-commerce technology	3	0.763	2.865	0.797
Customer satisfaction	4	0.727	2.996	0.584
Agribusiness sustainability	3	0.708	3.266	0.485

Table 1 showed the reliability analysis for 10 items used to measure e-commerce technology (independent variable), agribusiness sustainability as a dependent variable and customer satisfaction as a mediator factor was above the standard threshold of 70%. Specifically, the findings revealed that e-commerce technology has an Alpha

registered with the Agricultural Development programme of Lagos State and residents in Badagry, Ojo, Amuwo-Odofin and Ajeromi- Ifelodun rural areas to examine the mediating effect. A total of 154 farmers were purposefully selected to participate in the survey. Under random sampling, each member of the list had an equal opportunity of being chosen as a part of the sampling process. The research instruments were adopted from previous studies. The three items measuring e-commerce technology were developed in line with the study of Al-Zyoude (2018). Likewise, agribusiness sustainability was measured using three items adapted from Nurohman, Kusuma and Narulitasari (2021) and customer satisfaction was measured using five items from Laurent (2016). To test the strength and direction of the relationship between e-commerce technology, customer satisfaction and agribusiness sustainability, Hierarchical Multiple Regression with the aid of Statistical Package for the Social Sciences (SPSS) software 25 was used.

IV. RESULTS AND DISCUSSIONS

A total of 133 copies of the questionnaire were collected and analysed using the following steps. At first, descriptive statistics like mean, standard deviation, frequencies and percentage were presented. Next, the reliability analysis was run to check the reliability of the scales. In addition, Pearson product-moment correlation was used to check the relationship of variables.

value of 0.763. In addition, agribusiness sustainability was found to have an Alpha of 0.727 while, customer satisfaction has an Alpha value of 0.708. This result indicated that all 10 question items used to measure the study variable were reliable for the current study.



Table 2: Correlation Analysis

Variables	ECT	CS	ABS
E-commerce technology(ECT)	1		
Customer satisfaction (CS)	.511**	1	
Agribusiness sustainability(ABS)	.501**	.761**	1
Number of Cases	133	133	133

**Correlation is significant at the 0.01 level (2-tailed).

Table 2 revealed that the value of Pearson correlation ($r = .501^{**}$, $p < 0.01$), between e-commerce technology and agribusiness sustainability is positive and significant, the value of Pearson correlation ($r = .761^{**}$, $p < 0.01$), between customer satisfaction and agribusiness sustainability is also positive and significant. In addition, the multicollinearity test is used to determine whether the independent variables (e-commerce technology and customer satisfaction) in the multiple regression equation are not highly correlated with each other because if there is a high correlation between the independent variables, it will be difficult to know which independent variables partially influence the dependent

variable. In this regard, the findings in Table 2 indicated that the correlation between e-commerce technology and customer satisfaction is moderately correlated at 0.511.

4.1 Hypotheses Testing

Path analysis uses hierarchical multiple regressions to analyse the direct or indirect relationship between independent variables and dependent variables. The path analysis values indicated in the path coefficients value. Model 1 represented the first regression and Model 2 represented the second regression as shown in Table 3.

Table 3: Hierarchical Multiple Regression

		Unstandardized Coefficients			
Model		B	Std. Error	t	Sig.
1	(Constant)	2.392	.137	17.478	.000
	ECT	.305	.046	6.627	.000
	R ²	.251			
	Adjusted R ²	.245			
	R ² Change	.251			
2	(Constant)	1.298	.144	8.986	.000
	ECT	.092	.039	2.345	.021
	CS	.568	.054	10.560	.000
	R ²	.773			
	Adjusted R ²	.597			
	R ² Change	.346			
	F Change	96.241			
	Sig. F Change	.000			



Table 3 presented a hierarchical multiple regression analysis to investigate the two research hypotheses for this study. Model one demonstrates that the direct relationship between e-commerce technology and agribusiness sustainability, (the value of Beta=.305 with P-value

=.000) is significant and positive. As for model 2 which applied multiple regression analysis to find both e-commerce technology as an independent variable and customer satisfaction as a mediator variable with agribusiness sustainability as a dependent variable, a significant positive mediating effect was reported in the relationship between e-commerce technology and agribusiness sustainability when the mediating factor, customer satisfaction was included, with the value of Beta = .568 with P-value .000. In addition, when e-commerce technology was entered first in model 1, it explained .251 per cent of the variance. After the entry of customer satisfaction in model 2, the total

variance explained by the model as a whole is 0.773. The F change from model 1 to model 2 is significant at the 5 percent level

4.2 Effect of Mediation

The second research hypothesis stated that the relationship between e-commerce technology and agribusiness sustainability in Nigeria is not mediated by customer satisfaction. Figure 1. shows the results of a path analysis test that contains regression coefficient values and standard errors between variables. Sobel test was further used to ascertain whether or not there is an indirect significant influence of customer satisfaction as a mediation variable through its calculator in www.quantpsy.org. A Sobel test is a test to find out whether a relationship through a mediating variable is significantly capable of being a mediator in that relationship (Priono & Akos, 2022). The result is presented in Table 4.

Table 4: Sobel Test

Input:	Test statistic:	Std. Error:	p-value:
a .374	Sobel test: 5.71058712	0.03719968	0.00000001
b 0.568	Aroian test: 5.69247309	0.03731805	0.00000001
s _a 0.055	Goodman test: 5.72887518	0.03708093	0.00000001
s _b 0.054	Reset all	Calculate	

Source: Sobel Test Output

The result of the Sobel test presented in Table 4 indicated that is significant with a p-value of 0.000. A Sobel test revealed that customer satisfaction partially mediated the relationship between e-commerce technology and agribusiness sustainability with a Test statistic of 5.7105812 significant at 0.001. Therefore, the Sobel test also confirmed that the indirect effect between e-commerce technology and agribusiness sustainability is statistically significant (p-value ≤ 0.05). Hence, Hypothesis 2 is rejected.

V. DISCUSSION OF FINDINGS

The main objective of this study is to analyse the effect of e-commerce technology on agribusiness sustainability in Nigeria and to determine the mediating effect of customer satisfaction and its relationship with e-commerce technology and agribusiness sustainability in Nigeria. The results indicated that e-commerce technology has a significant effect on agribusiness sustainability in Nigeria. This result implies that

business transaction over the internet is important for farmers and agricultural companies to engage in practices that are in line with initiatives for business sustainability. E-commerce allows farmers to bypass intermediaries and sell directly to various customer groups that would have otherwise been out of reach. This result is in agreement with previous studies such as Purba *et al* (2021) and Sun *et al* (2021) who confirmed that e-commerce had a significant effect on agribusiness sustainability.

Also, findings revealed that the relationship between e-commerce technology and agribusiness sustainability in Nigeria is mediated by customer satisfaction. In other words, e-commerce is understood in terms of the degree to which an individual perceives this technology to enhance their satisfaction. In this regard, to improve customers' satisfaction, e-commerce must create a positive match between customer expectations and experiences (Wijaya *et al.*, 2019). Users of e-commerce websites often have high



expectations for the quality of service, and if those expectations are not met, an alternative product would be sought by the customer. In a country like Nigeria where there is a high rate of fraudulent activities over the Internet, many people would be skeptical about conducting business over the Internet. Attempting to find out what customers want and then trying to deliver the same may be seen as striving for customers' satisfaction or conducting effective e-commerce. The finding of this study is similar to the result of Mitchev and Nuangjamnong (2021) who found that e-commerce has a significant positive effect on customer satisfaction among online shopping platforms in Thailand. Similarly, Solimun and Fernandes(2018)examined the role of customer satisfaction as a mediator in the interaction between service quality, service orientation, and marketing mix strategy. The results demonstrated that factors such as service quality, service orientation, and the marketing mix approach used by the business cannot all directly influence customer loyalty without also affecting consumer satisfaction. In the study of Khatoon *et al* (2020), the mediating role of customer satisfaction was established for e-banking service quality and customer purchase intentions.

VI. CONCLUSION

Businesses today are increasingly aware of the need to ensure business sustainability. Through business sustainability, organizations develop a balanced and integrated approach to meeting their goals and objectives. In this regard, the use of technology in agriculture is inevitable as it increases productivity and ensures the economic sustainability of farm businesses. This study adopted hierarchical multiple regression analysis and the Sobel test to determine the mediating effect of customer satisfaction in the relationship between e-commerce technology and Agribusiness sustainability in Nigeria. The results indicated that all the null hypotheses were rejected. Specifically, the result of the second hypothesis revealed that customer satisfaction mediates the link between e-commerce technology and agric-business sustainability. In conclusion, the use of electronic commerce is consistent with preferred work practices of modern-day information technology that ensure customer satisfaction which in turn guarantees agric-business sustainability.

VII. RECOMMENDATIONS

Based on the findings and conclusion, the following recommendations are made. Agric businesses should provide adequate information like any additional charges on their e-commerce page to ensure customers are not dissatisfied with a sudden increase in the cost of purchase online that will affect business sustainability. In addition, farm business should have a system of listening, tracking and responding to consumers feedback. Lastly, Farm businesses should create a multichannel strategy to identify their clients' preferred e-commerce platforms, such as Facebook, Instagram, or WhatsApp, and make sure they are present there.

This study has been conducted in Lagos therefore, generalization of the results to other parts of Nigeria needs to be done with some caution. In addition, there are other factors like the computer literacy of farmers could influence their ability to adopt e-commerce technology. Therefore, future studies could consider the moderating role of computer literacy on the relationship between e-commerce technology and Agribusiness sustainability.

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