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EFFECTS OF ADOPTION INTENSITY ON THE EFFICIENCY OF DIGITAL MARKETING TECHNIQUES IN FOOD COMMODITY MARKETING IN IMO STATE, NIGERIA

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ABSTRACT

The study examined the Effects of adoption intensity on the Efficiency of digital marketing techniques in food commodity marketing in Imo State, Nigeria. The specific objectives were to describe the socioeconomic characteristics of the respondents, describe the various digital food marketing techniques in food commodity marketing, determine the adoption intensity of digital marketing techniques in food commodity marketing, analyze the factors influencing adoption intensity, in digital food marketing techniques, and determine the effect of adoption intensity, its features on the efficiency of digital food commodity marketing techniques in the study area. Primary data were collected from 150 respondents using a well-structured questionnaire and the data were analyzed using descriptive statistics, adoption index model, multinomial logistic regression model, and Ordinary Least Square multiple regression model. The descriptive statistics results showed the mean ages of the digital food marketers was 34 years, they were mostly female (61.33%), most of them had tertiary education (68.67%), mean household size of 4 persons, mostly married (56.00%), and a mean digital marketing experience of 6 years. The results of the various digital food marketing techniques of the respondents showed that Facebook (5.00±0.00), WhatsApp (5.00±0.00), Instagram (4.88±0.432), Tiktok (4.11±1.190), X handle (3.42±1.459), SMS (5.00±0.00), YouTube (3.03±1.211), and Affiliate market (3.02±1.712) were among the 8 digital food marketing techniques adopted by the digital marketers in the study area. The categorization of digital food marketers based on their adoption intensity reveals Late Adopters (22.00%), Late Majority (63.33%), Early Majority (13.33%), and Innovators (1.34%). The results of the factors influencing the adoption category of adopters of digital marketing for food commodity marketing showed a pseudo-R² of 63.2% and age ($P < 0.01$), level of education ($P < 0.05$), and access to information ($P < 0.1$) were the factors that significantly influenced adoption categories of digital marketing techniques in the study area.. The results of the effect of adoption intensity on the efficiency of digital marketing of food commodity marketing showed that 74.5% of the variation of the effect of adoption intensity features on the efficiency of digital food marketing techniques in the study area was accounted for by the explanatory variables in the model. Variables such as cost of use ($P < 0.01$), education level ($P < 0.01$), and trading experience ($P < 0.01$) were significant effects of adoption intensity features of the efficiency of digital marketing in the study area.

Keywords: Adoption Intensity, Digital Marketing, socio economic characteristics, Efficiency

INTRODUCTION

Agricultural marketing can be defined as a process that involves all the economic activities from the point at which agricultural commodities are being produced to the point of final consumers. Agricultural marketing according to Hassanzoy, (2013) covers the services involved in moving an agricultural product from the farm to the consumer. Agricultural marketing is defined as the performance of all business activities involved in the supply of farm inputs to the farmers and the movement of agricultural products from the farms to the ultimate consumers (Acharya and Agarwal, 2010). The marketing of food commodities ensures that consumers have access to nutritious and affordable food by facilitating the distribution of food products from

locations where they are produced in surplus to where they are in deficit; it ensures a consistent supply of essential food items to both urban and rural areas contributing to food security. It also ensures that farmers receive fair prices for their products by regulating supply and demand. Jari and Fraser (2009) noted that some activities involved in agricultural and food marketing like processing, retailing, storage, and transportation also provide employment opportunities. The traditional marketing of food commodities is faced with a lot of challenges; Awoyinka, (2009) stated that agricultural markets in the country are poorly developed and ill-organized and are inadequate in the face of growing demand for products due to population growth and changing dietary demand patterns, Ateke (2015)

stated that there is paucity of data and information which limit forecasting, planning, farm management and various marketing practices.

Iyagba and Anyanwu (2012) further complained that there are no organized ways of transmitting price information in Nigeria's agricultural markets; there is therefore no mechanism for coordinating production activities of the millions of farmers with the demand of millions of individual, corporate and institutional consumers.

Oguoma et al (2010) stated that farmers encounter high production costs in their efforts to boost production but hardly get fair pricing of their products from the numerous middlemen and the bulk farm gate buyers. The real profit goes to the middlemen who buy up the farm products at almost give away prices and sell at outrageous prices to the consumers.

The digitalization of food commodity marketing has the potentials of removing most of these bottlenecks to improve agricultural and food marketing. According to Mahaveer (2018), digital marketing refers to the use of online techniques and strategies to target customers. It is also known as Internet Marketing, Web Marketing, Digital Marketing, or Online Marketing. Digital marketing is the component of marketing that uses the Internet and online based digital technologies such as desktop computers, mobile phones and other digital media and platforms to promote products and services. Digital marketing helps in reaching a larger audience than would not be possible through traditional methods and target the prospects that are most likely to buy the product or service. Digital marketing not only includes marketing on the Internet but also through e-mail and wireless media. Digital marketing of agricultural products involves marketing agricultural products through online channels from agricultural producers to businesses or end consumers.

Studies have shown the potential of digital marketing techniques in food marketing. Bojkic *et al.* (2016) reported that the application of digital technologies in agricultural marketing improved selling, advertising, and gathering of information related to agriculture in Croatia. Hamdan (2021) found that digitalization helped local farmers in gaining brand awareness in Budapest, Hungary. He further reported that digital technologies (social media) helped in the interactions among stakeholders in agricultural marketing. He also found that digital technologies helped farmers in knowing the trending agricultural products.

However, the effect of digital marketing techniques on the efficiency of food commodity marketing is a relatively unexplored terrain. Marketing efficiency implies producing the maximum return for minimal cost, both in terms of budget and resources. Marketing efficiency focuses on reducing marketing costs without reducing output or results. The aim of overall

marketing efficiency is to provide goods to consumer in the required form, at the required time and place, and with the lowest possible marketing costs consistent with the interests of the producer (Otekunrin *et al.*, 2019).

This study seeks to;

1. describe the socioeconomic characteristics of the respondents in the study area;
2. describe the various digital food marketing techniques of respondents in the study area;
3. determine the respondents' adoption intensity of digital marketing techniques in food commodity marketing in the study area;
4. analyze the various factors influencing the adoption of digital marketing techniques in food commodity marketing in the area;
5. determine the effect of adoption intensity and its features on the efficiency of digital food commodity marketing techniques in the area.

Methodology

This study was conducted in Imo State, Nigeria. The State is made up of 27 local government areas. The state is divided into three agricultural zones namely Owerri, Orlu, and Okigwe. It is located geographically within latitudes 4°45'N and 7°15'N and longitudes 6°50'E and 7°25'E with an area of around 5100sqKm (Nwaobiala, 2018). The State shares a border with Anambra State to the north, Abia State to the east, Rivers State to the south and River Niger and Delta State to the west. The population of Imo State stood at about 5,408,300 in 2016 and is estimated to grow at a rate of 3.8% per annum. Food commodity marketing in the area is carried out in open markets mostly found in rural areas. Sometimes, aggregators buy from farmers directly on their farms and send them to urban and bigger markets.

The emerging digital marketing of Nigeria and Imo State in particular has not fully developed a properly organized structure. The structural outlook of digital marketing in Nigeria is yet to include food commodity marketing but an important feature it has is that it is gaining a wide interest among the traders across the three zones of the state who adopted various devices and platforms to make their food product relevant and increase consumers' preferences and customers interest for their products.

Since the market does not have a well-defined and suitable arrangement, the study adopted a snowball sampling technique. The use of this technique was to enable the researcher to reach as many traders as possible who have identified with the different devices and platforms in food commodity marketing in the area. The study required repeated visits and referrals to the different respondents identified using the snowball sampling method. As soon as one (1) food commodity marketer using a digital marketing technique is located in an area, others within the same area who were referred

by the respondents were also visited to get more respondents into the study until the sample size of 150 respondents was achieved.

Data for the study were obtained mainly from primary and secondary sources. The primary data collection was done with the aid of a structured questionnaire. The instrument was divided into sections to correspond to the objectives of the study. Secondary data such as data from textbooks, journals, internet materials, etc. was also sourced from the University Library and the internet.

The socioeconomic characteristics of the respondents in the study area were analyzed using descriptive statistics such as frequency tables, mode, means, and percentages. The Various digital food marketing techniques of the respondents was analyzed using mean and standard deviation estimated from the stages of adoption of digital marketing techniques in food commodity marketing by the traders in the area. A 7-point Likert scale used by Ehirim (2014) was adopted and used to measure the adoption stages of the respondents. The responses were rated into NA = Not Aware (0), A = Aware (1), I = Interested (2), E = Evaluated (3), T = Tested (4), Ad = Adopted (5) and D = Discontinue (6). A standard mid value of the adoption process (SMAd) is expressed as the average of the total sum of ordinal value (X) attached to the adoption process of an *i*th respondent and it is expressed as;

$$\text{SMAd} = \frac{\sum X}{7} = \frac{0+1+2+3+4+5+6}{7} = 3.0$$

Eqn 1

The study identified 11-point compendiums of digital food marketing techniques (DFMT), denoted as V_i as shown in a set notation in equation 3.2 below.

EST

$$= \{V_i; i, 1 \dots 11\}$$

Where; V_1 = Facebook; V_2 = WhatsApp; V_3 = Instagram; V_4 = Youtube; V_5 = Email; V_6 = Search Engine Optimization; V_7 = Websites; V_8 = Pay-per-click (PPC); V_9 = SMS; V_{10} = Tiktok; V_{11} = Affiliate marketing

The mean score of the *j*th technique was estimated and used in identifying the digital techniques adopted by the respondents in food commodity marketing in the area by comparing it with the standard mid-adoption score of 3.0. Hence, where the mean adoption score is just equal to or greater than the mid value of 3.0, techniques were adopted and if the mean adoption score is less than 3.0 the technique is not adopted

The adoption intensity of the respondents, hence their categories of adoption of digital food marketing techniques were achieved using the adoption intensity

model as used by Ehirim, (2014) and adopted for this study. The model is remodelled as:

AI

$$= \frac{\text{Adoption intensity response score}}{\text{numbers of digital marketing techniques}}$$

A compendium of digital food marketing techniques adopted by the traders varies across time and space and the variation is captured in adoption scores between cross products of 0 X 11 and 6 X 11 which was used to determine the adoption intensity. The scores obtained were divided by the number of digital marketing techniques to give an adoption intensity score. The adoption intensity (AI) score was used to categorize the marketers into innovators, early majority, late majority, late adopters, and laggards. Adoption Intensity score between 0.50 – 1.99 was categorized as laggards, between 2.0 – 2.99 was categorized as late adopters, between 3.0 – 3.99 as late majority, between 4.0 – 4.99 as early majority, and between 5.0 and above as innovators.

To analyze the various factors influencing the adoption categories of adopters of digital marketing techniques in food commodity marketing in the area was achieved using the categorization of marketers to different categories of adopters based on specification and estimation of the multinomial logit model. The model used by Ehirim, 2014) predicted the utility derivable by an *i*th adopter falling in a choice based on his level of adoption intensity was adopted for this study and is expressed as:

$$U_{ij} = \gamma_j N_{ij} + \varepsilon_{ij} \text{ --- (3.4)}$$

U_{ij} = Utility derived by the adopter derives in being in the *j*th category due to his adoption intensity

N_{ij} = The set of determinants that is constant across alternative categories

N_1 = Age of the traders in years

N_2 = years of traders experience in years

N_3 = household size (nominal value)

N_4 = level of formal education of the traders in years

N_5 = Access to the Internet (nominal values)

N_6 = Technology compatibility index based on the number of years of training

N_7 = cost of using the device or platform or technology

N_8 = Amount of Operating Capital (₦)

N_9 = Number of information sources available to traders

N_{10} = Food Commodity Marketing as a major source of Income (nominal Value)

ε_{ij} = The random

This model is built on '*j*' possible categories, as '*j*' = 1,2,3..., *J* – that are exclusive and exhaustive. In this analysis, the five (5) categories considered are: (1).

None adopters or Laggards, (2). Late Adopters, (3). Late Majority, (4). Early Majority, and (5). Innovators.

To determine the effect of adoption intensity and its features on the efficiency of digital marketing of food commodity marketing in the area was achieved using the ordinary least squares (OLS) regression analysis. Digital food marketing efficiency was estimated first value fitted as the dependent variable to estimate the effect of adoption intensity and its features on the efficiency of digital marketing of food commodity marketing. The model is specified as;

$$\frac{\text{Digital food Marketing Efficiency}}{\text{value added from using digital marketing technique}} = \frac{\text{cost of the digital marketing technique}}{\text{cost of the digital marketing technique}} - (3.7)$$

Value added from using digital marketing was proxied into the numbers of completed transactions and the total amount realized from the completed transactions.

$$DFME = f(X_1, X_2, X_3, X_4, X_5, X_6, \dots) \quad (3.8)$$

Where;

DFME = Digital Food Marketing Efficiency

X1 = Adoption intensity index of the traders

X2 = Cost of the digital technology (in naira)

X3 = Level of formal education (in years)

X4 = Level of experience in digital marketing (in years)

X5 = Number of training had in digital food commodity marketing

RESULTS AND DISCUSSION

Table 1 shows that 28.67% of the respondents fall within the age limit of 20 – 29 years of age, 48.00% of the respondents fall within the age limit of 30 – 39 years of age, 21.33% of the respondents fall within the age limit of 40 – 49 years of age and 2.00% of the respondents fall within the age limit of 50 – 59 years. The results also show that the respondents' mean age was 34 years. This implies that the respondents are young, youthful and energetic.. This agrees with the findings of Tarazona Montoya et al (2024) that younger people are more inclined to shop and market online compared to older adults, who tend to prefer physical stores.

The results indicate that 38.67% of the respondents were males, while 61.33% were females. This suggests that female digital marketers are predominant in the study area, highlighting a significant presence of women in the digital marketing workforce.

Table 1 also indicated that none of the respondents had only a primary education, highlighting the value they place on higher education which could be because of the presence of several tertiary institutions in the State. Specifically, 22.00% of the respondents completed secondary education, 9.33% were undergraduates, and 68.67% were graduates. The majority of respondents in digital marketing were graduate. This implies that graduate respondents are more into the use of digital

food marketing techniques. Marketers with a graduate degree often have a deeper understanding of complex marketing concepts, data analytics, and consumer behaviour theories (Okorie *et al.*, 2024).

The results regarding household size indicate that 49.33% of digital marketers belong to small households with one to three members. This aligns with the fact that most of the digital marketers are young with young families. 32.67% of digital marketers come from larger households of four to six members and 18.00% have households with seven to nine members. The data also reveals an average household size of 4 members per household.

The results indicated that most digital marketers have between one to five years of experience in the field. The average digital marketing experience among the marketers in the study was 6 years, suggesting that digital marketing in the area is still developing. With six years of experience, these marketers are better equipped with the necessary knowledge and effective strategies to increase their volume of marketed food and customer reach. Experience is a crucial factor that helps digital marketers manage risks effectively.

Various Digital Marketing Techniques Adopted by Food Commodity Traders.

The result in Table 2 shows that out of the 11 digital marketing techniques selected only 9 could be said to be adopted by digital food marketers in the state. It could be seen from the result that most digital marketers took speedy action on the majority of the digital marketing techniques. Among the techniques adopted were Facebook (5.00±0.00), WhatsApp (5.00±0.00), Instagram (4.88±0.432), Tikok (4.11±1.190), X handle (3.42±1.459), Short Message Service (SMS) (5.00±0.00), YouTube (3.03±1.211), and Affiliate market (3.02±1.712).

The results also showed that Facebook, WhatsApp, Short Message Service (SMS), Instagram, and TikTok had a high proportion of mean values of adoption of digital marketing techniques. This result agrees with the study of Nwoye *et al* (2021) that Search Engine Optimization (SEO), and Pay Per Click (PPC) had a low level of adoption amongst marketers because these tools were noted as unavailable digital marketing tools in the study area. The finding agrees with the finding of Yogesh *et al* (2021) who indicated that so many companies and individuals make use of numerous social media platforms such as Facebook, Instagram, and X-Handle for social media/online marketing.

Adoption Intensity and Categorization of Digital Food Marketing Techniques

The results of adoption intensity and categorization of digital food marketing techniques of the respondents are presented in Table 3

The result shows that out of the 8 digital food marketing techniques adopted by the respondents in the State,

Facebook had an adoption intensity of (5.00), WhatsApp (5.00), Instagram (5.31), TikTok (5.30), X-Handle (4.88), Short Message Service (SMS) (5.00), YouTube (4.24), and Affiliate market (4.73). The findings indicate a significant level of engagement with social media platforms, suggesting that visual and interactive content is preferred in digital marketing strategies within the food sector. These results are consistent with trends noted in current literature about the effectiveness of social media in agricultural marketing. Recent research by Richard et al. (2023) highlighted that platforms like Facebook and WhatsApp are essential for farmers and marketers, as they enhance market access and customers engagement. This allows for more direct interactions with consumers, potentially leading to improved marketing outcomes. Additionally, Geng et al. (2024) reported that digital technologies can boost growers' economic benefits by reducing labour and input costs, increasing yields, and improving quality. Specifically, they found that there is a 30.4% increase in economic benefits for each unit increase in the intensity of digital technology adoption.

The results indicated that all respondents used Facebook (100%), WhatsApp (100%), and SMS (100%). Additionally, 90.67% used Instagram, 61.33% engaged in affiliate marketing, 59.33% utilized YouTube, 56% were active on TikTok, and 36% had accounts on X-Handle. This demonstrates that respondents are well-acquainted with various digital food marketing techniques to enhance their marketing potential. This aligns with the findings of Adeola et al. (2023) and Ismail et al. (2023), which state that Facebook and WhatsApp have become essential tools for farmers looking to connect directly with consumers and effectively market their products. Moreover, using Instagram and TikTok in agricultural marketing is particularly successful in reaching younger audiences, who are increasingly influenced by social media in their purchasing decisions.

The categorization of digital food marketers based on their adoption intensity reveals Late Adopters (22.00%), Late Majority (63.33%), Early Majority (13.33%), and Innovators (1.34%). These results indicate that a significant percentage of respondents belong to the Late Majority category when it comes to adopting digital food marketing techniques in the study area. This finding aligns with the research conducted by Okwu et al. (2022), which also identified a predominant Late Majority among agricultural producers and marketers across various regions. This reflects farmers'/marketers' tendency to observe and evaluate the experiences of their peers before fully committing to new marketing strategies.

Factors Influencing the Adoption Categories of Digital Marketing Techniques in Food Commodity Marketing

The results of the factors influencing the adoption category of adopters of digital marketing for food commodity marketing is presented in Table 4

The Multinomial logit regression model was used because it exhibits a superior ability to predict discrete choices. The Chi-square value of 132.057, which was significant at 1%, is an indication that the model is well-fitted. Adoption levels were captured as techniques employed among digital food marketers in digital marketing. These were categorized into four: (a) innovation levels, (b) early majority levels, (c) late majority levels, and (d) late adoption levels. Results in Table 9 showed that age ($P < 0.01$), level of education ($P < 0.05$), and access to information ($P < 0.1$) were the factors that significantly influenced adoption categories of digital marketing techniques in the study area.

The age of digital marketers had a positive and significant influence on the adoption of digital marketing techniques implying that a year increase in the age of the respondents will increase the likelihood of the digital marketers getting involved in digital food marketing in the levels of innovation. But in all the other categories of adoption levels, age does not have any significant influence.

Level of education had a negative influence at the innovation levels and a positive influence at the early majority on the adoption of digital marketing techniques among digital food marketers indicating that a yearly increase in the education level of marketers increased the likelihood of the marketers to adopt digital marketing techniques. Thus, in line with a priori expectations, the positive influence of levels of education on the adoption of digital marketing techniques implies that marketers with higher levels of education are more likely to adopt digital food marketing techniques. A probable reason is that educated marketers, because of their exposure, are likely to be more aware of the trends and globalization of digital marketing more than the physical shops.

Access to internet shows a positive and significant influence on adoption of digital marketing. This implies that an increase in the access to internet increases the adoption of digital marketing techniques. According to Nwoye *et al* (2021), access to unlimited internet across a geographical location is a benefit to adoption to digital food marketing techniques.

Effect of Adoption Intensity and its Features on the Efficiency of Digital Marketing of Food Commodity Marketing

The results of the effect of adoption intensity on the efficiency of digital marketing of food commodity marketing are presented in Table 5

The results of the ordinary least squares multiple regression analysis on the effect of adoption intensity features on the digital marketing techniques showed that the linear functional form was chosen as the lead

equation with the coefficient of multiple determination of 0.745 and an f-statistics of 84.134 model which was significant at 1%, is an indication that the model is well fitted. This implies that 74.5% of the variation of the efficiency of digital food marketing techniques in the study area was accounted for by the explanatory variables in the model. Variables such as cost of use ($P < 0.01$), education level ($P < 0.01$), and trading experience ($P < 0.01$) were significant effects of adoption intensity features of the efficiency of digital marketing in the study area.

The coefficient of cost of use was significant at one per cent and had positive effects on the adoption intensity features in the efficiency of digital food marketing techniques. This implies that a decrease in the cost of digital marketing techniques leads to an increase in the efficiency of digital food marketing techniques in the study area. Hossain *et al.* (2021) note that reducing costs can facilitate better resource allocation and strategic decision-making, further enhancing marketing practices' efficiency.

The coefficient of levels of education was significant at one per cent and had positive effects on the efficiency of digital food marketing techniques. This implies that a yearly increase in education level positively increases the efficiency of digital food marketing in the study area. A probable reason is that education is an important investment in the efficiency of the globalization of digital marketing. This is in line with Hossain *et al.* (2021) who emphasized that education improves individual competencies and fosters innovation within agricultural communities. Educated individuals are more likely to embrace new technologies and marketing strategies that can lead to significant efficiency gains.

The coefficient of trading experience was significant at one per cent and had a negative effect on the efficiency of digital food marketing techniques. This implies that a decrease in the trading experience leads to a decrease in the efficiency of digital food marketing in the study area. Consistently negative trading experiences can lead to a loss of consumer trust and marketing margin which can adversely affect the efficiency of digital food marketing techniques. This is in line with the findings of Nwafor *et al.* (2021) that lower trading experience can negatively affect profit margins. As farmers become less familiar with consumer needs and preferences, they may also miss opportunities to optimize pricing and promotional strategies, ultimately contributing to decreased marketing efficiency.

CONCLUSION

The study revealed that the majority of digital food marketers in the area are young, youthful and energetic. They are predominantly female, majority of respondents in digital marketing were graduates which gave them a deeper understanding of complex marketing concepts.

The findings also revealed that household size provides additional support for their marketing activities, and that marriage also helps the married digital marketers to focus on products that meet the needs and preferences of families hence enabling them to contribute to the well-being of their families. The finding further revealed that marketers are better equipped with the necessary knowledge and effective strategies to increase the volume of their marketed food, and customer reach, and help manage risks effectively.

Furthermore, the finding also revealed that a high proportion of digital marketers adopted 100% of Facebook, WhatsApp, and SMS as a digital marketing technique. In addition, the findings showed that high categories of digital marketing techniques showed Late Majority adoption levels and only a small proportion showed the early majority, late adopters and Innovators. More to note, it was found that the younger the marketers the more the likelihood of getting involved in digital food marketing, higher levels of education are more likely to adopt digital food marketing techniques, and increased internet access increases the adoption of digital marketing techniques.

Lastly, findings revealed that a decrease in the cost of digital marketing techniques leads to an increase in the efficiency of digital food marketing techniques, education level positively increases the efficiency of digital food marketing, and a decrease in the trading experience leads to a decline in the efficiency of digital food marketing in the study area.

RECOMMENDATION

Education should be encouraged amongst food commodity traders as it increases their likelihood of getting involved in digital marketing and also positively increase the efficiency of digital food marketing.

Digital traders should try as much as possible to be cost effective in the use of digital marketing techniques as decrease in the cost of use of these digital techniques leads to an increase in the efficiency.

Governments and Non-Governmental Organizations are encouraged to build synergy on youth development through skill acquisitions to integrate more young people into digital marketing and also provide internet access which increases the likelihood of adopting digital marketing.

REFERENCES

- Acharya, S.S. and Agarwal, N.L. (2010). *Agricultural Marketing in India* (4th edition). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Adeola, A. M., Oredipe, A. M., and Jones, K. (2023). Impact of Social Media on Agricultural Marketing: Insights from Smallholder Farmers. *Agricultural Marketing Journal*, 14(2), 73-85.

- Ateke, B. W. (2015). Challenges of agricultural production and marketing of agricultural produce in Oyibgo local government area of Rivers State. *West African Journal of Business and Management Sciences*, 4(1), 43 – 53.
- Awoyinka, Y. A. (2009). Cassava marketing: Option for sustainable agricultural development in Nigeria, *Ozean Journal of Applied Science*, 2(2), 175-183.
- Ehirim, N.C. (2014) Economics of Adoption of environmental Sustainable Fishing Techniques in Coastal Mangrove Niger Delta, Nigeria.
- Geng, W.; Liu, L.; Zhao, J.; Kang, X.; and Wang, W. (2024). Digital Technologies Adoption and Economic Benefits in Agriculture: A Mixed Methods Approach. *Sustainability*, 16, 4431, 1-24.
- Hassanzoy, N. (2013). Agricultural Marketing for a Small Agribusiness. A Training Manual, Pp 1-14.
- Hossain, M., Kosaka, A., and Rahman, M. (2021). Awareness and Efficiency in Digital Marketing among Farmers: An Insight into Cost Management. *International Journal of Agricultural Management*, 10(2), 120-130.
- Ismail, S. A., Khamis, A., and Abubakar, I. (2023). Leveraging Social Media for Agricultural Marketing: A Case Study on Instagram and TikTok. *Journal of Food Products Marketing*, 29(1), 45-60.
- Jari, B. & Fraser, C.G. (2009). An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, 4(1), 1129 – 1137.
- Mahaveer, S. (2018) E-Marketing of Agricultural Products. *International Journal of Trend in Scientific Research and Development (IJTSRD) Kle Society's Basavaprabhu Kore Arts, Science and Commerce College, Chikodi*.
- Nwafor, C. A., Okoronkwo, C., and Uzochukwu, E. (2021). Profit Margins and Trading Experience in Digital Food Marketing: An Analysis. *Journal of Agricultural Economics*, 72(2), 341-356.
- Nwafor, C.U., Ogundeji, A.A. and Westhuizen, Carlu van der (2020). Adoption of ICT-Based Information Sources and Market Participation among Smallholder Livestock Farmers in South Africa. *Agriculture* 2020, 10, 44; doi:10.3390/agriculture10020044.
- Nwaobiala C.U. (2018) Farmers Adoption of Cassava Agronomic Practices and Intercrop Technologies in Abia and Imo States, Nigeria. *Journal of Agricultural Extension*, 22(2), 82–96. Retrieved from <https://www.aesonnigeria.org/ajm/index.php/jae/article/view/1398>
- Nwoye, I.I., Onubogu, O.H., and Uzochukwu, I.E. (2021). Availability and Utilization of Digital Marketing Tools among Fresh African Catfish Marketers in Omambala Region of Anambra State, Nigeria, *Journal of Agricultural Extension* Vol. 26 (2), 61 – 69.
- Oguoma, O.N., Nkwocha V. I., Ibeawuchi I.I. (2010). implications of middlemen in the supply chain of agricultural products. *Journal of Agriculture and Social Research (JASR)* 10(2), 77-83.
- Okorie, G.N., Udeh, C.A., Adaga, E.M., Dara-Ojimba, O.D., and Oriekhoe, O.I. (2024). Digital Marketing in the Age of IoT: A Review of Trends and Impacts. *International Journal of Management and Entrepreneurship Research*, Volume 6(1), 104 – 131.
- Okwu, A. T., Olaniyi, O. S., and Taiwo, A. A. (2022). Examining the Adoption of Digital Marketing Tools Among Farmers in Nigeria: Insights and Implications. *Journal of Rural Studies*, 87, 324-332.
- Otekunrin, O.A., Momoh, S., and Ayinde, I.D. (2019). Smallholder Farmers' Market Participation: Concepts and Methodological Approach from Sub-Saharan Africa.\
- Richard, J., Mburu, J., and Amimo, E. (2023). The Role of Social Media in Enhancing Agricultural Marketing: Insights and Trends. *Journal of Agricultural Marketing*, 15(1), 45-61.
- Tarazona-Montoya, R., Deveci, C., Llopis-Albert, C., and García-Agreda, S. (2024). Effectiveness of digital marketing and its value in new ventures. *International Entrepreneurship and Management Journal* (2024) 20:2839–28

Tables

Table 1: Socio economic characteristics

Variables	frequency	percentage
Age limit		
20 – 29	43	28.67
30 – 39	72	48.00
40 – 49	32	21.33
50 – 59	3	2.00
Gender		

Male	58	38.67
Female	92	61.33
Levels of Education		
Primary	0	0.00
Secondary	33	22.00
Undergraduate	14	9.33
Graduate	103	68.67
Household Size		
1 – 3	74	49.33
4 – 6	49	32.00
7 – 9	27	18.00
Marital Status		
Single	48	32.00
Married	84	56.00
Widowed/Widower	18	12.00
Digital Marketing Experience		
1 – 5	93	62.00
6 – 10	34	22.67
11 – 15	21	14.00
16 – 20	2	1.33

Source: Field Survey Data Analysis, 2024

Table 2: Distribution according to various digital food marketing techniques

Digital Food Marketing Techniques	Mean (μ)	Standard Deviation	Remark
Facebook	5.00	0.00	Adopted
WhatsApp	5.00	0.00	Adopted
Instagram	4.88	0.432	Adopted
Tiktok	4.11	1.190	Adopted
Search Engine Optimization	0.56	0.930	Not Adopted
X handle (Twitter)	3.42	1.453	Adopted
Pay Per Click	0.54	0.832	Not Adopted
SMS	5.00	0.783	Adopted
YouTube	3.03	1.211	Adopted
E-mail	1.95	0.780	Not Adopted
Affiliate Market	3.02	1.712	Adopted

Source: Field Survey Data Analysis, 2024. Mean (μ) > 3.0 Adopted, mean (μ) < 3.0 Not Adopted

Table 3: Distribution according to adoption intensity and categorization of digital food marketing techniques

Digital Food Marketing Techniques	Number of Respondents that Adopted the Digital Food Marketing Techniques	Per cent Adoption	Adoption Intensity
Facebook	150	100.00	5.00
WhatsApp	150	100.00	5.00
Instagram	136	90.67	5.31
TikTok	84	56.00	5.30

Search Engine Optimization	0	0.00	1.49
X handle (Twitter)	54	36.00	4.88
Pay Per Click	0	0.00	1.37
SMS	150	100.00	5.00
YouTube	89	59.33	4.24
E-mail	0	0.00	2.73
Affiliate Market	92	61.33	4.73

CATEGORIZATION OF RESPONDENTS ACCORDING TO THEIR ADOPTION INTENSITY

Respondents Levels of Adoption Intensity	Frequency	Per cent	Cumulative per cent
Laggards	0	0.00	0.00
Late Adopter	33	22.00	22.00
Late Majority	95	63.33	85.33
Early Majority	20	13.33	98.66
Innovators	2	1.34	100.00
Total	150		

Source: Field Survey Data Analysis, 2024 *** = Multiple Responses AI (0.50 – 1.99) = Laggard, AI (2.00 – 2.99)

Table 4: Factors Influencing the Adoption Categories of Digital Marketing Techniques in Food Commodity Marketing

Factors	Innovation		Early Majority		Late Majority		Late Adopter	
	Marginal influence	Z	Marginal influence	Z	Marginal influence	Z	Marginal influence	Z
Age	0.946	2.964***	-0.315	-0.672	-0.114	-0.644	-0.050	-0.367
Experience	-2.357	-0.004	-0.763	-1.042	0.062	0.346	0.143	0.198
Household size	3.732	0.006	2.749	0.878	0.592	1.833*	-0.013	-0.78
Education	-5.242	-2.367**	11.700	2.049**	0.005	0.007	0.017	0.287
Access to Information	0.001	1.984*	0.001	1.561*	0.001	0.013	0.04	0.175
TCI	-0.179	0.095	0.008	0.095	-0.071	-1.268	0.902	0.279
Cost of device	-0.001	-0.19	0.059	0.765	0.001	0.001	0.34	0.277
AOC	0.001	0.016	0.001	0.403	0.001	0.010	0.001	0.021
NOI	6.328	0.063	22.544	0.063	1.041	1.099	0.833	0.343

Source: Field Survey Data Analysis, 2024. *Significant at 10% ($p < 0.1$); **Significant at 5% ($p < 0.05$); *** Significant at 1% ($p < 0.01$), LR $\text{CHI}^2 = 67.83$ Pseudo $R^2 = 0.632$, Log likelihood = -132.057, TCI = Technology Compatibility Index, AOC = Amount of Operation Capital, NOI = Number of Information source

Table 5: Effect of Adoption Intensity and its features on the efficiency of digital marketing techniques

Explanatory Variable	+Linear Function	Exponential Function	Double-Log Function	Semi-Log Function
Constant	2.350 (15.334)	0.939 (23.425)	-1.090 (-5.781)	-5.436 (-7.348)
Adoption intensity	0.006 (0.866)	0.002 (0.903)	0.020 (1.317)	0.073 (1.260)
Cost of use	8.828E-005 (12.706) ***	2.250E-005 (12.374) ***	0.246 (12.056) ***	0.946 (11.812) ***
Education	0.167 (4.963) ***	0.046 (5.252) ***	0.130 (5.022) ***	0.477 (4.707) ***
Trading experience	-0.023 (-3.145) ***	-0.006 (-3.198) ***	-0.032 (-3.110) ***	-0.124 (-3.066) ***
Number of training	0.010 (0.255)	0.004 (0.387)	0.002 (0.233)	0.004 (0.110)
Functional Parameters				
R²	0.745	0.742	0.747	0.737
Adj R²	0.736	0.733	0.739	0.728
F-Statistics	84.134	82.707	85.177	80.719

Source: Field Survey Data Analysis, 2024. + = Lead equation *** = significant at 1%, ** = significant at 5%,
 * = significant at 1%