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Evaluation of Artificial Intelligence and Efficacy of E-commerce adoption in Nigeria

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Abstract

The study focuses on Evaluation of Artificial Intelligence and Efficacy of E-commerce adoption in Nigeria. Artificial Intelligence (AI) has become increasingly popular globally as a crucial tool for electronic marketing and commerce, but in Nigeria, the adoption and use of AI tools by marketers is still in its early stages. Attention has been primarily focused on the basic 5 popular e-commerce companies in Nigeria, with little attention given to small-scale online business practitioners in Nigeria. This study seeks to examine the impact of AI on electronic marketing and commerce adoption in Nigeria by employing a survey research design. The population of this study comprises 178 e-commerce firms operating in Lagos and Rivers State, with a sample size of 124 firms selected using purposive sampling technique. Data was collected through a well-structured questionnaire, and the reliability of the research instrument was confirmed with a Cronbach Alpha test result of an average of 70%. Descriptive analysis and regression analysis were used to analyse the data, and the results indicated that Ease of use, data mining, machine learning, and consistent messages across channels exhibited a significant positive relationship with e-commerce adoption rate in Nigeria. The study concluded that the use of AI will enable digital marketers to predict future trends and make more informed decisions that focus on improving online marketing offerings and encourage more people to participate in online marketing. The study recommended constant training of consumers and marketing personnel on the use of the online marketing interface, data mining techniques to improve e-commerce, investment in machine learning tools by e-marketing firms in Nigeria, and increased use of ease-of-use interface that will entice the consumers to purchase online and also break their normative belief that once anyone makes available their card information online, that he/she will be defrauded.

Introduction

The internet has emerged as a useful instrument in the marketing platform whether through internal or externally created transactions ever since it underwent a technological transformation in the twenty-first century (Adeyinka, 2024). This can be seen with the improvements in worldwide interconnection and better information systems. Online shopping has become commonplace among consumers who want to buy any goods or services. This is in line with the rate of internet usage and technological development.

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Electronic commerce (e-commerce) refers to both financial and informational internet-based transactions among an institution and any related parties it deals with (Ajayi & Aigbavboa, 2020). It is frequently broken down into a sell-side e-commerce standpoint, which relates to transactions with selling products to a firm's customers, and a buy-side e-commerce viewpoint, which relates to industry transactions to acquire resources required by an organization (Chaffey & Ellis-Chadwick, 2016). AI-enabled e-commerce solutions have the potential to revolutionize the e-commerce landscape in Nigeria by enabling personalized consumer experiences, optimizing pricing models, and driving targeted marketing strategies. By leveraging AI technologies such as machine learning, natural language processing, and computer vision, e-commerce businesses can gain valuable insights into consumer behavior patterns and preferences, thereby improving customer retention and increasing sales (Kalu & Ogungbangbe, 2024). Artificial intelligence, using historical data, can forecast the occurrence of machine failure and can notify the user of past acts. In addition, data absorption is a crucial aspect of AI since it involves the collection of enormous volumes of data based on specific requirements (Feng et al., 2018; Lim et al., 2023).

The digital economy is rapidly transforming the way businesses operate and consumers behave in Nigeria. E-commerce has emerged as a significant driver of economic growth and development, with the potential to create new opportunities for businesses and consumers. However, the e-commerce landscape in Nigeria is still evolving, and businesses face several challenges in reaching and engaging with consumers effectively. In this context, artificial intelligence (AI) has emerged as a powerful tool for enhancing e-commerce operations and consumer engagement. Personalization has become a key driver of customer engagement and loyalty in e-commerce. With the help of AI, e-commerce businesses can now offer personalized product recommendations, tailored marketing strategies, and optimized pricing models to their customers. In this section, we discuss the use of AI for personalization in e-commerce and its impact on consumer behavior (Kalu & Ogungbangbe, 2024).

AI-powered product recommendations are based on the analysis of customer data, such as browsing history, purchase history, and search queries. By using machine learning algorithms, e-commerce businesses can identify patterns in customer behavior and suggest products that are most likely to be of interest to the customer. For example, (Linden et al., 2003) Amazon uses an item-to-item collaborative filtering algorithm to recommend products based on the customer's previous purchases and the purchases of other customers who have bought similar items. AI can also be used to optimize pricing models in e-commerce. By analyzing customer data, e-commerce businesses can identify the price points that are most likely to result in a sale. For example, a fashion e-commerce platform can use AI to analyze customer data and identify the price points that are most likely to result in a sale for different categories of products. The platform can then adjust its pricing strategy accordingly to maximize sales and revenue. Understanding consumer behavior is crucial for e-commerce businesses to improve customer engagement, retention, and sales. AI technologies such as machine learning and natural language processing can be used to analyze consumer behavior patterns and gain valuable insights into customer preferences, needs, and expectations. Studies have been abundant on AI efficacy in other fields of endeavour but there is a paucity of empirical studies in the field of marketing and e-commerce in Nigeria hence this study is poised to bridge this gap. The overall objective of this study is to evaluate AI and Efficacy of e-commerce adoption in Nigeria. Specifically, the study set out to achieve the following sub-objectives: to evaluate the effect of data mining, machine learning, and Perceived Ease of Use on the efficacy of e-commerce adoption in Nigeria.

Literature Review and Hypotheses Development

Conceptual Review

Artificial Intelligence

Artificial intelligence (AI) refers to a computerized machine that replicates the cognitive and emotional abilities of the human mind. AI-enabled systems are specifically engineered to perceive and respond to their surroundings (Russell & Norvig, 2020). They possess a comprehensive understanding of the surroundings and respond accordingly, while also retaining knowledge about potential scenarios that may arise shortly. Artificial Intelligence is the replication of human intelligence in machines that are programmed to reason and imitate human behaviors. AI refers to a range of technologies and methods that allow computers and systems to carry out tasks that usually require human intelligence, including learning, reasoning, problem-solving, interpreting natural language, and recognizing patterns.

John McCarthy, a prominent computer scientist, introduced the term "Artificial Intelligence" in 1955-56 during the Dartmouth College Artificial Intelligence Conference. The purpose of this conference was to demonstrate how machines could be developed to imitate the problem-solving abilities of humans, as exemplified by the Logic Theorist program initiated by Allen Newell, Cliff Shaw, and Herbert Simon (Keni, 2020). McCarthy defined AI as the science and engineering of creating intelligent machines (Akinadewo, 2021). AI is the use of computer systems to perform tasks that are typically carried out by human intelligence, and it is currently a hot topic. Over sixty years ago, the first AI-based project was an attempt to create software that could translate between Russian and English, as noted (Hwang & Chang, 2021; Ivy et al., 2020).

Cognitive Technology or Cognitive Computing are alternative term for Artificial Intelligence, has a broad range of applications that are not all relevant to accounting, according to Kokina and Davenport (2017). Although the technical aspects of AI are not typically part of traditional business disciplines, its significant impact has made it a topic of interest in business education and practices. AI technology is utilized across various business functions, such as production, distribution, procurement, sales and marketing, accounting and finance, audit, research and development, and human resource management (Wilson, Keni & Tan, 2021).

As a fundamental aspect of a business, e-marketing, and e-commerce are exposed to both the advantages and disadvantages of AI technology. Reddy and colleagues (2019) suggest that decision-making tools based on technology are increasingly crucial as business operations become more complex. AI-driven consumer behavior analysis has several benefits for e-commerce businesses. By gaining a deeper understanding of customer preferences and needs, businesses can improve customer retention and increase sales. For example, a study by McKinsey found that personalized product recommendations can increase sales by up to 15% (Bughin *et al.,* 2018). AI-driven consumer behavior analysis can also help businesses to identify new customer segments and opportunities for growth. For example, a fashion e-commerce platform can use AI to analyze customer data and identify emerging fashion trends, allowing the platform to offer new and relevant products to its customers (Adeyinka, 2024).

Data Mining

Data mining involves analyzing large data sets to uncover patterns and relationships that can help businesses solve problems and make informed decisions, as stated by (Kalu, Ogungbangbe & Nto, 2017). Despite researchers proposing frameworks that demonstrate the benefits of continuous auditing and data mining over the past decade, practical difficulties persist (Genter et al., 2018). Expert system software can be developed for any problem requiring a selection from a set of options, especially those based on logical steps, according to Kalu and Ogungbangbe (2024).

Thus, any field that requires specialized knowledge or expertise has the potential to utilize an expert system. The demand for data mining in auditing has grown significantly due to the increasing complexity and potential for the manipulation of consumer behavior through online systems and technological devices. Kalu and Ogungbangbe (2014) note that data mining has become increasingly valuable in the field of e-commerce as it evaluates vast amounts of consumer and market data in the attest function more manageable.

Machine Learning

The study of machine learning is an aspect of computer science that examines the development of algorithms that can use statistical analysis to recognize patterns and relationships within large data sets, to make accurate predictions about future events (Dagunduro et al., 2023; Isa et al., 2016). This area has been applied to a wide range of fields, including finance, biology, health, and education.

The concept of machine learning has been defined by various researchers, but all describe a computer's ability to learn from historical data and use that knowledge to make predictions about future data. Machine learning involves the construction of mathematical models from sample data and the evaluation of these models' accuracy in predicting future data about the markets and consumer behaviour (Akinadewo, 2021; Owonifari, igbekoyi, Awotomillusi & Dagundiwo, 2023). Machine learning has many practical applications, such as in analyzing relevant data to predict outcomes in similar situations. Hence it can also be used to predict why a consumer may showcase varying behavioural patterns over time under certain circumstances.

The use of machine learning, along with other technological advancements such as big data and blockchain, is expected to significantly transform the fields of online trading and e-commerce by enabling greater automation and more efficient analysis of large volumes of market and consumer data. In marketing, machine learning is already being used by major marketing online services firms to automate manual tasks, identify potential problems or errors, and engage the customers during shopping online (Kalu & Nwokah, 2020; Chen et al., 2018).

Machine learning algorithms can be used to analyze customer data and identify patterns in consumer behavior. A good example of this is how clustering algorithms can be used to segment customers based on their purchasing behavior, while regression algorithms can be used to predict customer churn. By using machine learning for consumer behavior analysis, e-commerce businesses can gain a deeper understanding of customer preferences and tailor their marketing strategies accordingly.

Ease of use

Davis (1989) defines ease of use as a level or condition where someone believes that the use of a particular system will be free of effort (Sugandini et al., 2018a). The main reasons why people shop or don't shop online are the trust variables in the shopping site concerned and the ease of applying the shopping site (Baba & Siddiqi, 2016).

The Technology Acceptance Model, (TAM), introduced by Davis (1989) is one of the most widely used models to explain environmental catalysts and user acceptance behaviors. The technological acceptance model proposes that perceived ease of use (PEOU) and perceived usefulness (PU) predict the acceptance of information technology (Tung, Sayar & Ekin, 2008). Since its inception, the model has been tested with various applications in various studies and has become the most widely applied model of user acceptance and usage (Pikkarainen, Pikkarainen, Karjaluoto & Pahnila, 2004).

Lichtenstein and Willliamson (2006) stressed that the model is grounded in social psychology theory in general and the Theory of Reasoned Action (TRA) in particular. TRA asserts that beliefs influence attitudes, which leads to intentions and therefore generate behavior. Correspondingly, Davis (1989) introduced the construct TAM as follows: perceived usefulness (PU), perceived ease of use (PEOU), attitude, and behavioral intention to use. Among the constructs, PU and PEOU form an end-user's beliefs on a technology and therefore predict his or her attitude towards the technology, which in turn predicts its acceptance (Cheng, Lam & Yeung, 2006). Various authors, simply posit that individuals who are keen to adopt an innovation, would want to believe or made to believe that they will not find a particular technology difficult to use and it would require not much labour in is usage.

Perceived ease of use could be specified as people's perceptions on how to learn and use the new product or services faster and easily without facing any difficulties. In addition, the costumers also feel that they do not need to spend more cost, time and energy to study about new product or services (Wilson, Keni & Tan, 2021).

According to Keni (2020), perceived ease of use can be described as the evaluation about the difficulty using of new technologies. If the people felt that the application of technologies are easier and not to complex, they will have more intention to adopt with these technologies. Therefore, the customers demand and intention to use the new technologies depend on how easier and efficiently they can apply it in their daily life.

Through online shopping, people expect more efficient service and efficiency, as it tends to be faster than offline shopping. This is also a reduction in non-monetary costs. The online shopping application also enables customers to enjoy a very flexible time when shopping since they do not need to visit the store, which will take a lot of time (Hurriyati et al., 2024). Online shopping applications can also provide convenience to customers by creating a sense of security and comfort when transacting. In online shopping, applications do not directly provide funds to the seller in question, but some procedures must be passed so that shopping online is safe for customers. With these expectations and convenience in online shopping, people will get many positive benefits, and the amenities offered in online shopping make many customers more interested in using applications and taking advantage of the various features available.

Online shopping that is easy to understand and use increases customers' intention to use online shopping applications. This has been demonstrated in some research about the close relationship between perceived ease of use and ease of use (Chong, 2013 and

Natarajan, Balasubramanian & Kasilingan, 2017). The intention to use online shopping applications can also be influenced in terms of ease of use, resulting in greater interest in using online shopping applications. In previous studies that examined the ease of online shopping, this affected the number of customers who use online shopping applications.

Research Hypotheses

The following hypotheses were formulated to guide the study and they include as follows.

Ho_1: data mining does not have a significant effect on the efficacy of e-commerce adoption in Nigeria.

Ho_2: machine learning does not have a significant effect on the efficacy of e-commerce adoption in Nigeria.

Ho_3: Perceived Ease of Use does not have a significant effect on the efficacy of e-commerce adoption in Nigeria.

Efficacy of E-commerce

To carry out e-commerce simply entails offering products and services that are capable of satisfying human wants. These customers sort for these services online without any physical contact with the seller who might not necessarily be the producer of such product or service, most e-commerce firm serves as middlemen in the distribution channel. They ensure that the product gets to the final consumer, since the marketing, and production process is not complete until the product gets to the final consumer (Nwokah, 2018; Kalu, Anyanwu & Onwumere, 2019). With the increasing complexity of businesses, the use of technology-based decision aids is becoming more critical in the e-commerce process. AI is automating several marketing processes that previously required manual labor, including sales promotion. Compared to traditional marketing practices, AI systems have the advantage of being able to analyze 100% of customer and market data, create market tests, and write marketing and business reports. AI technology can also minimize errors by automating data capturing and entry processes, interfacing with customers, protecting customer information, and reducing the need for human intervention (Blair & Stout, 2017).

To fully appreciate the role of AI tools in e-commerce, it is important to understand the process of digital marketing, which involves no physical contact between the buyer and the seller. However, AI technology can enhance effectiveness at each step of the e-marketing process, serving as a connector where the output of one step becomes the input of the next. AI has really gone a long way in making e-commerce easy and less cumbersome whereby a customer can sit in the comfort of his room in Aba and order for a product from Lagos and the product will be delivered to him/her with few hours as against spending days traveling to get such product from Lagos state, Nigeria.

Theoretical Framework

This study reviewed Technology Acceptance Model and it was adopted as the theoretical underpin for the study.

Technology Acceptance Model (TAM)

The theory relating to the use of information systems is the TAM (Technology Acceptance Model). According to Davis (1986), Andryanto (2016), Sugandini (2017), TAM is an information systems theory designed to explain how users understand and use information technology. In addition, TAM considers the adoption of technology by the user to be determined by two perceptions, namely perceived benefits and perceived ease of use. The purpose of TAM is to provide a basis for tracing the influence of external factors on users' trust, attitudes, and goals. Decreased Intention to buy in online shopping is one of them caused by trust variables.

The acceptance and the use of information technologies can bring immediate and long-term benefits at organisational and individual levels, such as improved performance, financial and time efficiency and convenience (Foley Curley, 1984; Sharda, Barr & McDonnell, 1988). The potential of technology to deliver benefits has long motivated IS management research to examine the willingness of individuals to accept innovative technology (Davis, 1989). The research on the adoption of technology became of primary importance in the 1980s, which coincided with the growth of the use of personal computers. However, a major stumbling stone at the development of the research on the adoption of personal computing was the lack of empirical insight into users' responses to the information system performance. Before the development of TAM, various technological and organisational perspectives had aimed to advance IS-related research (e.g. (Benbasat, Dexter & Todd, 1986; Robey & Farrow, 1982). Research had emphasised the importance of factors such as users' involvement in the design and implementation of information systems (Robey & Farrow, 1982).

The primary objective of TAM was to shed light on the processes underpinning the acceptance of technology, to predict the behaviour of and provide a theoretical explanation for the successful implementation of technology. The practical objective of TAM was to inform practitioners about measures that they might take prior to the implementation of systems. To fulfil the objectives of the theory, several steps were carried out (Davis, 1989; Davis, 1993). Davis embarked on the development of the model of technology acceptance by framing the processes mediating the relationship between IS characteristics (external factors) and actual system use. The model was based on the Theory of Reasoned Action, which provided a psychological perspective on human behaviour and was missing in the IS literature at that time (Davis, 1989; Davis, 1993).

TAM explore the role that users perceived benefit and perceived ease of use plays on the acceptance and usage rate of technology by users, how they are able to build trust, develop attitude and develop goals tied to the technology. Users tend to shy away from using technologies that has complicated user interface and hence IT developer should strive to ensure the simplicity of their technological interface and try to make it user friendly. TAM was adopted as the theoretical underpin for the study since it explains how users accept, understand, and uses new technology as they are invented.

Empirical Review

Onobrakpeya and Bayagbon, (2024) in their study assessed the effect of artificial intelligence on the marketing performance of e-commerce platforms in Nigeria. The chosen research design for this study was the cross-sectional survey research design. The study's population was restricted to employees of e-commerce platforms located in South-South Nigeria. The Cochran formula was used to determine the sample size (384 participants) for the study. The study used the judgmental sampling technique. The data

for this study were collected from the primary source using a structured questionnaire. The study used internal consistency reliability to test the effectiveness of the questionnaire items. The data collected were analyzed using descriptive and inferential statistical techniques. Findings indicated that chatbots, predictive analytics, and personalized content have a significant positive effect on marketing performance. However, by leveraging predictive analytics, e-commerce platforms can gain strategic insights into customer behavior, preferences, and market trends. The study concluded that artificial intelligence has a significant positive effect on the marketing performance of e-commerce platforms in Nigeria. The study recommended amongst others that firms should invest in robust predictive analytics tools and data infrastructure to harness customer data effectively. This enables the development of data-driven marketing strategies that optimize performance.

Nwachukwu (2023) carried out a study on how AI marketing impacts customer satisfaction with products and services of telecommunication companies in Port Harcourt, Rivers State, Nigeria. This study aims to investigate the influence of AI marketing on customer satisfaction. The research design adopted for this study was quantitative, utilizing a cross-sectional survey method to collect data from customers of telecommunication companies in Port Harcourt. The sample size was determined using the Godden sample size formula, resulting in a sample size of 384. Data analysis involved the use of Pearson Moment Correlation Coefficient and SPSS spreadsheet for computation. The findings of this study indicate that AI personalization has a significant positive relationship with customer satisfaction, as evidenced by the significant positive correlation coefficients with repeat purchases and customer referrals. The results also show that the recommendation system has a significant positive relationship with repeat purchases and customer referrals. The implications of this study suggest that telecommunication companies in Port Harcourt can benefit from implementing AI marketing strategies, specifically AI personalization and recommendation systems, to enhance customer satisfaction, increase repeat purchases, and encourage customer referrals. Further research in this area is needed to explore the long-term effects of AI marketing on customer satisfaction and loyalty in the Nigerian telecommunication industry.

Methodology

A survey research design was used to investigate the impact of artificial intelligence on efficacy of e-commerce adoption in Nigeria. The study focused on personnel from e-commerce retail firms in the Rivers State and Lagos State, of which there were 178. The researcher utilized the purposive sampling method to select members of the population who have incorporated AI variables into the electronic marketing process for the sample size. A sample size of 124 firms, representing approximately 70% of the population, was deemed appropriate for the study to ensure reliable data. Five questionnaires were administered per firm, resulting in a total of 620 questionnaires collected for data analysis. Descriptive analysis using measures of central tendency (such as mean, median) and dispersion (such as standard deviation) was used to analyze the data.

Reliability of research instrument

Cronbach Alpha model was used to determine the reliability test for the questionnaire as the Instrument for data collection. Ten (10) copies of the questionnaire were administered to my colleagues. And a test-retest method was adopted for the content

of the instrument. The results of the pre-test and post-test were presented in Tables 4.1 and 4.2brespectively.

Table 1: Pre-test results of Cronbach Alpha Reliability Test

Cronbach Alpha	No. of Items
.72	4

At 95 confidence level (5% significant level)
Source: Researcher, 2024

Table 2: Post-test results of Cronbach Alpha Reliability Test

Cronbach Alpha	No. of Items
.75	4

At 95 confidence level (5% significant level)
Source: Researcher, 2024

Table 1 and 2 indicates that the results of our test-retest of 0.72 and 0.75 which were above 0.70 (as the benchmark, criterion). We therefore accepted the research instrument as reliable for data collection for the study.

Results

Table 3 displays the distribution characteristics of the variables in the study. The average distribution of e-commerce adoption is 4.008575, with a range from 2.750000 to 5.000000. The standard deviation of 0.612354 indicates that e-commerce adoption has a higher deviation rate from its mean value. The skewness of e-commerce adoption is negatively skewed with a value of -0.198410, while its kurtosis of 2.130986 indicates a platykurtic distribution. Data mining has an average value of 4.061003, with a standard deviation of 0.870729, which indicates a higher deviation rate from the mean value. The data for data mining is negatively skewed with a skewness value of -1.159746, and its kurtosis value of 2.852451 indicates a platykurtic distribution. Similarly, machine learning has a mean value of 3.935593, ranging from 1.000000 to 5.000000, with a standard deviation of 1.151421. The data for machine learning is negatively skewed with a value of -1.159749, and its kurtosis value of 3.695964 indicates a leptokurtic distribution. Finally, Ease of Use has a mean value of 4.105251, with a high standard deviation of 0.849332 relative to the mean value. The data for Ease of Use is negatively skewed with a value of -1.222213, and its kurtosis value of 5.275576 indicates a leptokurtic distribution.

Variable	**E-C**	**DM**	**ML**	**PEoU**
Mean	4.008575	4.061003	3.935593	4.105251
Median	4.000000	4.000000	4.000000	4.000000
Maximum	5.000000	5.000000	5.000000	5.000000
Minimum	2.750000	2.000000	1.000000	1.000000
Std. Dev.	0.612354	0.870729	1.151421	0.849332
Skewness	-0.198410	-0.706394	-1.159746	-1.222213
Kurtosis	2.130986	2.852451	3.695964	5.275576
Observations	590	590	590	590

Source: Author's Computation (2024)

Linearity Test

Table 3 shows the correlation analysis between e-commerce adoption and artificial intelligence variables in Nigeria. The correlation coefficient of data mining is 0.562, which indicates that the use of artificial intelligence created through data mining increases e-commerce adoption in Nigeria. The correlation coefficient between machine learning and e-commerce adoption is also positive and significant, with a value of 0.651, suggesting that an increase in artificial intelligence created through machine learning will lead to an increase in e-commerce adoption in Nigeria. Moreover, perceived ease of use has a significant positive correlation of 0.480 with e-commerce adoption in Nigeria, indicating that an increase in Ease of Use of artificial intelligence will increase e-commerce adoption in Nigeria by 0.480 units. However, there was no evidence of a multicollinearity problem among the explanatory variables, as the highest correlation coefficient value of 0.651 does not exceed the threshold value of 0.7.

Table 3: Correlation Analysis

Variables	E-C	DM	ML	PEoU
E-C	1.0000			
DM	0.562** (0.000)	1.0000		
ML	0.651** (0.000)	0.368** (0.000)	1.0000	
PEoU	0.480** (0.000)	-0.005 (.942)	0.267** (0.000)	1.0000

Source: Researcher, 2024

Artificial Intelligence and E-Commerce adoption in Nigeria

Table 4 above shows the results of the OLS analysis on the relationship between artificial intelligence and E-Commerce adoption in Nigeria. The R2 coefficient value of 0.681962 and an adjusted R2 value of 0.678580 indicate that approximately 68% of the variation in audit practice in Nigeria can be explained by data mining, machine learning, and image recognition. The F-statistics of 198.6086 with a p-value of 0.000000 demonstrates that the model is statistically significant and a good fit.

Table 4: OLS Regression on Artificial Intelligence and E-Commerce adoption in Nigeria

Variable	Coefficient	Std. Error	t-statistic	Prob
DM	0.293319	0.025464	11.16635	0.0000
ML	0.209601	0.069258	3.026383	0.0029
PEoU	0.100757	0.031220	3.227322	0.0016
C	0.892487	0.140799	6.338740	0.0000
R-Squared	0.681962			
Adjusted R-Squared	0.678580			
F-statisic	198.6086			
Prob (F-statistic)	0.000000			

Source: Researcher, 2024

The individual coefficients of the model indicate that data mining has a coefficient of 0.283319, t-statistics of 11.16635, and p-value of 0.0000, implying that a unit increase in the coefficient of data mining will result in a 0.293319 unit increase in the e-commerce adoption in Nigeria. Machine learning has a coefficient of 0.209601, t-

statistics of 3.026383, and p-value of 0.0027, suggesting that a unit increase in the coefficient of machine learning will lead to a 0.209601 unit increase in e-commerce adoption in Nigeria. PEoU has a coefficient of 0.100757, t-statistics of 3.227322 with a p-value of 0.0013, indicating that a unit increase in the coefficient of PEoU will lead to a 0.100757 unit increase in e-commerce adoption in Nigeria.

The results show that data mining, machine learning, and PEoU have significant and positive relationships with e-commerce adoption in Nigeria. The findings are consistent with previous studies (Kalu, Anyanwu & Onwumere, 2019; Kalu, Ogungbangbe & Nto, 2017; Owonifari, *et al.,* 2023) among others that suggest that data mining and machine learning techniques help organizations to sort through large data sets, identify patterns and relationships, predict future trends, and make more informed business decisions, which, in turn, can improve e-commerce adoption. The use of machine learning to automate shopping tasks, analyze data, identify exceptions and potential problems, and assess risks has improved e-commerce adoption in Nigeria as supported by the findings of (Ajayi, & Aigbavboa, 2020; Keni, 2020; Wilson, Keni & Tan 2021; Adeyinka, 2024) among others. Similarly, the study found that there is a significant positive correlation between PEoU and e-commerce adoption in Nigeria, which is in agreement with the results of other studies conducted by (Onobrakpeya & Bayagbon, 2024), and others. These studies suggest that PEoU helps to improve e-commerce adoption by classifying the simplicity of the interface usage into different phases that will help customers easily navigate while shopping.

Conclusion and Recommendation

The study shows the relationship between artificial intelligence and e-commerce adoption in Nigeria was investigated using online vendors from River State and Lagos State as a case study. The study employed regression analysis and correlation matrix to analyze the relationship between the dependent variable, e-commerce adoption, and the independent variables, which were data mining, machine learning, and PEoU. The results showed that all the explanatory variables in the model had a significant positive relationship with e-commerce adoption in Nigeria. Thus, it was concluded that the use of artificial intelligence through data mining, machine learning, and PEoU improves e-commerce adoption in Nigeria. Based on the findings, the study made the following recommendations:

First, electronic Marketers and Online vendors should undergo training and re-training on the use of data mining techniques to improve the quality of e-commerce practice in Nigeria. Second, e-commerce firms in Nigeria should invest more in machine learning to further improve the e-commerce process in the country. Third, the use of PEoU, which helps in attracting consumers to engage in shopping should be increased among e-commerce firms in Nigeria.

Consumer behavior analysis through AI can help e-commerce businesses gain valuable insights into customer preferences, needs, and expectations, leading to improved customer engagement and retention. it is advisable to pay attention to PEOU, usefulness, and customer trust. PEOU can be increased by developing applications that are simple to use, easy to obtain, and have clear and understandable interactions with the online store. PU can be increased by providing helpful content or information for purchasing products or services; online information aids decision-making processes, is simple and functional for buying online, and it can improve purchasing effectiveness.

To build customer trust, businesses must be able to provide or deliver products as promised to their customers.

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