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| RESEARCH ARTICLE

Artificial Intelligence and Service Quality of Telecommunication Firms in Nigeria

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| ABSTRACT

Globally, artificial intelligence (AI) technology spans various industries, but relatively little attention is given to the use of AI technologies by telecommunication industries. This study evaluated the effect of AI on the service quality of telecommunications companies in Nigeria, specifically the effect of data mining, machine learning, and chatbots on the service quality of these firms. The research employed a survey research design, and its population was heterogeneous. A sample size of 400 participants was chosen using Taro Yamane's formula, and the Cronbach alpha test yielded an average of 75%, confirming the reliability of the instrument. To analyze the data collected, descriptive and ordinary least squares regression methods were used. The study revealed that data mining and chatbots exhibited a significant positive effect while machine learning showed a negative relationship to the service quality of the telecommunications industry. Based on these findings, it is concluded that artificial intelligence affects service quality in Nigeria, with strong reference to data mining and chatbot, which enhance the quality of service to customers in Nigeria. It is therefore recommended that telecommunication firms in Nigeria should embrace the philosophy of AI to improve their quality of service.

| KEYWORDS

Artificial intelligence, service quality, data mining, machine learning, chatbot, Telecommunications.

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| ARTICLE INFORMATION

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1. Introduction

Artificial intelligence technology is becoming increasingly popular worldwide due to its efficiency, cost reductions, product quality, and customer service improvements in organizations (Liu et al., 2020). AI technology adoption is expected to increase in the future due to its potential benefits. Creative firms experiment with advanced technologies and incorporate them into their daily operations to stay competitive (Bag et al., 2021; Shareef et al., 2021). According to Tractica (2018), AI has the potential to create $90 billion in profits by 2025, up from $7 billion in 2018, especially in North America, Europe, and Asia-Pacific. AI can improve customer service by providing cost-effective solutions (Payne et al., 2021).

The broad study of AI research has focused on its applications in various sectors, with very little attention given to the telecommunications industry (Huynh et al., 2021; Bag et al., 2021; Pillai et al., 2020; Keegan et al., 2022; and Chatterjee et al., 2021), among others. Liu et al. (2020) validated the impact of AI on company innovation processes and management practices, technological innovation, and the relationship between AI learning and entrepreneurial performance (Khalid, 2020). Furthermore, Hashem and Alqatamin (2021) studied artificial intelligence and Jordanian manufacturing firms' financial performance. The study by Ibrahim and Nwobilor (2020) focused on AI and decision-making and found a link between AI and decision-making. Today, technological applications of AI are rapidly spreading in the telecommunications industry. The study by Joseph and Falana, 2021;

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Elegunde and Osagie, 2020; and Gambo, 2020 explored that AI has a positive impact on employee and organizational performance by utilizing Pearson's correlation analysis to measure the relationship between the two variables. AI in telecommunication companies can forecast advertising objectives and pricing tactics based on user profiles and consumption histories (Volkova et al., 2021; Giannoulakis et al., 2020; & Shang et al., 2020). AI-powered customer care can assist customers in resolving difficulties rapidly, leading to improved customer service in the telecom industry (Varsha et al., 2021). In addition, AI can help telecom businesses understand market patterns and avoid data theft (Cui et al., 2021). However, AI can be used to improve service quality, but understanding is limited.

Despite the potential benefits of AI, many firms are yet to implement an AI strategy, with less than 39% of all enterprises globally having one (Ranbotham et al., 2017). As more value-added employment processes are in the service industry, job profiles are under pressure due to automation and skills requirements leading to job losses and layoffs (Frey & Osborne, 2013). As firms in Africa and the rest of the globe embrace globalization and AI systems, the knowledge, skills, and attitudes (KSA) of individuals must be improved to prevent job loss (Elumelu, 2019). AI-based solutions can help firms in developing nations improve production efficiencies, meet customer demand, and develop mobile AI apps for services and finance access (Strusani & Houngbonon, 2019).

In Nigeria, there are only a few researches that looked at the effect of AI on the service quality of organisations. Very few of the literature have considered telecommunication firms. The study seeks to advance existing contributions that adequately and comprehensively explore service quality in an organization based on the above-mentioned studies and how these objectives will be stimulated by artificial intelligence on telecommunication firms in Nigeria because it is a service-based company. The broad objective of this study is to investigate the effect of artificial intelligence on service quality in the Nigerian telecommunication sector. MTN was used in this study because it has the highest customer base in Nigeria. The study focused on data mining, machine learning, and chatbots. The study is significant in providing essential guidance for the management of e-commerce and telecom companies to improve their quality of service and develop a competitive advantage, as well as for policymakers in the world of artificial intelligence, as the study provides evidence for the expected to deliver the effect of AI on service quality.

The paper is divided into five separate headings and subheadings, namely the introductory aspect of the study, literature review, and hypothesis development. This is to clarify concepts and show the relationship between variables, consistent with previous studies. The third heading presents the data and methods used in the study. The analysis and discussion of the results are presented in the fourth heading, and the fifth heading contains the conclusion and recommendations.

2. Literature Review and Hypotheses Development

2.1 Conceptual Review

2.1.1 Artificial Intelligence

Machines can imitate complex human processes, including learning, thinking, and making decisions using artificial intelligence (Alzaidi, 2018). According to Miller (2019), artificial intelligence is the trigger for the emergence of Industrial Revolution (IR) 4.0 in the digital age. It enables the machine to learn and do tasks similar to humans (Dagunduro et al., 2023; Falana et al., 2023). Furthermore, Zhang et al. (2020) defined AI as a result of successfully leveraging big data and machine learning (ML) technology to comprehend the past and forecast the future using massive volumes of data. According to Haenlein and Kaplan (2019), artificial intelligence is the use of technical technologies to mimic human cognitive capacities to achieve autonomous goals. Lee and Tajudeen (2020) asserted that AI technology enables robots to adapt, learn, and do activities similar to humans. Large volumes of data can be processed with AI technology, making it easier to detect patterns in the data. According to Pan (2016), artificial intelligence (AI) is the ability of robots to understand reason, learn and emulate human intelligence. Mata et al. (2018) highlighted that artificial intelligence systems employ sophisticated algorithms capable of communicating at extremely rapid data transmission rates and making decisions independently. Dash et al. (2019) posited that AI could decrease development cycles, optimize manufacturing and supply chain efficiency, prevent errors, and improve service quality within businesses. AI may have a huge effect on how a business interacts with its customers, partners, and prospective clients. As a result, applying AI to service-based organizations like telecommunication companies is imperative for strengthening service quality and gaining a competitive edge (Kelly et al., 2019).

For enterprises, artificial intelligence (AI) can increase the value of IT. It can be applied throughout an organization's whole value chain, enabling the skillful use of big data and data analytics to improve service quality (Kuzey et al., 2014; PwC, 2019). This study looked at how AI impacted the quality of services provided by telecom firms.

2.1.2 Service Quality

Service quality is defined as a crucial component of customers' experience, and it can be improved with the help of artificial intelligence (AI) technologies. Service quality, according to Hemmington et al. (2018), is the extent to which users perceive that the

service satisfies their wants. Furthermore, Fandy and Chandra (2015) affirmed that service quality could be attained by satisfying customers' requirements and wishes and delivering goods precisely to balance their expectations**.** According to the paper by Dash et al. (2019), AI can improve service quality by decreasing development cycles, enhancing productivity, and reducing supply chain and manufacturing errors. It further explained how AI algorithms could examine consumer feedback and pinpoint areas for service delivery improvement, assisting businesses in managing customers' challenges and enhancing customer experience. Additionally, by automating repetitive operations, minimizing errors, and streamlining processes, AI can assist businesses in optimizing their service delivery processes. Several aspects of service quality are given varying amounts of weight by customers. Among customers, some value friendliness and quality, while others value speed and precision. Customers' expectations for both the type and quality of services increase as a result of the introduction of service robots (Edvardsson et al., 2018; Lee & Lee, 2019). Ivanov and Webster (2017) asserted that the use of bots and AI in the tourist and hospitality industries has enhanced service quality and can improve customer experience by providing interactive means of service delivery, communication, and consumer involvement, giving businesses a competitive edge.

2.1.3 Data Mining and Service Quality

Data mining is the process of using computer techniques on massive volumes of data to discover meaningful information. It may also be described as the procedure of sorting through vast data sets to reveal patterns and associations (Falana et al., 2023). This can improve data-driven business solutions. Data mining techniques and technology allow businesses to foresee future trends and make better-informed business decisions. In the telecommunication industry, data mining is required to advance operations and address issues. Identification of scam calls and identifying network faults to isolate problems are two of the main functions. Data mining helps businesses develop more effective marketing strategies (Awotomilusi et al., 2022). Yet, this sector of the economy faces difficulties dealing with the logical and time aspects of data mining. This requires expecting rarities in telecommunication information to recognize network problems or buyer frauds in real-time. Applying quantitative analytical techniques to real-world problems, such as corporate problems, is called data mining (Falana et al., 2023; Schommer, 2008).

2.1.4 Machine Learning and Service Quality

The concept of machine learning describes how a computer can acquire knowledge without explicit programming (Gui, 2019). Determining data patterns and designing systems to learn from them are the main purposes of machine learning (Deloitte, 2018). By using machine learning, computers can think and respond without human input. Observing historical data allows computers to make informed predictions using machine learning. Machine learning uses algorithms to solve problems. The advantage of one algorithm may never outweigh the disadvantages of another simply because developing an algorithm that resolves all issues is difficult (Dagunduro et al., 2023). Different algorithms should be used for different problems. The flow of data between a base station and a mobile network is optimized using machine learning (ML). Algorithms are used to dynamically select which portion of the spectrum should be used for which user and with which parameters to improve efficiency. AI can be used to tweak these algorithms' parameters (Zhang et al., 2020). Using machine learning (ML) applications, the classification of transactions can be predicted from data from previously processed transactions. However, forecast accuracy depends on the dataset quality and inherent bias (Cockcroft & Russell, 2018). For example, an e-mail communication tool can classify consumer marketing and promotion as an advertising expense and internal communication as an IT or communication cost. ML technology uses pre-programmed algorithms to discern between these groupings, making it easier to understand (Awotomilusi et al., 2022; Jordan & Mitchell, 2015). Before rolling out AI-based services, companies must comprehend what their customers need and expect as far as service quality from these machines. This can help to improve customer satisfaction and loyalty, ultimately leading to greater profitability through faster and more efficient customer service. Machine learning is used to gain insights into the purchaser of a product after receiving free samples, aiding in the success of marketing efforts (Won et al. 2018).

2.1.5 Chatbot and Service Quality

Chatbots are computer programs that use natural language to interact with people (Brandtzaeg & Folstad, 2017). Dan (2018) described chatbots as a form of AI-powered technology which can communicate with customers verbally or through text. Platforms such as IBM Watson, Microsoft Bot Framework, and Google's DialogFlow allow businesses to use chatbots for customer service. Brandtzaeg and Folstad (2017) study revealed that most people use chatbots for efficiency, ease of use, user experience, social aspects, and novelty. Xu et al. (2017) affirmed that customer service conversations usually include emotional and factual statements. Interestingly, AI-powered chatbots can detect emotional customer statements more accurately than humans (Liu et al., 2018). Trivedi (2019) suggested that the success of chatbots in customer service is largely determined by information, system, and service quality. The objective quality of the chatbot is linked to how users perceive its service quality (Sugathan et al., 2018). Additionally, businesses in Nigeria, such as banks and telecommunications companies, may use artificial intelligence technology in intelligent virtual assistants to improve their services and increase customer satisfaction. As chatbots take on roles in companies, telecoms will deploy human salespeople and support agents more effectively so policyholders get faster access to services and product

information (Martin et al., 2021). Two concepts that are germane to this study are artificial intelligence and service quality. Hence, the concepts are diagrammatically represented and presented below:

2.1.6 Conceptual Framework

The diagram below conceptually portrays the relationship between artificial intelligence and the service quality of telecommunication firms in Nigeria. Where artificial intelligence is the explanatory variable and is measured by data mining, machine learning, and chatbots, while (service quality) is the dependent variable.

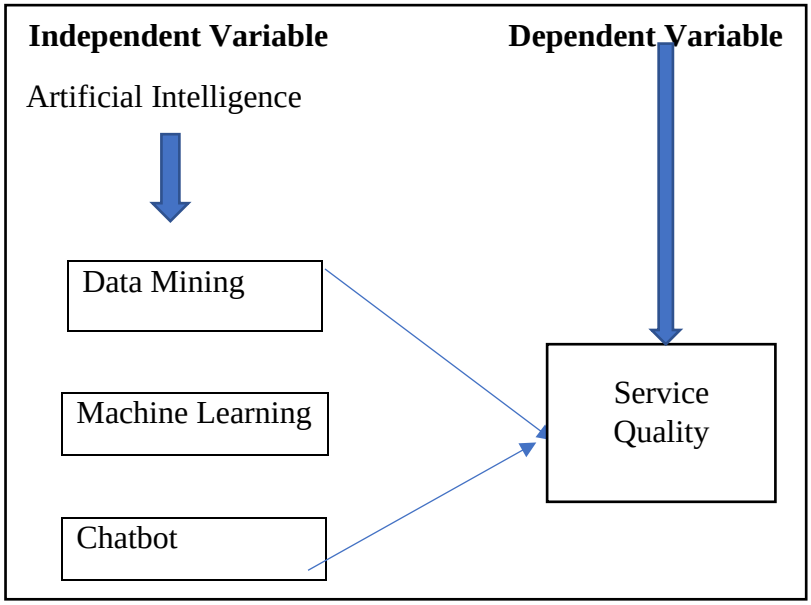

Figure 1: Conceptual framework to show the interaction between data mining, machine learning, chatbot, and service quality

Source: Researcher's Compilation (2023)

2.2 Theoretical Underpinning

The TAM is a theory developed by Fred Davis in 1986 that looks for broad determinants and signs of computer acceptability, with perceived utility and perceived ease of use being two important elements. These elements can be used to interpret the behavior of users across a variety of end-user computing systems and user demographics. The probability that a system's utilization may improve a firm's activity is referred to as perceived usefulness. In contrast, perceived ease of use refers to how much the potential user (in this case, a business) anticipates the target system to be simple to use (Davis, 1989).

According to Davis, as cited in Okoye et al. (2019), perceived usefulness of innovation refers to the chances of using a new application, device, or program will improve performance, whereas perceived ease of use implies the ability of users (in this case, telecom operators) to make use of it and operate the application, device or program with minimal or no effort by adding value, increasing service satisfaction and quality. Surendran (2012) identified political and social aspects as the two most important external elements influencing the system (artificial intelligence) predictors (the perception of utility and the perceived user friendliness) to understand the intentions of users while embracing modern technologies. Innovations pose a danger to an existing paradigm or approach to doing things. In reality, they represent opportunities for enhanced and improved service delivery. Researchers have found that a significant barrier to innovation adoption is employee reluctance to deviate from tested platforms (Okoye et al., 2019; Ezeji & Achugamonu, 2019; Lai, 2017). Therefore, as technological innovations improve service delivery, it is crucial to understand how to overcome these obstacles.

2.3. Empirical Review

Dagunduro et al. (2023) investigated the impact of artificial intelligence on the quality of audit practice in Nigeria. The study used a survey research design with a total population of 178 practicing accounting firms in Nigeria using the application of artificial intelligence, and a sample size of 125 was determined using the purposive sampling method. The study used primary data using

a well-structured questionnaire. Data analysis was conducted using descriptive statistics and OLS. The results of the study showed that expert systems, machine learning, and intelligent agents exhibited a significant positive relationship to audit quality in Nigeria.

Bodinga et al. (2022) used machine learning techniques to conduct a study on customer engagement analysis with a telecom firm in Sokoto, Nigeria. The following aims led this study to provide an overview of how data mining is used to create predictions in a telecoms company. MTN Nigeria was chosen as a case study to detect fraudulent telecom firms in Nigeria, as well as the data mining difficulties faced by telecom companies in Nigeria. The study employed a descriptive and explanatory design. Orange data mining software was utilized to evaluate primary data sources. Results showed that data mining has a significant effect on the performance of the telecom business.

Abbas et al. (2021) investigated the study with the goal of elaborating and discussing numerous approaches used in data mining, analyzing various data mining strategies to make improvements, and discovering more powerful mining techniques to increase the business. Several data mining approaches and strategies are employed to optimize the business. We used data warehouse strategies to boost business by utilizing Business Intelligence (BI) and Business Analytics (BA), as well as their many types and tools. The study also covered several technologies for data mining and organizing organizational data. The study used Business Intelligence (BI) and Business Analytics (BA) methodologies to improve the company. Previously, there were just four strategies for business improvement (regression, classification, association, and clustering). Crawler proved to be the best tool for the job.

Bagana et al. (2021) investigated artificial intelligence as a human substitute. Based on the UTAUT principle, customers' perceptions of the conversational user interface in the banking business. The study sought to investigate the variations in perceptions among Bank Rakyat Indonesia, Bank Negara Indonesia, and the bank clients about the use of each bank's conversational user interface. 58 people were questioned using the Kruskal-Wallie technique, using printed questionnaires and stationery. There were 58 participants in the study. The study found that all three banks are unlikely to implement the feature in the future, and there was no change in behavioral intention.

Meganathan and Samala (2021) studied the impact of artificial intelligence (AI) on customer experience and service quality in the banking sector. They found that AI can improve credit ratings, system failure prediction, emergency alert mechanisms, fraud detection, phishing website detection, liquidity risk assessment, customer loyalty assessment, and information system. Mobile banking, chatbots, and augmented reality are important ways AI can improve users' experience in banking.

Elegunde and Osagie (2020) investigated the use of artificial intelligence and employee performance in the Nigerian banking sector. The study explored AI's ability to supplement work procedures. A descriptive cross-sectional research design was used by the researchers, and data was sourced through primary data. The study population consisted of all 127 employees from six (6) selected banks in Lagos State, Nigeria. The study used Taro Yamane's (1967) sample size determinant to arrive at a sample size of 98 items and was distributed to respondents from six banks in Lagos State, Nigeria, using basic proportions and ratios. For this study, content validity was assumed, and the cronbach Alpha result was 0.773 indicating a good internal consistency. The study concluded that artificial intelligence and machine-assisted tasks facilitate operations in Nigerian banks.

Li et al. (2020) conducted an artificial intelligence-based customer service study on customer attitudes and their effect when shopping online. Random samples of 670 consumers were interviewed. The study found that 71.5% of customers accepted AI customer support due to its availability, impartiality, and future trend, but 28.5% remain skeptical of AI chatbots due to their lack of relevance, effectiveness, and smoothness. Also, there are widespread barriers to seamlessly connecting AI chatbots with human agents. Regarding explicitly specified AI chatbots versus hidden AI chatbots, merchants should have them specified as consumers who have a strong dislike for AI chatbots disguised as human agents.

Prentice et al. (2020) investigated the influence of artificial intelligence and employees service quality on customer satisfaction and loyalty. This study takes a customer-centric approach, exploring how AI and employee service quality affect client satisfaction and loyalty. The study was done across numerous hotels in Portugal and focused on departing visitors who had used AI and staff services at the studied hotels. The study found that AI and employee service quality affect customer satisfaction and loyalty, but only specific service quality measures revealed significant differences. AI and customer retention research contribute to financial implications and resource allocation.

Wang and Xing (2020) did research and development on data mining technologies in enterprise services. This research investigated data mining technology by merging characteristics from several fields and assessing its applicability in various network platforms. The study concluded that the value of data mining in enterprise services improves business operations, perfects data services, and maximizes its positive function.

Chukwudi et al. (2018) investigated the use of artificial intelligence in auditing practices in south-eastern Nigeria. Accounting systems have moved from paper journals to computerization employing expert systems and other sophisticated technologies, according to the authors. A survey was conducted to collect data to investigate the relationship between the introduction of expert systems and their impact on audit process performance. These two variables were found to have a favorable association. The study found that expert systems have a positive impact on audit process performance, improving accuracy and speed, resulting in better reporting, less paper consumption, and better data-driven decisions.

Gentner et al. (2018) highlighted in their paper the use of machine learning algorithms on a customer database comprising of customer and product-related data from a manufacturing organization. Even though examining a complete client base for future possibilities in the B2B industry is normally done manually, machine learning was used to examine the market for strategic foresight and business management activities such as product management and full descriptions of acceptable sales measurement instruments. The study concluded that machine learning was used to identify potential clients based on their demands and behavior after measuring sales performance.

Sonie et al. (2018) investigated the impact of robots' more intelligent behavior on the growth rate and changing the behavior of businesses worldwide. The study seeks to answer these concerns by studying 100 AI firms from across the world that aspires to meet customer needs in a variety of fields. The results found that AI technologies can increase productivity, reduce human error, accelerate business decisions, honor customer preferences, make predictions, and maximize revenue, leading to an appetite for AI growth.

Studies conducted in Nigeria have yielded mixed results. Most authors have focused on non-financial performance in the banking sector, public sector and accounting firms, while few have addressed quality of service alongside telecom companies. The following hypotheses are proposed.

H_{o1}: data mining has no significant effect on the service quality of telecommunication firms in Nigeria

H_{o2}: machine learning has no significant effect on the service quality of telecommunication firms in Nigeria

H_{o3}: chatbot has no significant effect on the service quality of telecommunication firms in Nigeria.

3. Methodology

This study used a survey research design to examine the effect of artificial intelligence on service quality in Nigeria's telecommunication sector. MTN Nigeria's population size is heterogeneous as they have a large customer base with diverse demographics and a high mobility rate. It becomes difficult to determine the actual population size at any given time. For this reason, the study followed Taro Yamanes' (1967) assumption that 400 respondents are an appropriate sample size for a large population that is undeterminable. A purposive sampling technique was used to purposively select customers in the 18-59 age group, which consists primarily of people of active age. The age groups are distributed as follows; 18-29, 30-39, 40-49 and 50-59. Data were collected from primary sources using a structured questionnaire. The questionnaire was distributed to 100 respondents in each of the groups. The reliability of the data instrument was tested with Cronbach Alpha at 83.3%. The Cronbach Alpha result presented in the table shows that the questions asked clearly achieved the goals. For this study, the data obtained were analyzed using descriptive statistics and regression analysis.

3.1 Reliability Test

To establish the validity of the research instrument, Cronbach alpha was used to test if the questions asked in the questionnaire were significantly relevant to each objective of the study. As revealed in Table 1, the reliability of artificial intelligence (data mining, machine learning, and chatbot) and service quality of telecommunication firms using Cronbach Alpha is 0.833, with a total of 28 items. By implication, the scale items demonstrate good internal reliability since Cronbach Alpha is greater than 0.7.

Table 1: Reliability Test Results

Cronbach Alpha	No of Item
0.833	28

Source: Researcher's Computation (2023)

4. Findings and Discussion

4.1. Descriptive Statistics

The result revealed in Table 2 below indicated that the average value of service quality of telecommunication industries in Nigeria stood at 3.9129. This indicated that the mean value is relatively high on a scale of 5 points. It has a standard deviation of 0.62805, which indicates moderate variability as the value is far lesser than the value recorded in the mean. The skewness explained the degree of deviation recorded in the variables. From the result, the service quality of telecommunication firms has a long-left tail due to its negative value. On the other hand, the kurtosis value stood at -0.742, which implies that the value is lesser than 3, thus referred to as platykurtic distribution as the distribution is lesser than normal.

On the other hand, the mean value of data mining, machine learning, and chatbot stood at 3.6061, 3.3612, 3.2996, respectively, while its standard deviation of 0.63031, 0.61151, and 0.67429 for DM, ML, and CB respectively indicated a low variability as their values are far lesser than the values recorded in the mean. The skewness of all the independent variables showed that they all have a long-left tail as their values are negatively skewed while the Kurtosis values of -0.319, -0.656, and 0.903 for DM, ML, and CB, respectively, are lesser than 3, thus referred to as platykurtic distribution.

Table 2: Descriptive Statistics

	Obs	Mean	Std. Dev	Min	Max	Skewness	Kurtosis
DM	400	3.6061	.63031	1.86	4.86	-.262	-.319
ML	400	3.3612	.61151	1.88	4.50	-.290	-.656
CB	400	3.2996	.67429	1.43	5.00	-.035	.693
SQ	400	3.9129	.62805	2.33	5.00	-.349	-.742

Source: Researcher's Computation (2023)

4.2. Test of Variables

4.2.1. Normality Test

From Table 3, the results showed that variables explaining artificial intelligence and service quality have p-values that are higher than 0.05 at a 5% level of significance. This indicates that the sample mean distributions across the independent samples are normally distributed.

Table 3: Kolmogorov-Smirnov Test of Data Normality

Variables	Obs	DM	ML	CB	SQ	Prob>0.05
Residuals	400	0.078	0.091	0.103	0.123	

Source: Researcher's Computation (2023)

4.2.2. Multicollinearity Test

The Tolerance and Variance Inflation Factor (VIF) was used to determine the multicollinearity and to ensure that there is no multicollinearity among the independent variables. For example, under the tolerance, the DM has a value of 0.890, ML is 0.616, and CB is 0.633, which falls between 0 and 1. Under the Variance Inflation Factor (VIF), the DM has a value of 1.124, ML is 1.622, and CB is 1.579, which means they are all less than 10. Hence, this implies there is no multicollinearity among the variables.

Table 4: Multicollinearity Test

Variables	Tolerance	VIF
DM	.890	1.124
ML	.616	1.622
CB	.633	1.579

Sources: Researcher's Computation (2023)

4.2.3. Correlation Matrix

The relationships between the study's variables were carried out to test their correlation. Table 5 revealed that the relationship between the service quality of telecommunication firms and data mining showed a positive and significant with a coefficient value of 0.315. This means that an increase in data mining will lead to an increase in the service quality of telecommunication firms in Nigeria. However, the relationship between service quality and machine learning is positive, with a coefficient of 0.273, which implies that an improvement in machine learning will improve service quality by 27.3 percent. Lastly, the relationship between

chatbot and service quality is positive with a 0.266 coefficient value which indicates that an improvement in a chatbot will lead to a 26.6 percent increase in telecommunication firms' service quality. The overall summary of the result is that the explanatory variables have a weak correlation with the dependent variable.

Table 5: **Correlation Analysis of Study Variables**

Variables	**SQ**	**DM**	**ML**	**CB**	
SQ	1.0000				
DM	0.315**	1.0000			
	(.000)				
ML	0.273**	0.599**	1.0000		
	(.000)	(0.000)			
CB	0.266**	0.105**		0.326**	1.0000
	(0.000)		(0.035)	(0.000)	

Source: Researcher's Computation (2023)

4.3. Artificial Intelligence and Service Quality of Telecommunication Firms in Nigeria

To examine the joint effect of artificial intelligence on the service quality of telecommunications firms in Nigeria. The R-Squared test indicates 0.163 and adjusted (R^2) 0.157, respectively, as shown in Table 6, and this implies that the explanatory variable has explained 16.3 percent of the dependent variable and the remaining percent is captured by the error term, implying that other significant artificial intelligence variables could affect service quality besides identified variables. It also shows the F-statistics. Table 6 shows that the independent variables are jointly significant at a 1% level of significance, at shown in the 0.000. The t-statistic of 25.733 also confirmed the joint significance of the model.

From Table 6, data mining (DM) has a positive and significant effect on service quality with a coefficient of 0.222 and a t-statistic of 4.576, which is significant with a p-value of 0.000. Based on the result of the analysis, the alternate hypothesis is accepted. Also, machine learning has a negative and significant effect on service quality with a coefficient of -0.198, a t-statistic of 2-3.298, and a p-value of 0.001. From the table, it was indicated that machine learning has a negative relationship with service quality. Lastly, Chatbot (CB) indicated a positive and significant effect on service quality with a coefficient of 0.555, a t-statistic of 6.593, and a p-value of 0.000. This implies that chatbots in telecommunications firms will improve the quality of service to customers to grow.

There are many implications for the statistical result of the findings and empirical analysis of this study. First, data mining has a positive and significant effect on the service quality of telecommunications firms. This result supported the findings of (Bodinga et al., 2022; Wang & Xing, 2020; Chukwudi et al., 2018), among others. This implies that telecommunications firms that implement data mining will improve the quality of service to customers. Also, it will enhance the bottom line of the firm's performance and improve customer loyalty.

On the other hand, it is evident that machine learning is significant but negatively affects the service quality of telecommunications firms, but in some components, the results vary. The findings of this study further corroborate other studies in other countries and Nigeria that machine learning has a positive effect on service quality (Gentner et al., 2020; Elegunde and Osagie, 2020; Soni et al., 2018). They argued that machine learning on service quality would ease operations, help identify high-potential customers, and reduce human error. The result of this study implied that machine learning algorithms negatively influence the service quality of telecommunications firms.

Lastly, chatbots exhibited a significant positive effect on the service quality of telecommunications firms in Nigeria. Existing studies have submitted that, individually and as a component, chatbots significantly influence service quality (Meganathan and Samala, 2021; Li et al., 2020; & Prentice et al., 2020). In a study conducted by Bagana et al. (2021) investigated artificial intelligence as a human substitution. Customers' perception of the conversational user interface in the banking industry is based on the UTAUT concept; the study found that the conversational user interface (chatbots) does not significantly affect the customer's perception of banks in Indonesia.

Table 6: Regression Result: Artificial Intelligence and Service Quality of Telecommunications Firms in Nigeria

SQ	Coef.	Std. Err.	F	P>f
DM	0.222	0.049	4.576	0.000
ML	-0.198	0.60	-3.298	0.001
CB	0.555	0.054	6.593	0.000
_cons	2.608	0.207	12.615	0.000
Number of Obs	= 400			
R-squared	= 0.163			
Adjusted R^2	= 0.157			
F	= 25.733			
Prob > F	= 0.000			

Source: Researcher's Computation (2023)

4.4. Discussion of Findings

Considering the results obtained from the regression analysis using the ordinary least squares method and the correlation test that showed that independent variables (data mining and chatbots) had a significant positive relationship while machine learning had a negative correlation with the service quality of telecommunications firms in Nigeria, it is clear that these three independent variables play an important role in improving the service quality. Therefore, this implied that telecommunications firms in Nigeria should invest and make use of artificial intelligence technologies like data mining, machine learning, and chatbot software to enhance security, improve their reputation and increase the overall service quality of telecommunication firms.

5. Summary, Conclusion, and Recommendations

Objective of the study: This study aimed to examine the combined impact of artificial intelligence (AI) on the service quality of telecommunications firms in Nigeria. The analysis revealed that the independent variables collectively had a significant effect on the dependent variable. Data mining (DM) was found to have a positive and significant influence on service quality, while machine learning (ML) showed a negative and significant effect. Conversely, chatbots (CB) exhibited a positive and significant impact on service quality. These findings contribute to the understanding of how AI technologies can affect service quality in the telecommunications industry.

Conclusion: The results of the study indicate that implementing data mining can enhance service quality in telecommunications firms, aligning with previous research. This implementation not only improves customer service but also positively impacts firm performance and customer loyalty. On the other hand, machine learning was found to have a negative influence on service quality, contradicting some previous studies. However, variations in specific components of machine learning's impact were observed. Finally, the study confirms that chatbots positively affect service quality, consistent with existing literature.

Recommendations: Based on the findings, it is recommended that telecommunications firms in Nigeria consider adopting data mining techniques to enhance service quality and achieve better business outcomes. However, caution should be exercised when implementing machine learning algorithms, as they might negatively impact service quality in certain aspects. Additionally, the study suggests that integrating chatbots can be beneficial for improving service quality, and firms should explore their potential applications.

Limitations: The study acknowledges several limitations. First, the explanatory power of the model was relatively low, indicating that other significant AI variables not included in the analysis could influence service quality. Secondly, the study focused solely on the telecommunications industry in Nigeria, limiting generalizability to other sectors and countries. Furthermore, the study did not consider potential moderating factors that could affect the relationships between AI technologies and service quality.

Contribution to Existing Knowledge: This study contributes to existing knowledge by investigating the joint impact of AI on service quality in the Nigerian telecommunications industry. It offers insights into the specific effects of data mining, machine learning, and chatbots on service quality, providing a nuanced understanding of how these technologies can influence customer experiences.

Suggestions for Future Studies: Future research should aim to address the limitations of this study. Exploring additional AI variables and their effects on service quality could provide a more comprehensive understanding of the topic. It would also be beneficial to conduct comparative studies across different industries and countries to examine the generalizability of the findings. Moreover, investigating potential moderating factors and conducting longitudinal studies could provide valuable insights into the dynamics of AI's impact on service quality over time.

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