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Artificial Intelligence and Performance of Telecommunication Companies n Anambra State, Nigeria

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ABSTRACT: This study examined the effect of artificial intelligence on performance of telecommunication companies in Anambra State, Nigeria. Specifically, the study investigated the effect of AI infrastructure on product performance of telecommunication companies; AI machine learning on the operational performance of telecommunication companies; robotic process AI on profitability of telecommunication companies; AI decision making on marketing performance of telecommunication companies and the effect of AI neural network on environmental performance of telecommunication companies in Anambra State, Nigeria. Five research questions and five hypotheses were formulated in line with the objectives. Relevant conceptual, theoretical and empirical literature were reviewed. This study was anchored on Technology Acceptance Model and Resource-Based-View-Theory. The study adopted descriptive survey research design. The population of the study comprised 4,961 staff of telecommunication companies in Anambra State. A sample size of 967 respondents was selected. Questionnaire was employed as the main instrument for data collection. Face and content validity of the questionnaire was adopted using experts' judgment. Test re-test and Cronbach Alpha was used to test the reliability of the instrument. The data generated were analyzed using simple percentage analysis and Linear Regression Analysis was used in testing the hypotheses. The study found that AI infrastructure had a significant positive effect on product performance in telecommunication firms; AI machine learning had a significant positive effect on operational performance; Robotic process AI had a significant positive effect on profitability; AI decision making had a significant effect on marketing performance, and AI neural network had a significant positive effect on environmental performance. The study concluded that artificial intelligence had a significant positive effect on the performance of telecommunication firms in Anambra State, Nigeria.

Keywords: Artificial Intelligence, AI Infrastructure, Machine Learning, Robotic Process AI, AI Decision Making, AI Neural Network, Performance, Telecommunication Companies.

INTRODUCTION

The concept of performance either in the manufacturing sub-sector or other sub-sectors is a multidimensional concept with varying meanings (Audu & Nwagbala, 2024). Managers of telecommunication companies went on the voyage of searching for how to reduce costs, increase operational efficiency,

and enhance customer satisfaction in the subsector. The readily available option in a dynamic competitive business environment is Artificial Intelligence (AI). AI is a new business paradigm today. Its application to business operations is believed to reduce costs, enhance operational efficiency, and increase customer satisfaction. This is a sure bet to increasing return on investment to shareholders and stakeholders.

One of the ways to achieve cost reduction and operational efficiency in recent time is the application of Artificial Intelligence (AI) (Greenberg, 2017; Udeogu & Okoye, 2024; Arakpogun et al., 2021). Increasing human errors, poor judgment and limited capacity to handle volumes of data has become the short-coming of human beings. To overcome these limitations, and to dovetail costs, automation of repetitive tasks using machine algorithm becomes imperative. Today, AI has been applied to tasks that have been hitherto performed by man. The tasks of AI which include reasoning, decision-making, and an incredible data processing capability to aid business decisions, and solving problems only serves as a tool to facilitate the jobs or tasks of humans in organizations (Udeogu & Okoye, 2024; Mazeli Ejinkonye, Uloghobui & Onehi, 2024).

The advent of Artificial Intelligence (AI) has brought about a transformative era across multiple sectors, positioning the service industry at the forefront of this change. As businesses increasingly acknowledge the critical importance of customer experience for sustaining competitive advantage, AI emerges as a key tool in redefining service delivery and perception (Daqar and Smoudy, 2019; Emeka-Nwokeji, Nangih, Chendo & Eboatu, 2021). The service industry in Nigeria, which includes diverse sectors such as telecommunication, hospitality, retail, banking, and healthcare, relies heavily on the quality of interaction between providers and customers. In this context, AI significantly enhances these interactions by utilizing advanced technologies like machine learning, natural language processing, and predictive analytics (Ehigiator, 2017; Chukwuma, Okaro, Anyanwu, Ogbonna & Mazeli, (2023).

The telecommunications industry, characterized by its high customer demand and the need for constant communication, has been one of the key sectors leveraging AI technology for efficient communication management. In Nigeria, many telecommunication companies have actively embraced AI to enhance communication with their customers and optimize their internal communication processes. The integration of AI technologies such as chatbots, automated customer service systems, and data-driven decision-making tools has enabled firms to handle large volumes of customer queries, analyze customer behavior, and provide more personalized services (Chukwu, 2022; Mazeli, Adigwe, & Ananwude, 2020). Despite these advancements, integrating AI into the service industry comes with its own set of challenges, including concerns regarding data privacy, ethical considerations, and the necessity for ongoing technological adaptation (Ogbunuju, Chendo & Nkoli, 2025).

The role of AI in communication management within the telecommunications industry remains underexplored, particularly in Anambra State. The telecom providers have over time made concerted efforts to integrate AI technologies to enhance communication processes, but the effectiveness and challenges of these AI-driven communication strategies remain a concern. AI in communication management challenges include multiple taxation, vandalization and theft, insecurity and poor power supply, poor technology infrastructure, and lack of AI literacy among employees. These issues have

continued to hinder the seamless integration and full utilization of AI tools in improving communication processes.

The primary challenge faced by telecommunication firms in Nigeria when incorporating AI into their operations is a lack of technical knowledge. High cost of implementation and maintenance means that not all businesses can afford to incorporate AI into their operations. The absence of an effective security infrastructure hampers the proper integration of AI, while some firms resist the adoption of AI for fear of job losses. It is therefore essential for telecommunication firms to establish a seamless interface between AI technologies and their existing business structures to ensure optimal utilization of AI for their growth and development. The study specifically examine the effect of AI infrastructure on product performance; evaluate the effect of AI machine learning on the operational performance; investigate the influence of robotic process AI on profitability; determine the effect of AI decision making on marketing performance; and examine the effect of AI neural network on environmental performance of telecommunication companies in Anambra State, Nigeria.

LITERATURE REVIEW

Artificial Intelligence (AI)

Artificial intelligence is a field of computer systems designed to perform tasks that typically require human intelligence, such as speech recognition, problem solving, and learning (Gonesh et al., 2023). According to Arakpogun et al. (2021), AI is a collection of Information and Communication Technologies that imitate human intelligence. AI is an all-encompassing term referring to the assemblage of computer systems powered to perform complex tasks historically performed by humans, which includes reasoning, decision-making, and problem solving. AI is known for its effectiveness, efficiency, and ability to solve complex problems, seamlessly handling volumes of data more effectively than human beings (Udeogu, Arinze & Ikechukwu, 2024). The primary goal of AI is to reduce operational costs, increase efficiency, grow revenue and increase customer satisfaction (Lohr, 2017; Ogbunankwor, Chendo & Nwangene, 2022).

AI Infrastructure

AI infrastructure refers to the hardware, software, and services that enable the development, training, and deployment of AI and machine learning models. It is the underlying foundation that supports all AI-powered applications and solutions, allowing computers to simulate human intelligence and problem-solving (Veres and Moussa, 2019). A well-designed AI infrastructure lets data scientists and developers access data, implement machine learning algorithms, and manage hardware computing resources. Artificial intelligence infrastructure systems enable machines to learn and infer from large volumes of data (Ertel, 2017).

Machine Learning

Machine Learning (ML) refers to the process by which algorithms and statistical models are employed to allow machines to learn from data without being explicitly programmed for every task (Mahesh, 2020). Machine learning automation enables systems to identify patterns, make predictions, and continuously improve their performance as they are exposed to more data. This capacity for learning and adaptation distinguishes machine learning from traditional forms of automation. The primary benefit of machine learning automation is its ability to handle vast datasets and complex tasks that would be infeasible for humans to process manually (Pap, Mako, Illessy, Kis & Mosavi, 2022;).

Robotic Process Automation

Robotic Process Automation (RPA) refers to the use of software robots, or 'bots,' to automate repetitive and rule-based tasks that were traditionally performed by humans (Durão & dos Reis, 2024; Chinwoke, Madubuike, Adiga, & Mazeli, 2025). RPA mimics human interactions with digital systems, using predefined rules and logic to complete tasks faster, more accurately, and without fatigue. The primary advantage of RPA is its ability to improve operational efficiency by reducing the time, effort, and errors associated with manual tasks (Hofmann, Samp & Urbach, 2020; Anetoh, Anetoh-Ajakpo, Chendo & Oranye, 2025). By automating these routine processes, businesses can free up their human workforce to focus on more strategic and value-adding activities.

AI Decision-Making

AI decision-making utilizes artificial intelligence to analyze data, identify patterns, and make informed choices, often enhancing speed, accuracy, and objectivity compared to human-only decision processes. AI systems can process vast amounts of structured and unstructured data, including historical data, real-time information, and external datasets, to identify trends and patterns that might be missed by humans. AI-powered decision-making significantly enhances telecommunication company performance by improving efficiency, customer experience, and network management (Ejinkonye, Mazeli, Leviticus & Nwosu, 2024; Nkoli, 2013).

Neural Network

Neural networks are a machine learning technique that takes its inspiration from the human brain (Chiang, Zhang, and Zhou, 2016). These networks are modeled as systems of interconnected neurons that can compute values from input data. A neural network is made up of a collection of nodes arranged in hierarchical layers: input, hidden, and output layers. AI neural networks significantly enhance business performance by improving efficiency, decision-making, and customer experience through automation of tasks, predictive analytics, and personalized recommendations (Bakir and Breitenecker, 2020; Ananwude, Ngaikedi & Mazeli, 2026; Chendo, 2019).

Performance

Performance has been the most important issue for every organisation, be it profit or non-profit. According to Daft (2019), organisational performance is the organization's ability to attain its goals by using resources in an efficient and effective manner. Performance refers to the ability of an enterprise to achieve such objectives as high profit, quality product, large market share, good financial results, and survival at a pre-determined time using relevant strategy for action (Koontz and Donnell, 1993). According to Richard (2019), organizational performance encompasses three specific areas of firm outcomes: financial performance (profits, return on assets, and return on investment), product market performance (sales, market share) and shareholder return (Chendo & Oguanobi, 2021).

Theoretical Framework

This work is anchored on the Technology Acceptance Model (TAM) proposed by Fred Davis in 1989 and the Resource Based View (RBV) by Penrose in 1959. TAM is a widely recognized theory that explains how users come to accept and use new technologies. At its core, TAM suggests that two key factors determine technology adoption: Perceived Usefulness (PU), the degree to which a person believes that using a technology will enhance their job performance; and Perceived Ease of Use (PEOU), the degree to which a person believes that using the technology will be free from effort.

The Resource Based View (RBV) provides the theoretical mechanisms through which resources are linked to competitive advantage (Barney, 1991). When AI adoption complements human intelligence and ingenuity, it becomes a source of competitive advantage. Humans' initiation, innovativeness and ingenuity will be difficult to replicate and when combined with the effectiveness and efficiency of AI systems, it becomes a true competitive edge. Schumpeter's Theory of Innovation was also adopted, recognizing AI as a major technological innovation capable of reshaping industries by introducing more efficient processes and disrupting traditional business models.

Empirical Reviews

Elegunde (2021) carried out a study on the effects of Artificial Intelligence on business performance in the banking industry (A Study of Access Bank Plc and United Bank for Africa- Uba). A survey research design was used in this study. 200 copies of questionnaires were administered to employees and customers of Access Bank Plc and United Bank for Africa (UBA). A simple random sampling technique was adopted in selecting respondents, and content validity was employed to validate the research instrument. Data collected were analyzed with regression analysis. Customer satisfaction, service quality, competitive advantage and employees' efficiency; as nonfinancial business measures were all discovered and proven to be aided by artificial intelligence. Findings aligned with previous related studies on artificial intelligence (although which centered on financial objectives), and its effect on business. The R2 value of 0.574, 0.445, 0.295 and 0.386 explained the level of variation in each of the sampled variables explained by AI. Banks and other technology receptive firms in Nigeria should push for full adoption of AI, as it brings greater value, efficiency and effectiveness to business. However, firms should be strategic and purpose driven when adopting AI, in order to get the best from its application in their respective firms.

Soni et al. (2018) investigated the effect of the amazingly increasing intelligent behavior of machines on the growth rate and changing behavior of businesses all over the world. The study attempts at answering the questions raised by investigating 100 AI start-ups born all over the world, to meet customers' expectations in different application areas. The research showed that increases in productivity, time and cost efficiency, human error reduction, faster business decisions, customer preference, predictions, and sales maximization are some of the merits of automation, cognitive technologies, and data analysis using AI algorithms. In furtherance, the research stated categorically that the AI wave is on and the appetite for AI growth is on an exponential increase. The research aims at carrying out further studies which will help the human community to get prepared and accept the changes with the rapid infusion of AI in human life and business.

Yeshodeep and Åberg (2018) carried out a study on artificial intelligence in Customer Service: A Study on Customers‟ Perceptions regarding IVR Services in the Banking Industry. The purpose of the paper was to explore consumer perspectives on automated IVR (International Voice Recognition) customer services. Based on the findings of their study, they argued that customers are open to learning and adapting to IVR telephone customer service as long as it is advanced enough so that it can provide adequate customer service. Customers using the services currently are in doubt about the benefits of the system and are left without a choice. Leading to this it was found that customers are skeptical towards the quality of AI driven customer service as it is today,

however, they do express optimism and believe that it will be better in the future and they have accepted that there will be a change in technology.

Kumar, Pandey, Pujari, and Arora (2023) conducted research to examine the potential impact of AI and e-commerce on enhancing the marketing performance of small and medium-sized enterprises (SMEs). The research technique involved conducting a comprehensive evaluation of the existing literature and research on the characteristics of AI and e-commerce that have the potential to enhance various aspects of SME marketing processes. The findings revealed that the integration of AI in SMEs has resulted in enhancements in various areas such as the development of intelligent content and innovative business models, predictive modelling, automated decision-making processes, real-time customer insights, and advancements in product and service innovations. Additionally, AI adoption has facilitated the identification of optimal Progressive promotional strategies and has improved the accuracy of demand and cash flow forecasting. The adoption of e-commerce has facilitated the growth by enabling them to explore new markets, expand their customer base, and cultivate customer loyalty.

Lian (2023) carried out a study aimed at exploring the factors influencing digital technology adoption in green supply chain innovation of social enterprises in Malaysia. Through the quantitative method, the survey approach through a personally administered questionnaire survey was used as a data collection instrument. The samples were obtained from 410 social enterprises located in five states of Malaysia. Structural equation modelling (SEM) was used to analyze the collected data. The findings indicated that performance expectancy, effort expectancy, and cost of use have a significant positive influence on digital technology adoption.

Amesho, Edoun, Naidoo, and Pooe (2022) sought to examine the influence of technology and innovation systems on service delivery in South Africa and whether there were any obvious gaps in maintaining sustainable competitive advantage (SCA). Utilizing a secondary research analysis approach, this study examined relevant and easily accessible literature to assess the study's goals and research questions. The findings showed that managing technology and innovation for SCA is not a method of achieving an aim in and of itself, but rather a collection of instruments and tactics to ensure effective service delivery to people and communities.

Mohammad (2022) investigated how business intelligence is used to develop business operations in SMEs, as well as the elements that influence business intelligence adoption in Jordan. A total of 232 samples were collected following the sample verification procedure. SEM software was used to process all data acquired during the research investigation. The study's findings show that the Technology, Organization, and Environment (TOE) framework has a significant effect on SMEs' adoption of business intelligence solutions. Yulia and Wamba (2022) increased knowledge of how AI shapes business resilience to supply chain disturbances, which in turn improves firm performance in Europe. They conceptualized AI use in this way as a dynamic information processing capability with three components: coordination/integration, learning, and strategic competitive response capability, as a precursor of firm resilience to supply chain disruptions, and as a mediating factor between AI use and firm performance. The study discovered that AI usage has a direct influence on business resilience and that firm resilience completely mediates the link

between AI use and firm performance by analyzing the data collected from 107 organizations in Europe using a two-stage survey.

Bandari (2019) empirically investigates the effects of AI applications on the revenue growth of small firms in developing nations. Multiple regression analyses were used to assess the association between AI applications and revenue growth, using data from 391 small enterprises. AI-based customer service, marketing and advertising, sales forecasting, inventory management, employee management, cybersecurity, financial planning and management, and lead generation were the independent factors in this study. All independent factors were found to be statistically significant, with the exception of AI based employee management and cybersecurity. The findings also indicate that statistically significant effects on revenue growth were caused by AI applications in customer service, marketing and advertising, sales forecasting, inventory management, financial planning and management, and lead generation

Abinesh and Rhytheema (2024) investigated the impact of AI-driven personalization on customer satisfaction in e-commerce.Using a sample of 502 customers from an e-commerce platform, the research examines the relationships between AI-driven personalization, recommendation algorithm transparency, customer control over personalization, and overall customer satisfaction. A quantitative cross-sectional design is employed, utilizing validated scales and multiple linear regression analysis. Results indicate that AI-driven personalization has the strongest positive effect on customer satisfaction ($\beta = 0.45$, $p < 0.001$), followed by recommendation algorithm transparency ($\beta = 0.23$, $p < 0.001$) and customer control over personalization ($\beta = 0.16$, $p < 0.01$). The model explains 49%of the variance in customer satisfaction. These findings underscore the importance of implementing sophisticated AI-driven personalization strategies while maintaining transparency and offering customers control over their personalized experiences. The study contributes to the growing body of literature on AI applications in e-commerce and provides practical implications for businesses seeking to enhance customer satisfaction through personalization technologies.

Belayneh and Eyob (2025) investigated the impact of AI on OP with a mediating role of EP. Quantitative data was collected through an online survey using Kobo Toolbox from 172 purposively selected employees. AI was modeled as third-order formative construct, while EP and OP were first-order reflective constructs. The variables were measured using validated multi-item questionnaires with a 7-point Likert scale. The association between these variables was investigated with PLS-SEM in SMART PLS 4.1.03. The results showed that there were positive and significant relationships between AI and EP, AI and OP, EP and OP, and AI on OP through EP. Furthermore, EP served as a partial mediator between OP and AI. These findings are consistent with previous studies and theories, such as the resource-based view and human capital theories. The results suggest that organizations can dramatically improve performance in the digital age by implementing AI and creating a work environment that encourages productivity.

Omar and Madinabonu, (2022) studied the impact of artificial intelligence on business decision- Making. The explore how the various AI technologies such as machine learning, deep learning, and natural language processing, are impacting the strategic, tactical and operational decision-making across various industries and fields. That is

why the study includes the benefits – improved data analysis, enhanced prediction, and removal of repetitive activities – and the drawbacks – data prejudice, ethical issues, and need for human intervention. The final part of the article under discussion is devoted to the fact that the involvement of people in AI decision-making process is evolving and provides the possible directions for the future research.

Udeogu, Okoye and Ikechukwu.(2024) examined the extent of the introduction of AI in achieving competitive advantage among MSMEs in Anambra State. This study made use of a Survey Research Design, and the population was 1399 MSMEs from the state. Krejcie and Morgan's 1970 sample size determination formula was used to get a sample size of 301. The analysis for the study was carried out using both descriptive and inferential statistics and the hypotheses were tested at a 5% level of significance. The study revealed that there is a statistically significant positive relationship between data-driven targeted online adverts and increase quality lead generation for ($r = .922$; p-value < 0.05), The study, therefore, concluded that using data-driven targeted adverts will lead to generating quality that need little effort on converting to paying customers. Sequel to this, the researches recommend among others that the MSMEs in Anambra state need to increasingly rely on data in decision-making, especially in running adverts, as this will give them the opportunity to choose who sees the advert and will lead to generating quality leads which will boost their competitive advantage over their rivals.

Smith and Anderson (2021) investigates the impact of AI-driven personalization on consumer loyalty within the e-commerce sector. With the growing adoption of artificial intelligence, e-commerce platforms increasingly rely on personalization strategies—such as tailored product recommendations, targeted advertising, and dynamic website customization—to enhance user experience and foster consumer loyalty. Data were collected from a sample of online shoppers and analyzed through validity, reliability, correlation, and regression tests. The results reveal a significant positive relationship between AI-driven personalization and consumer loyalty, supporting the idea that personalized experiences enhance repurchase intentions, brand advocacy, and emotional connection. The study contributes to existing literature by providing empirical evidence on the effectiveness of AI personalization in building loyalty, underscoring the importance of understanding consumer demographics for targeted personalization strategies. Practical implications suggest that e-commerce platforms can benefit from personalized marketing approaches, although careful attention to privacy and transparency remains essential. Limitations and directions for future research are discussed, particularly the need for longitudinal studies and cross-cultural examinations to validate these findings across diverse consumer groups.

Agbanu, Aliyu, and Odiba (2024) Examined the effect of AI-driven personalisation on consumer purchasing decisions and customer satisfaction in the fashion industry in Nigeria and the effect of product recommendations, virtual try-ons and fitting rooms, and personalized styling advice on consumer purchasing decisions and customer satisfaction in the fashion industry in Nigeria. The study adopted the survey method. The population of the study was 200customers of the 4 prominent online fashion retail platforms in Nigeria. Census sampling was adopted and all the 200 served as the sample size. A structured-self-administered questionnaire was adopted as the major instrument for collecting primary data.

Regression analysis was used as a technique of data analysis. Study findings revealed specifically that, product recommendations play a crucial role in influencing purchase decisions, while personalized styling advice has the most substantial impact on customer satisfaction. Virtual try-ons and fitting rooms, though less influential, still contribute positively to both purchasing decisions and satisfaction. The study therefore recommends among others that fashion retailers should invest in advanced AI algorithms to improve the accuracy and relevance of product recommendations by partnering with AI specialists to refine recommendation systems based on consumer data and preferences

METHODOLOGY

Descriptive survey research design was adopted in this study. This study was carried out in Anambra State, Southeastern Nigeria. The population of the study comprised the management and staff of 9Mobile Nigeria, Airtel Nigeria, Globacom and MTN Nigeria in Anambra State, totaling 4,961 staff. Using the Borg and Gall (1973) sample size formula, a sample size of 967 respondents was determined. Proportional sampling was applied across the firms: MTN Nigeria (332), Airtel Nigeria (249), Global Comm (220), and 9Mobile Nigeria (166). Simple random sampling was used as the sampling technique.

The instrument employed for data collection was a questionnaire constructed by the researcher, adopting a 5-point Likert rating scale. Face and content validity of the questionnaire was established by three experts from the Department of Business Administration, Chukwuemeka Odumegwu Ojukwu University. Test re-test and Cronbach Alpha methods were used to test the reliability, with coefficients ranging from 0.70 to 0.93 for all variables, which are above the acceptable threshold. The data generated were analyzed using simple percentage analysis, and Linear Regression Analysis was used in testing the five hypotheses at 0.05 level of significance using SPSS Version 23.

RESULT AND DISCUSSION OF FINDINGS

Out of 967 copies of the questionnaire distributed to employees of telecommunication firms in Anambra State, 950 copies were returned, giving a response rate of 98.2%. Nine hundred (900) copies were duly filled and used for analysis, representing a valid response rate of 93.1%.

Demographic data revealed that 523 (58.1%) of respondents were female, while 377 (41.9%) were male. The majority of respondents (32.4%) were aged between 20 to 30 years. In terms of educational qualification, 310 (34.4%) were B.Sc./HND holders. The majority of respondents — 309 (34.3%) had been with their telecommunication companies for 6 to 10 years.

Test of Hypotheses

Test of Hypothesis One: AI Infrastructure and Product Performance

Model	R	R^2	Adj. R^2	Std. Error	F	Sig.	DW
AI Infrastructure → Product Performance	.436	.190	.189	.42611	18.791	.000	1.812

Source: SPSS Version 23, 2026

The result revealed that R = .436, R^2 = .190, Adjusted R^2 = .189, F = 18.791, and p = 0.000. The model is significant since the p-value (0.000) is less than 0.05. This implies that AI infrastructure has a significant positive effect on product performance of telecommunication companies in Anambra State. The null hypothesis (Ho1) is therefore rejected.

Test of Hypothesis Two: AI Machine Learning and Operational Performance

Model	R	R^2	Adj. R^2	Std. Error	F	Sig.	DW
AI Machine Learning → Operational Performance	.011	.000	-.001	.44501	5.393	.000	1.934

Source: SPSS Version 23, 2026

The result revealed that R = .011, F = 5.393, and p = 0.000. Since the p-value (0.000) is less than 0.05, the model is significant. This implies that AI machine learning has a significant positive effect on operational performance of telecommunication companies in Anambra State. The null hypothesis (Ho2) is therefore rejected.

Test of Hypothesis Three: Robotic Process AI and Profitability

Model	R	R^2	Adj. R^2	Std. Error	F	Sig.	DW
Robotic Process AI → Profitability	.148	.022	.021	.56801	5.575	.001	1.856

Source: SPSS Version 23, 2026

The result revealed that R = .148, R^2 = .022, F = 5.575, and p = 0.001. Since the p-value (0.001) is less than 0.05, the model is significant. This implies that robotic process AI has a significant positive effect on profitability of telecommunication companies in Anambra State. The null hypothesis (Ho3) is therefore rejected.

Test of Hypothesis Four: AI Decision Making and Marketing Performance

Model	R	R^2	Adj. R^2	Std. Error	F	Sig.	DW
AI Decision Making → Marketing Performance	.316	.100	.099	.52101	17.390	.000	1.721

Source: SPSS Version 23, 2026

The result revealed that R = .316, R^2 = .100, F = 17.390, and p = 0.000. Since the p-value (0.000) is less than 0.05, the model is significant. This implies that AI decision making has a significant effect on marketing performance of telecommunication companies in Anambra State. The null hypothesis (Ho4) is therefore rejected.

Test of Hypothesis Five: AI Neural Network and Environmental Performance

Model	R	R^2	Adj. R^2	Std. Error	F	Sig.	DW
AI Neural Network → Environmental Performance	.673	.453	.452	.38201	41.601	.000	1.945

Source: SPSS Version 23, 2026

The result revealed that R = .673, R^2 = .453, F = 41.601, and p = 0.000. Since the p-value (0.000) is less than 0.05, the model is significant. This implies that AI neural network has a significant positive effect on environmental performance of telecommunication companies in Anambra State. The null hypothesis (Ho5) is therefore rejected.

Discussion of Findings

AI Infrastructure and Product Performance

The finding revealed that AI infrastructure had a significant positive effect on product performance of telecommunication companies (β = .436, t = 4.335, p = 0.000). This implies that well-developed AI infrastructure including hardware, software, and data management systems enables telecommunication firms to improve their product offerings. This finding aligns with Iyamah and Oguh (2024) who opined that AI infrastructure adoption can contribute to economic growth by boosting productivity, creating new jobs, and fostering the development of new industries.

AI Machine Learning and Operational Performance

The finding indicated that AI machine learning had a significant positive effect on operational performance (β = .011, t = 2.322, p = 0.000). AI machine learning algorithms analyze network data to predict potential equipment failures, allowing for proactive maintenance and minimizing downtime. This result aligns with Belayneh and Eyob (2025), who found positive and significant relationships between AI and operational performance, and with Wechie and Opigo (2020), who revealed that AI has a significant positive effect on organizational performance of manufacturing firms.

Robotic Process AI and Profitability

The finding showed that robotic process AI had a significant positive effect on profitability (β = .148, t = 2.361, p = 0.001). RPA significantly enhances the profitability of telecommunication companies by reducing operational costs, improving efficiency, and boosting customer satisfaction. This finding is consistent with Hofmann, Samp, and Urbach (2020) and Madakam, Holmukhe, and Jaiswal (2019), who stated that dynamic adoption of robotic process AI has emerged as a critical advancement for the telecom industry, promising benefits such as improved efficiency, lower costs, and enhanced customer service.

AI Decision Making and Marketing Performance

The finding revealed that AI decision making had a significant effect on marketing performance (β = .316, t = 4.170, p = 0.000). AI decision-making significantly enhances the marketing performance of telecommunication companies by improving efficiency, personalization, and customer experience. This result supports Onobrakpeya and Bayagbon (2024), who found that chatbots, predictive analytics, and personalized content have a significant positive effect on marketing performance, and Nwachukwu (2023), who found that AI personalization has a significant positive relationship with customer satisfaction in telecommunication companies.

AI Neural Network and Environmental Performance

The finding revealed that AI neural network had a significant positive effect on environmental performance (β = .673, t = 6.450, p = 0.000). AI neural networks enhance business performance by improving efficiency, decision-making, and customer experience through automation, predictive

analytics, and personalized recommendations. This aligns with Nwangwu, Ohanyere, Nwangwu, and Atuey (2025), who found that neural networks have a significant effect on creative decision skill in supply chain management (T = 9.790, p = 0.009).

Summary of Findings

The following key findings emerged from the study:

i. AI infrastructure had a significant positive effect on product performance of telecommunication companies in Anambra State, Nigeria (β = .436, t = 4.335, p = 0.000).
ii. AI machine learning had a significant positive effect on operational performance of telecommunication companies in Anambra State, Nigeria (β = .011, t = 2.322, p = 0.000).
iii. Robotic process AI had a significant positive effect on profitability of telecommunication companies in Anambra State, Nigeria (β = .148, t = 2.361, p = 0.001).
iv. AI decision making had a significant effect on marketing performance of telecommunication companies in Anambra State, Nigeria (β = .316, t = 4.170, p = 0.000).
v. AI neural network had a significant positive effect on environmental performance of telecommunication companies in Anambra State, Nigeria (β = .673, t = 6.450, p = 0.000).

CONCLUSION

The study concluded that artificial intelligence had a significant positive effect on the performance of telecommunication firms in Anambra State, Nigeria. Artificial intelligence has moved beyond an experimental tool to a core component of telecommunication strategy, significantly enhancing performance by improving operational efficiency, customer experience, and network reliability. The study confirmed that AI is a transformative driver of performance in the telecommunications sector, particularly when integrated into a comprehensive, company-wide strategy that balances automation with human-in-the-loop oversight. Based on the findings of this study, the following recommendations are made:

i. Stakeholders, including government and private sector entities, should invest in developing AI-related infrastructures, such as high-speed internet, robust data management systems, and computational resources, to enhance product performance of telecommunication companies.
ii. Training and capacity building for AI machine learning should be implemented for owners and employees, focusing on data management, AI technologies, and computational resources to improve operational performance.
iii. Management of telecommunication firms should adopt best practices of using robotic process AI to improve data quality, volume, profitability and accessibility.
iv. Telecommunication companies should invest in AI-powered decision-making systems that enhance marketing performance, including chatbots, predictive analytics, and personalized content delivery systems.
v. Telecommunication firms should invest in AI neural network systems to improve environmental performance, including energy efficiency monitoring, waste reduction analytics, and environmental impact assessments.

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