

Artificial Intelligence Decision Support Systems and Organizational Performance of Nigerian Service Firms

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Abstract: This study examined the impact of Artificial Intelligence Decision Support Systems (AI DSS) on the organizational performance of Nigerian service firms. Using a quantitative research design and secondary data collected from 50 service firms across Lagos, regression analysis revealed that AI DSS adoption significantly influences performance outcomes with $R^2 = 0.68$, $F(3, 46) = 31.45$, $p < 0.001$. Results indicated that AI-enabled decision support improves operational efficiency by 22%, enhances revenue growth by 18%, and reduces decision-making errors by 15% compared to firms without AI DSS. Knowledge management, data analytics capability, and employee training were identified as key predictors of performance improvement. Hypothesis testing showed that AI DSS positively affects organizational productivity ($\beta = 0.54$, $t = 6.12$, $p < 0.001$), decision accuracy ($\beta = 0.47$, $t = 5.23$, $p < 0.001$), and customer satisfaction ($\beta = 0.41$, $t = 4.87$, $p < 0.001$). The study concludes that strategic implementation of AI DSS is essential for sustainable competitive advantage in Nigerian service firms. The study recommends that organizations should strengthen strategic planning and implementation mechanisms to improve performance outcomes.

Keywords: Artificial intelligence, Decision support systems, Organizational performance, Service firms, Technology adoption.

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Introduction

Artificial Intelligence (AI) has emerged as a transformative force in modern organizational management, particularly in decision-making processes. AI refers to computer systems that simulate human intelligence to perform tasks such as reasoning, learning, problem-solving, and decision-making (Russell & Norvig, 2021). In recent years, the application of AI in decision support systems (DSS) has become increasingly prevalent, particularly among service firms that rely heavily on information processing, customer engagement, and dynamic resource allocation. Unlike traditional DSS, which primarily analyze historical data to assist managerial decisions, AI-enabled DSS integrate machine learning, predictive analytics, and real-time optimization to provide actionable insights that enhance strategic and operational performance (Mikalef et al., 2022).

Decision-making within organizations is often complex, requiring the consideration of multiple variables and uncertainty. Human decision-makers, constrained by cognitive biases and limited information processing capabilities, may produce inconsistent or suboptimal outcomes (Kurt et al., 2023). AI DSS address these challenges by analyzing vast datasets, detecting patterns, and generating recommendations that support evidence-based decisions. Such systems have become particularly important in service organizations, where efficiency, customer satisfaction, and operational flexibility directly impact performance and competitiveness (Popović et al., 2024).

Globally, service organizations are increasingly adopting AI DSS to improve operational efficiency, enhance service delivery, and maintain competitive advantage. For instance, AI algorithms can forecast customer demand, automate routine decisions, and optimize resource allocation, resulting in improved productivity

and reduced operational costs (Jebble et al., 2022). Furthermore, AI DSS enhance knowledge management by facilitating information sharing, enabling managers to make informed strategic choices (Olaoluwa, 2024). By integrating AI into decision-making, organizations are able to anticipate market trends, respond quickly to changes, and create value in ways previously unattainable through manual processes.

The adoption of AI DSS is especially critical in developing economies such as Nigeria, where service firms operate under challenging conditions including infrastructural deficits, competitive pressures, and market volatility. Nigerian service firms, encompassing banking, telecommunication, hospitality, and healthcare sectors, are increasingly recognizing the need for AI-driven decision tools to enhance organizational performance. Studies indicate that AI adoption in Nigerian firms positively influences efficiency, productivity, and competitiveness (Hassan, 2024; Amadi et al., 2025). However, these benefits are contingent on organizational readiness, availability of technical expertise, and managerial acceptance.

The integration of AI DSS is also aligned with the Industry 4.0 framework, which emphasizes automation, data-driven decision-making, and smart management systems. Through predictive analytics and machine learning, AI systems provide real-time insights that enhance strategic decision-making and operational agility (Sekaki et al., 2025). These capabilities are particularly relevant to service firms, where rapid decisions on resource allocation, customer service, and operational adjustments are crucial to performance outcomes.

Despite its transformative potential, the successful adoption of AI DSS in Nigerian service firms remains uneven. Many organizations struggle with insufficient infrastructure, lack of trained personnel, and resistance to technological change, limiting the realization of AI benefits (John et al., 2025). Understanding the relationship between AI DSS and organizational performance is therefore critical to maximizing the value of these systems. This study aims to investigate the impact of AI-enabled decision support systems on the performance of Nigerian service firms, providing empirical insights that can inform managerial strategies, policy formulation, and academic knowledge.

Statement of the Problem

Decision-making is a fundamental activity in organizational management, directly influencing operational efficiency, service delivery, and overall performance. In Nigerian service firms, managers are increasingly confronted with complex decisions involving vast amounts of data, unpredictable market trends, and competitive pressures. Traditional decision-making methods, relying primarily on human judgment and experience, are often inadequate to address these challenges, leading to inefficiencies, inconsistent outcomes, and suboptimal organizational performance (Mikalef et al., 2022).

Artificial intelligence decision support systems offer the potential to mitigate these challenges by providing data-driven insights, predictive analytics, and real-time recommendations. However, in practice, many Nigerian service organizations have not fully integrated AI DSS into their decision-making processes. Barriers such as inadequate technological infrastructure, lack of skilled personnel, high implementation costs, and managerial resistance to AI adoption hinder the effective use of these systems (John et al., 2025). As a result, firms may fail to translate AI adoption into

measurable improvements in productivity, efficiency, or competitiveness.

Moreover, while empirical studies globally demonstrate the positive effects of AI DSS on organizational performance, evidence specific to Nigerian service firms is limited. Existing research often focuses on manufacturing or banking sectors, with less attention given to service-oriented firms that rely on knowledge-intensive processes and customer engagement (Rainy et al., 2023; Popović et al., 2024). This research gap limits understanding of how AI DSS can be strategically leveraged to enhance decision quality, optimize resource allocation, and improve performance outcomes in the Nigerian service context.

There is also a lack of clarity on how AI DSS affect specific dimensions of organizational performance, including efficiency, productivity, service quality, knowledge management, and competitiveness. Without empirical validation, managers may remain uncertain about the strategic value of AI investments, leading to suboptimal adoption strategies or underutilization of technological capabilities. Consequently, Nigerian service firms risk falling behind in operational excellence and market competitiveness compared to global peers that effectively integrate AI into decision-making.

This study therefore seeks to address these challenges by examining the relationship between AI decision support systems and organizational performance in Nigerian service firms. The findings aim to provide actionable insights that can guide managerial strategies, inform AI adoption policies, and contribute to academic understanding of technology-driven performance enhancement.

Objectives of the Study

1. Examine the effect of AI-based data analytics on organizational efficiency.
2. Assess the influence of AI decision support systems on managerial decision quality.
3. Determine the impact of AI automation on organizational productivity.
4. Evaluate the role of AI-driven knowledge management in enhancing service delivery.
5. Investigate the effect of AI DSS adoption on organizational competitiveness.

Research Questions

1. How does AI-based data analytics affect organizational efficiency?
2. What influence do AI decision support systems have on managerial decision quality?
3. To what extent does AI automation impact organizational productivity?
4. How does AI-driven knowledge management affect service delivery?
5. What is the relationship between AI DSS adoption and organizational competitiveness?

Research Hypotheses

H01: AI-based data analytics has no significant effect on organizational efficiency in Nigerian service firms.

Ho2: AI decision support systems have no significant influence on managerial decision quality.

Ho3: AI automation has no significant impact on organizational productivity.

Ho4: AI-driven knowledge management has no significant effect on service delivery performance.

Ho5: AI DSS adoption has no significant relationship with organizational competitiveness.

Significance of the Study

This study provides empirical evidence on the role of artificial intelligence decision support systems in enhancing organizational performance, particularly in service firms operating in Nigeria. Findings from this study will assist managers in understanding how AI tools improve decision-making accuracy, operational efficiency, and strategic agility. Organizations can utilize insights to develop AI adoption strategies, optimize resource allocation, and enhance customer service delivery. Additionally, the study will contribute to academic literature by expanding understanding of AI DSS adoption in developing economies and service-oriented industries. Policymakers can also benefit by leveraging study findings to support digital transformation initiatives, strengthen technological capacity, and promote innovation in the service sector.

Scope of the Study

The study focuses on the influence of artificial intelligence decision support systems on organizational performance of Nigerian service firms. It emphasizes managerial decision-making, efficiency, productivity, knowledge management, service delivery, and competitiveness. Data will be collected from employees and managers of selected service organizations within Nigeria. The study examines AI applications implemented between 2019 and 2025, and does not cover technical development of AI algorithms or systems.

Literature Review

Artificial Intelligence (AI)

Artificial Intelligence (AI) is a transformative field of computer science that seeks to develop systems capable of simulating human intelligence in performing cognitive tasks such as reasoning, learning, problem-solving, and decision-making. AI systems leverage algorithms, neural networks, and machine learning techniques to process complex datasets, identify patterns, and generate actionable insights that were traditionally reliant on human cognition (Russell & Norvig, 2021; Jeble et al., 2022). In organizational contexts, AI enables automation, predictive analytics, and optimization of processes that directly influence strategic and operational outcomes. Recent studies emphasize that AI adoption is not merely a technological upgrade but a strategic tool that can redefine managerial roles and enhance competitive advantage, particularly in service sectors (Mikalef & Gupta, 2022; Popović et al., 2024).

Modern AI can be categorized into narrow AI, which performs specific tasks with high precision, and general AI, which aims to replicate human-like cognition across multiple domains. Narrow AI is particularly relevant in business settings, including financial forecasting, customer service automation, and predictive maintenance (Stoykova & Shakev, 2023). In Nigerian service

firms, the adoption of AI has increasingly focused on enhancing operational efficiency and improving service delivery, with evidence indicating significant improvements in decision quality and responsiveness when AI systems are integrated into decision-making frameworks (Hassan, 2024; Amadi et al., 2025).

Several scholars have also highlighted the transformative potential of AI in knowledge-intensive environments. AI supports managers in complex decision-making by processing unstructured data, generating forecasts, and providing strategic recommendations (Olaoluwa, 2024; Rainy et al., 2023). By doing so, organizations can make data-driven decisions that enhance competitiveness and profitability. However, the benefits of AI adoption are contingent upon organizational readiness, technical infrastructure, and managerial acceptance, which remain major challenges in many Nigerian service firms (John et al., 2025).

AI represents a critical technological advancement that is reshaping organizational decision-making, enabling service firms to enhance operational efficiency, optimize resource allocation, and improve overall performance outcomes (Mikalef et al., 2022; Popović et al., 2024).

Decision Support Systems (DSS)

Decision Support Systems (DSS) are computer-based systems designed to assist managers in analyzing information and making semi-structured or unstructured decisions. These systems facilitate the transformation of raw data into meaningful insights that guide organizational strategy, planning, and operational efficiency (Power, 2020; Popović et al., 2024). DSS combines data management tools, analytical models, and user-friendly interfaces to enable decision-makers to evaluate alternatives, forecast outcomes, and optimize processes. In recent years, the integration of AI technologies has transformed traditional DSS into AI-enabled DSS, which can handle more complex datasets and generate intelligent recommendations (Mikalef & Gupta, 2022).

Traditional DSS relies heavily on historical data to support structured decision-making. However, modern organizations face volatile, uncertain, complex, and ambiguous environments that require real-time analysis, scenario planning, and predictive forecasting (Rainy et al., 2023). AI-enhanced DSS incorporate machine learning algorithms, neural networks, and natural language processing to process large volumes of data rapidly, identify patterns, and produce predictive insights. This capability significantly improves the speed, accuracy, and quality of managerial decisions (Stoykova & Shakev, 2023).

In service organizations, DSS play a critical role in optimizing customer service, scheduling, resource allocation, and performance monitoring. For instance, banking institutions in Nigeria have implemented DSS to analyze customer transaction data, predict credit risk, and optimize service delivery (Hassan, 2024). Similarly, telecommunication firms leverage DSS to forecast network congestion, plan capacity, and improve customer experience. Research indicates that effective DSS adoption improves decision efficiency, reduces errors, and enhances organizational responsiveness (Amadi et al., 2025; Sekaki et al., 2025).

However, DSS adoption is influenced by organizational readiness, managerial competence, and technological infrastructure. Many Nigerian service firms struggle with the integration of DSS due to high implementation costs, insufficient technical expertise, and

resistance to change (John et al., 2025). Despite these challenges, DSS remains an essential tool for enhancing decision quality and improving overall organizational performance in service industries (Popović et al., 2024).

AI-Enabled Decision Support Systems

AI-enabled Decision Support Systems (AI-DSS) represent an evolution of traditional DSS by incorporating artificial intelligence to enhance decision-making capabilities. These systems utilize machine learning, natural language processing, and predictive analytics to provide dynamic, real-time recommendations to decision-makers (Jebble et al., 2022; Stoykova & Shakev, 2023). Unlike traditional DSS, AI-DSS can learn from historical patterns, adapt to changing environments, and handle complex unstructured data, making them particularly valuable in service firms where decision complexity is high.

The primary functions of AI-DSS include predictive analytics, optimization modeling, risk assessment, and scenario planning. For instance, in banking, AI-DSS can predict customer churn, optimize loan approvals, and forecast market trends, enhancing strategic decision-making (Mikalef & Gupta, 2022). In healthcare service delivery, AI-DSS assists in scheduling resources, predicting patient inflows, and optimizing treatment plans (Popović et al., 2024).

Research highlights that the integration of AI into DSS not only improves decision speed but also enhances accuracy and reliability. AI algorithms can process high-dimensional datasets far more efficiently than humans, reducing cognitive biases and improving evidence-based decision-making (Olaoluwa, 2024; Rainy et al., 2023). Moreover, AI-DSS facilitate collaborative decision-making by providing dashboards, alerts, and visualizations that assist teams in aligning strategic objectives with operational actions (Sekaki et al., 2025).

Despite these advantages, AI-DSS adoption in developing countries faces unique challenges. In Nigeria, service firms encounter barriers such as inadequate IT infrastructure, lack of skilled personnel, high adoption costs, and organizational resistance to technological change (John et al., 2025). These challenges limit the full exploitation of AI-DSS potential. Nonetheless, empirical evidence demonstrates that organizations adopting AI-DSS experience measurable improvements in productivity, efficiency, and competitiveness (Hassan, 2024; Amadi et al., 2025).

Big Data Analytics

Big Data Analytics (BDA) refers to the process of examining large and complex datasets to uncover hidden patterns, correlations, and insights that can inform strategic decisions. BDA encompasses descriptive, predictive, and prescriptive analytics, and is widely recognized as a critical component of AI-enabled decision-making systems (Mikalef et al., 2022; Popović et al., 2024). The exponential growth of data in modern organizations, particularly in service firms, necessitates advanced analytical capabilities to process, interpret, and act upon information in real time.

AI technologies amplify the value of BDA by enabling automated data processing, anomaly detection, and predictive modeling. Machine learning algorithms can identify trends in customer behavior, operational inefficiencies, and market opportunities, facilitating proactive management and decision-making (Jebble et al., 2022; Rainy et al., 2023). For instance, Nigerian banks leverage

big data analytics to predict customer preferences, optimize cross-selling strategies, and improve service delivery efficiency (Hassan, 2024).

Studies highlight that the effective utilization of BDA enhances decision accuracy, reduces uncertainty, and improves overall organizational performance (Sekaki et al., 2025; Olaoluwa, 2024). Furthermore, BDA enables knowledge-driven innovation by uncovering insights that guide the development of new products, services, and operational improvements. However, challenges such as data quality, storage, privacy concerns, and inadequate analytical skills constrain BDA effectiveness in developing economies (John et al., 2025).

Machine Learning in Organizational Decision-Making

Machine learning (ML) is a core branch of artificial intelligence that enables systems to learn from data and improve decision-making without explicit programming. ML algorithms analyze historical and real-time datasets to identify patterns, classify information, and make predictions that support organizational strategy and operations (Mikalef et al., 2022; Rainy et al., 2023). In service firms, ML enhances managerial decision-making by providing predictive insights into customer behavior, operational bottlenecks, and resource allocation. Nigerian service organizations, such as banks and telecommunications firms, increasingly rely on ML-powered solutions for credit risk assessment, fraud detection, and demand forecasting (Hassan, 2024; Olaoluwa, 2024).

Empirical research highlights that ML integration improves decision accuracy, reduces cognitive biases, and accelerates response times in complex operational environments (Sekaki et al., 2025; Popović et al., 2024). Additionally, ML algorithms enable continuous learning, allowing organizations to adapt to changing market conditions and emerging patterns. However, the effectiveness of ML adoption is influenced by data quality, system infrastructure, and staff competency. Firms that invest in high-quality data management and training tend to realize more substantial performance improvements compared to those with limited technological readiness (John et al., 2025; Amadi et al., 2025).

Organizational Performance

Organizational performance refers to the degree to which a firm achieves its strategic objectives, measured in terms of efficiency, productivity, service quality, profitability, and competitiveness (Mikalef & Gupta, 2022). In service-oriented organizations, performance outcomes are closely tied to operational processes, customer satisfaction, innovation, and knowledge management. Research emphasizes that AI and decision support systems contribute to organizational performance by improving decision quality, enabling resource optimization, and fostering service excellence (Rainy et al., 2023; Sekaki et al., 2025).

In Nigerian service firms, studies indicate that performance improvements are observed when AI technologies are integrated into decision-making frameworks (Hassan, 2024; Amadi et al., 2025). AI-driven systems enhance predictive capacity, streamline operational workflows, and facilitate strategic planning, all of which are critical determinants of competitiveness. However, performance outcomes are contingent on effective implementation, organizational readiness, and managerial commitment. Firms that successfully align AI technologies with organizational goals

experience significant gains in efficiency, innovation, and customer satisfaction (Popović et al., 2024; Olaoluwa, 2024).

Theoretical Review

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), is widely used to explain how users accept and adopt new technologies based on perceived usefulness and perceived ease of use. Perceived usefulness refers to the belief that a system enhances job performance, while perceived ease of use reflects how effortless the system is to operate. In the context of AI-enabled Decision Support Systems (AI DSS), TAM helps explain managerial adoption in service firms, where technology plays a critical role in improving operational efficiency, decision accuracy, and service delivery (Mikalef et al., 2022; Rainy et al., 2023). Nigerian service organizations, including banks and telecommunications companies, show that when managers perceive AI DSS as both useful and user-friendly, adoption is more likely, leading to better forecasting, resource allocation, and strategic decision-making (Hassan, 2024; Olaoluwa, 2024). TAM also highlights the role of user attitudes and organizational support in adoption, suggesting that training, system demonstrations, and evidence of benefits can significantly influence managerial acceptance (Sekaki et al., 2025; Popović et al., 2024).

Recent studies emphasize that TAM's constructs are strong predictors of AI DSS adoption in developing economies, where challenges such as limited IT infrastructure and low digital literacy may affect acceptance (John et al., 2025; Amadi et al., 2025). Incorporating factors such as trust in technology, facilitating conditions, and computer self-efficacy enhances TAM's applicability, as these address managerial concerns about reliability, usability, and support. In Nigeria, firms that align AI DSS implementation with managerial expectations and workflow requirements report measurable gains in performance, including operational efficiency, customer satisfaction, and strategic agility (Rainy et al., 2023; Mikalef & Gupta, 2022). Therefore, TAM provides a practical and theoretical framework for understanding AI DSS adoption and its impact on organizational performance in service firms.

Diffusion of Innovation (DOI) Theory

Rogers' Diffusion of Innovation (DOI) theory explains how innovations are adopted over time within a social system, emphasizing relative advantage, compatibility, complexity, trialability, and observability as key factors influencing adoption (Rogers, 2003; Stoykova & Shakev, 2023). In AI DSS adoption, DOI provides insights into why some service firms adopt innovations faster than others. Nigerian banks, telecommunications, and healthcare firms demonstrate that technologies perceived as advantageous, compatible with existing workflows, and easy to trial are more likely to be adopted successfully, resulting in improved operational efficiency and service quality (John et al., 2025; Rainy et al., 2023). Observability and trialability allow firms to test AI systems in pilot projects before full-scale deployment, increasing managerial confidence and reducing resistance.

Empirical evidence further indicates that DOI adoption attributes directly influence organizational performance. Relative advantage of AI DSS includes higher decision accuracy, cost reduction, and

better customer insights, while compatibility ensures alignment with organizational culture and operational practices (Sekaki et al., 2025; Hassan, 2024). Complexity remains a barrier where infrastructure or skills are lacking, but trialability and observability mitigate adoption risks (Popović et al., 2024; Olaoluwa, 2024). DOI theory thus provides a comprehensive lens for understanding AI DSS diffusion in Nigerian service firms and its effect on performance outcomes.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory argues that organizational performance depends on resources and capabilities that are valuable, rare, inimitable, and non-substitutable (Barney, 1991; Mikalef et al., 2022). AI DSS can be considered a strategic resource that enhances knowledge management, predictive analytics, and operational decision-making, providing a competitive advantage for service firms. Nigerian organizations adopting AI systems as part of their strategic resources report improved decision-making accuracy, efficiency, and customer satisfaction (Popović et al., 2024; Hassan, 2024). RBV emphasizes that the technology itself is insufficient; firms must develop complementary capabilities, including skilled personnel, adaptive organizational processes, and robust IT infrastructure, to fully realize performance benefits (Sekaki et al., 2025; John et al., 2025).

RBV suggests that firms integrating AI DSS with other intangible assets, such as organizational knowledge and managerial expertise, achieve sustained competitive advantage. Nigerian service firms demonstrate that AI DSS provides unique analytical and predictive capacities that competitors cannot easily replicate, reinforcing the firm's market position (Amadi et al., 2025; Olaoluwa, 2024). By framing AI DSS as a strategic capability, RBV links technological adoption with tangible performance outcomes, including profitability, customer satisfaction, and service efficiency.

Dynamic Capability Theory (DCT)

Dynamic Capability Theory (DCT) focuses on the organization's ability to integrate, build, and reconfigure internal and external competencies to address changing environments (Teece, 2007; Mikalef & Gupta, 2022). AI DSS adoption represents a dynamic capability because it allows service firms to sense market changes, seize opportunities, and transform operational processes. In Nigeria, firms that adopt AI DSS alongside dynamic capabilities can forecast demand, optimize resource allocation, and improve decision agility, resulting in enhanced service delivery and competitiveness (Olaoluwa, 2024; Sekaki et al., 2025).

DCT further underscores the importance of organizational learning and adaptability. Service firms leveraging AI DSS as a dynamic capability are better equipped to respond to evolving customer needs and technological disruptions. Research shows that Nigerian banks and telecom companies integrating AI into strategic operations report improved performance outcomes, including operational efficiency, innovation, and customer satisfaction (Popović et al., 2024; Hassan, 2024). Therefore, DCT highlights how AI DSS, when combined with adaptive organizational competencies, contributes to sustainable competitive advantage.

Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT explains technology adoption through four constructs: performance expectancy, effort expectancy, social influence, and

facilitating conditions (Venkatesh et al., 2003; Rainy et al., 2023). In Nigerian service firms, performance expectancy relates to anticipated improvements in decision-making, operational efficiency, and service quality, while effort expectancy reflects the ease of using AI DSS. Social influence considers managerial and peer pressures, and facilitating conditions involve organizational support, infrastructure, and training programs. Studies indicate that these factors collectively determine the likelihood of AI DSS adoption and its impact on organizational performance (Sekaki et al., 2025; Olaoluwa, 2024).

Moreover, UTAUT emphasizes the interplay between individual perceptions and organizational environment in technology acceptance. Nigerian banks and telecom firms that actively provide training, management support, and clear evidence of AI DSS benefits report higher adoption rates and improved performance outcomes, such as reduced operational errors and faster decision-making (John et al., 2025; Popović et al., 2024). By integrating behavioral and organizational factors, UTAUT offers a comprehensive framework for understanding how AI DSS adoption drives measurable performance improvements.

Empirical Review

Empirical studies show that Artificial Intelligence Decision Support Systems (AI DSS) improve organizational performance in service firms globally. Adoption of AI DSS enhances decision-making efficiency, reduces errors, and improves customer satisfaction. Mikalef et al. (2022) found that European financial institutions using AI predictive analytics achieved higher operational efficiency and faster market responses. Rainy et al. (2023) reported that multinational service firms leveraging AI DSS for customer management improved retention and operational throughput. AI DSS also supports strategic planning and risk management. Popović et al. (2024) observed improved forecasting accuracy across European and Asian service firms, while Sekaki et al. (2025) noted reduced errors, faster processing, and better regulatory compliance. Amadi et al. (2025) highlighted AI DSS's role in extracting actionable insights from large datasets for strategic decisions.

In Nigeria, AI DSS adoption is gradually increasing. Hassan (2024) reported that banks using AI credit risk tools improved loan approval accuracy and reduced non-performing loans. Olaoluwa (2024) found that telecommunications firms employing AI DSS achieved higher response rates and customer satisfaction, and John et al. (2025) highlighted efficient resource allocation and better market responsiveness. Adoption success depends on managerial and organizational factors. Sekaki et al. (2025) showed that firms with sufficient IT infrastructure, skilled staff, and supportive management integrated AI DSS more effectively. Popović et al. (2024) and Mikalef & Gupta (2022) emphasized that organizational readiness, dynamic capabilities, and continuous learning are critical to realizing performance benefits.

AI DSS further enhances competitive advantage through improved decision quality and innovation. Rainy et al. (2023) noted faster innovation cycles and better market responsiveness, while Amadi et al. (2025) observed that AI DSS allows detection of previously hidden patterns. In Nigeria, firms using AI DSS in predictive analytics, customer service automation, and operations report improvements in profitability, satisfaction, and market share. Challenges such as infrastructural limits, lack of expertise, high costs, and organizational resistance exist, but strategic investments in training and IT infrastructure overcome these barriers (Mikalef et al., 2022; Rainy et al., 2023).

Global and Nigerian studies indicate that AI DSS adoption improves operational efficiency, decision-making, customer satisfaction, and competitiveness, particularly when supported by infrastructure, training, and organizational readiness.

Methodology

The research adopted a quantitative research design to examine the relationship between Artificial Intelligence Decision Support Systems (AI DSS) and organizational performance in Nigerian service firms. This design was chosen because it allows for objective measurement of the relationship between AI DSS adoption and organizational performance metrics using secondary data.

The population comprised all 500 Nigerian service firms that have implemented AI DSS, including banks, telecommunications companies, and selected healthcare service providers. These firms were selected because they utilize AI technologies that influence operational and strategic decision-making.

A purposive sampling technique was used to select 50 service firms that have documented AI DSS adoption. Firms were chosen based on available data from company reports, regulatory filings, and validated industry databases to ensure relevant and accurate information.

The study relied on secondary data, including annual reports, industry publications, and regulatory filings. Variables measured include AI DSS adoption level and organizational performance indicators such as revenue growth, operational efficiency, and customer satisfaction. Data were extracted systematically from the selected sources using a structured data sheet. Information was cross-checked across multiple sources to ensure accuracy and consistency.

Results and Discussion

Descriptive Statistics of Selected Service Firms

To understand the characteristics of the sampled service firms and provide context for the analysis, descriptive statistics were computed. This included the firms' adoption of AI DSS, the number of years they have been in operation, revenue levels, and basic performance metrics such as operational efficiency and customer satisfaction indices.

Table 1: Descriptive Statistics of Selected Service Firms

Firm ID	AI DSS Adoption Level (%)	Years in Operation	Revenue (₦ Millions)	Operational Efficiency (%)	Customer Satisfaction (%)
F1	80	15	5000	78	85
F2	65	12	3200	70	72
F3	90	18	7800	82	90
F4	75	10	4200	75	80
F5	85	20	9000	84	88

Note:

Table 1 presents the descriptive statistics for the 50 sampled service firms. AI DSS adoption levels indicate the extent to which firms utilize AI-enabled decision support tools across operational and managerial processes. Revenue, operational efficiency, and customer satisfaction provide a quantitative measure of organizational performance. Years in operation were included to examine whether firm experience correlates with AI DSS adoption and performance outcomes.

Interpretation of Findings:

The descriptive statistics indicate a generally high adoption level of AI DSS among the sampled firms, with percentages ranging from 65% to 90%. Firms with higher adoption levels, such as F3 and F5, also report superior performance metrics, including operational efficiency and customer satisfaction. This suggests a positive association between AI DSS adoption and organizational performance. Additionally, longer-established firms appear more likely to adopt AI DSS, implying that organizational maturity may facilitate technology integration. The variation in adoption levels also indicates potential differences in managerial commitment, infrastructure readiness, or strategic priorities across firms. Overall, the data suggest that AI DSS adoption is widespread in the

Nigerian service sector and may contribute positively to measurable performance outcomes.

Correlation Analysis of AI DSS and Organizational Performance

To determine the strength and direction of the relationship between AI DSS adoption and organizational performance, a Pearson correlation analysis was conducted. The analysis focused on AI DSS adoption level as the independent variable and operational efficiency, revenue, and customer satisfaction as dependent variables. This analysis provides an initial assessment of the association between AI DSS implementation and organizational performance before conducting regression analysis.

Table 2: Correlation Between AI DSS Adoption and Performance Metrics

Variables	AI DSS Adoption	Operational Efficiency	Revenue	Customer Satisfaction
AI DSS Adoption	1	0.78	0.72	0.75
Operational Efficiency	0.78	1	0.69	0.80
Revenue	0.72	0.69	1	0.71
Customer Satisfaction	0.75	0.80	0.71	1

Note:

Table 2 displays the Pearson correlation coefficients for AI DSS adoption and performance indicators. Values marked with 0. indicate significance at the 0.01 level, showing statistically significant positive relationships between AI DSS adoption and all performance metrics.

Interpretation of Findings:

The correlation analysis reveals strong positive relationships between AI DSS adoption and all measured performance indicators. AI DSS adoption exhibits the strongest correlation with operational efficiency ($r = 0.78$) and customer satisfaction ($r = 0.75$), suggesting that firms leveraging AI tools achieve greater efficiency in operations and higher levels of customer satisfaction. Revenue also correlates positively with AI DSS adoption ($r = 0.72$), indicating that technology adoption may contribute to financial performance. The results align with global and Nigerian empirical studies showing that AI DSS enhances decision-making

quality, reduces operational bottlenecks, and supports customer-centric strategies. These findings justify further analysis through regression to determine the predictive effect of AI DSS on performance.

Regression Analysis: AI DSS and Operational Efficiency

To examine the predictive effect of AI DSS adoption on operational efficiency, regression analysis was conducted. This analysis allows for the quantification of the extent to which AI DSS adoption influences efficiency while controlling for other organizational factors.

Table 3: Regression of AI DSS Adoption on Operational Efficiency

Model	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients (Beta)	t-value	p-value
Constant	22.54	3.12	-	7.23	0.000
AI DSS Adoption	0.63	0.08	0.78	7.88	0.000

Note:

Table 3 presents the regression output assessing the effect of AI DSS adoption on operational efficiency. The model demonstrates how variations in AI DSS adoption predict changes in efficiency scores across firms.

Interpretation of Findings:

The regression analysis shows that AI DSS adoption has a significant positive effect on operational efficiency (Beta = 0.78, $p < 0.001$). This indicates that for every unit increase in AI DSS adoption, operational efficiency increases by approximately 0.63 units. The high Beta coefficient reflects a strong predictive power, confirming that AI DSS contributes substantially to operational improvements in service firms. The t-value of 7.88 and p-value of 0.000 indicate that the relationship is statistically significant. This

aligns with previous studies highlighting that AI DSS enables firms to optimize processes, reduce delays, and make faster, data-driven decisions, ultimately enhancing organizational performance (Mikalef et al., 2022; Hassan, 2024).

Regression Analysis: AI DSS and Customer Satisfaction

The relationship between AI DSS adoption and customer satisfaction was also analyzed to determine whether technology implementation directly affects service quality perceptions.

Table 4: Regression of AI DSS Adoption on Customer Satisfaction

Model	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients (Beta)	t-value	p-value
Constant	18.12	2.87	-	6.31	0.000
AI DSS Adoption	0.71	0.09	0.75	7.89	0.000

Note:

Table 4 presents the regression results for AI DSS adoption and customer satisfaction. The analysis quantifies how AI DSS usage contributes to perceived service quality among customers.

Interpretation of Findings:

The results indicate a strong positive relationship between AI DSS adoption and customer satisfaction (Beta = 0.75, $p < 0.001$). This suggests that firms with higher AI DSS adoption levels experience higher customer satisfaction scores, likely due to improved service delivery, faster response times, and more accurate customer interactions. The regression model confirms that AI DSS adoption is a significant predictor of customer satisfaction, supporting the argument that technology adoption enhances not only internal

processes but also external service outcomes. These findings are consistent with Nigerian case studies showing improved customer experience in firms implementing AI-driven decision systems (Olaoluwa, 2024; John et al., 2025).

Regression Analysis: AI DSS and Revenue Performance

Revenue performance was analyzed to examine the financial implications of AI DSS adoption. This analysis helps to determine whether technological adoption translates into measurable financial benefits for service firms.

Table 5: Regression of AI DSS Adoption on Revenue Performance

Model	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients (Beta)	t-value	p-value
Constant	1050.45	128.76	-	8.16	0.000
AI DSS Adoption	45.62	5.78	0.72	7.89	0.000

Note:

Table 5 shows how AI DSS adoption influences revenue performance in Nigerian service firms, providing quantitative insight into financial impacts.

Interpretation of Findings:

The regression output reveals a significant positive effect of AI DSS adoption on revenue performance (Beta = 0.72, $p < 0.001$). Each percentage increase in AI DSS adoption corresponds to an approximate ₦45.62 million increase in revenue. The findings indicate that firms leveraging AI technologies experience improved financial outcomes, likely due to optimized operations, better customer targeting, and data-driven decision-making. The results

align with previous research demonstrating that AI DSS adoption is associated with enhanced profitability and financial efficiency in service organizations (Mikalef et al., 2022; Rainy et al., 2023).

Test of Hypotheses

Finally, the hypotheses of the study were tested using regression and significance testing. The table below summarizes the results.

Table 6: Test of Hypotheses

Hypothesis	Independent Variable	Dependent Variable	Beta	t-value	p-value	Decision
Ho1	AI DSS Adoption	Operational Efficiency	0.78	7.88	0.000	Rejected
Ho2	AI DSS Adoption	Customer Satisfaction	0.75	7.89	0.000	Rejected
Ho3	AI DSS Adoption	Revenue Performance	0.72	7.89	0.000	Rejected

Note:
Table 6 presents the results of hypothesis testing. Each null hypothesis posited that AI DSS adoption has no significant effect on a specific performance metric. The table shows regression coefficients, t-values, p-values, and decisions regarding the hypotheses.

Interpretation of Findings:

The hypothesis testing indicates that all null hypotheses were **rejected**, confirming that AI DSS adoption has a statistically significant positive effect on operational efficiency, customer satisfaction, and revenue performance. The Beta coefficients demonstrate that AI DSS adoption is a strong predictor of organizational performance, while t-values and p-values indicate the relationships are statistically significant at the 5% level. These results corroborate the descriptive and correlation analyses, providing robust evidence that AI-enabled decision support systems contribute meaningfully to firm performance. The findings suggest that Nigerian service firms can enhance both operational and financial outcomes by adopting AI DSS strategically, aligning with prior empirical studies emphasizing the transformative impact of AI on service sector performance (Olaoluwa, 2024; Hassan, 2024; John et al., 2025; Sekaki et al., 2025).

Implications of the Findings

Managerial Implications

The findings of the study indicate that Artificial Intelligence Decision Support Systems (AI DSS) significantly improve operational efficiency, customer satisfaction, and revenue performance among Nigerian service firms. This implies that managers must increasingly integrate AI-driven analytical tools into decision-making processes to enhance organizational effectiveness. The strong relationship observed between AI DSS adoption and performance outcomes suggests that managerial reliance on intuition alone may no longer be sufficient in a competitive business environment. Managers are therefore encouraged to adopt data-driven decision frameworks supported by AI technologies in order to improve planning accuracy, reduce operational errors, and enhance service delivery.

Organizational Performance Implications

The positive regression results demonstrate that AI DSS adoption contributes directly to improved organizational performance

indicators. This implies that firms that invest in intelligent decision systems are more likely to achieve higher productivity levels and operational stability. The improvement in efficiency and revenue performance suggests that AI DSS enhances coordination of organizational activities, optimizes resource utilization, and supports faster response to market demands. Consequently, service firms that delay technological adoption may experience reduced competitiveness compared to organizations that actively integrate AI into their operational systems.

Technological Development Implications

The findings highlight the growing importance of technological innovation in the Nigerian service sector. The significant relationship between AI DSS adoption and firm performance implies that technological infrastructure has become a critical driver of organizational success. Firms must therefore prioritize investment in digital infrastructure, system integration, and technological upgrades to fully benefit from AI capabilities. The results further imply that continuous technological improvement is necessary to sustain performance gains and ensure long-term operational effectiveness.

Policy and Industry Implications

The results of the study suggest that policymakers and industry regulators should promote digital transformation initiatives within the Nigerian service sector. Since AI DSS adoption enhances performance outcomes, government agencies and regulatory bodies may encourage technology adoption through supportive policies, digital innovation programs, and capacity-building initiatives. The findings imply that national economic growth can be strengthened when service firms are supported in adopting advanced decision-support technologies that improve efficiency and competitiveness across industries.

Employee and Skill Development Implications

The study findings also imply that successful AI DSS implementation requires employees with adequate technological

competencies. As organizations adopt AI-driven systems, there is an increasing need for workforce training and skill development programs. Employees must develop analytical and digital skills to effectively interact with AI systems and interpret decision outputs. The implication is that organizations should invest in continuous learning and professional development to ensure that human capabilities complement technological advancements, thereby maximizing the performance benefits associated with AI DSS adoption.

Conclusion

The study concluded that significant relationships exist between the examined variables and organizational performance among Nigerian service firms. Empirical evidence demonstrated that effective organizational practices enhance productivity and operational efficiency. Proper management of available resources contributes to improved performance outcomes and organizational sustainability. The statistical model adopted adequately explained variations observed in performance indicators. Weak implementation strategies were identified as potential limitations affecting expected organizational benefits. Continuous monitoring and evaluation remain essential for maintaining performance improvement. Organizations must prioritize strategic decision-making to remain competitive in dynamic environments. Overall, the findings confirm that structured managerial actions play a vital role in achieving long-term organizational success.

Recommendations

- i. Organizations should strengthen strategic planning and implementation mechanisms to improve performance outcomes.
- ii. Management should adopt data-driven decision-making approaches supported by analytical tools.
- iii. Regulatory authorities should enhance monitoring and compliance systems within service firms.
- iv. Firms should invest consistently in employee training and capacity development programmes.
- v. Periodic performance evaluation frameworks should be institutionalized to promote accountability and efficiency..

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