



Artificial Intelligence Utilization as a Correlate of Management Effectiveness in Public Tertiary Institutions in Edo State, Nigeria

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Abstract. The increasing adoption of Artificial Intelligence (AI) in higher education presents significant opportunities for improving institutional management; however, empirical evidence on its utilization and relationship with management effectiveness in Nigerian tertiary institutions remains limited. This study examined the relationship between Artificial Intelligence utilization and management effectiveness in public tertiary institutions in Edo State, Nigeria. Anchored on the Technology Acceptance Model and Systems Theory, the study adopted a correlational research design. The population comprised academic staff, non-teaching staff, and students from Federal and State-owned tertiary institutions in Edo State, from which a sample of 300 respondents was selected using a multi-stage sampling procedure. Data were collected using the validated and pilot-tested *Artificial Intelligence Utilization and Management Effectiveness Questionnaire (AIUMEQ)* and analysed using mean, standard deviation, and Pearson Product Moment Correlation at the 0.05 level of significance. The findings revealed that the level of Artificial Intelligence utilization in the institutions was low, while management effectiveness was moderate. The study further established a statistically significant positive relationship between Artificial Intelligence utilization and management effectiveness, indicating that institutions with higher levels of AI Utilization tended to demonstrate better planning, communication, coordination, monitoring, and decision-making processes. The study concluded that Artificial Intelligence utilization is positively associated with management effectiveness and represents a strategic resource for enhancing institutional administration. It recommended increased investment in AI infrastructure, capacity building, and policy frameworks to promote the

effective integration and utilization of AI technologies into tertiary institution management and improve organisational effectiveness.

Keywords: Artificial Intelligence, Management Effectiveness, Public Tertiary Institutions, Educational Management, Technology Utilization.

1. Introduction

The rapid advancement of digital technologies has transformed virtually every sector of human endeavor, including education. In recent years, Artificial Intelligence (AI) has emerged as one of the most innovative technological developments influencing institutional management in the areas of planning and administration, instructional delivery, decision-making, and organizational effectiveness across the globe. Artificial Intelligence refers to the simulation of human intelligence in computer systems designed to perform tasks that normally require human intelligence, such as learning, critical reasoning, problem-solving, prediction, communication, and data analysis among others. The integration of AI into educational systems has significantly reshaped the management and operational processes of tertiary institutions by improving efficiency, accuracy, and service delivery.

Globally, tertiary institutions are increasingly adopting AI-driven technologies to enhance administrative effectiveness, institutional planning, student management, and quality assurance processes. AI-powered systems such as Student Information Systems (SIS), Enterprise Resource Planning (ERP) platforms, Learning Management Systems (LMS), predictive analytics tools, biometric attendance systems, virtual assistants, and

decision-support systems are now widely utilized to facilitate institutional management and improve educational outcomes. These technologies have contributed to improved coordination of academic activities, effective communication, streamlined admission processes, automated record management, and data-driven decision-making in higher education institutions.

The growing complexity of tertiary institution management in the 21st century has increased the need for innovative management approaches capable of addressing challenges associated with large student populations, data management, institutional coordination, quality assurance, and service delivery. Traditional administrative methods are gradually becoming inadequate for managing the dynamic demands of modern tertiary education. Consequently, tertiary institutions are increasingly embracing AI technologies to enhance operational efficiency and institutional effectiveness. AI utilization in tertiary education management has the capacity to reduce administrative bottlenecks, improve productivity, strengthen monitoring systems, and facilitate timely decision-making.

In Nigeria, the integration of AI into tertiary education management is gradually gaining attention as institutions seek to align with global trends in educational digitalization and smart institutional governance. Several tertiary institutions now utilize AI-supported platforms for online registration, computer-based examinations, digital communication, virtual learning, plagiarism detection, and student data management. Despite these developments, the extent of AI utilization in tertiary institution management across many states, including Edo State, remains uncertain and uneven. Some institutions still experience challenges such as inadequate technological infrastructure, limited technical expertise, poor funding, resistance to technological innovation, and insufficient policy support for effective AI integration.

Management effectiveness in tertiary institutions is essential for achieving institutional goals, ensuring quality service delivery, promoting staff productivity, maintaining academic standards, and enhancing students' educational experiences. Effective management involves efficient coordination of institutional resources, timely implementation of policies, transparent decision-making, effective supervision, and quality assurance practices. In the contemporary educational environment, the effectiveness of institutional management is increasingly linked to the extent to which modern technologies, particularly AI systems, are utilized to support administrative and academic operations.

The utilization of AI technologies in tertiary institutions may contribute significantly to management effectiveness through automation of administrative functions, improved institutional planning, enhanced communication systems, predictive data analysis, and efficient monitoring mechanisms. AI-driven systems can facilitate real-time access to institutional data, improve coordination among departments, strengthen academic quality assurance, and enhance responsiveness to the needs of staff and students. Furthermore, AI-supported tools such as predictive analytics and learning management systems can assist administrators in identifying institutional challenges and implementing evidence-based solutions.

In Edo State, tertiary institutions continue to experience increasing demands for efficient administration, effective academic coordination, improved service delivery, and enhanced institutional accountability. Although some institutions have introduced digital technologies into their administrative operations, there is limited empirical evidence regarding the extent to which AI technologies are specifically utilized and how such utilization influences management effectiveness. This situation creates the need for empirical investigation into the relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions within the state.

Therefore, this study seeks to examine Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State. Specifically, the study focuses on the utilization of AI administrative management tools, AI academic planning and decision-support tools, AI communication and service delivery tools, as well as AI monitoring, security, and quality assurance tools in relation to management effectiveness within tertiary institutions.

1.1 Background to the Study

The rapid advancement of digital technologies has continued to reshape management in terms of administrative systems, communication patterns, and organizational practices across the globe. Among these technological innovations, Artificial Intelligence (AI) has emerged as one of the most transformative developments of the twenty-first century. Artificial Intelligence refers to computer-based systems capable of performing tasks that ordinarily require human intelligence, such as reasoning, learning, prediction, problem-solving, communication, and decision-making. Russell and Norvig (2021) described Artificial Intelligence as the development of intelligent agents capable of perceiving their environment and taking actions that

maximize the achievement of specific goals. The increasing sophistication of AI technologies has influenced virtually every sector of society, including healthcare, finance, governance, manufacturing, and education. In recent years, educational institutions across the world have increasingly adopted AI-driven technologies to improve institutional administration, operational efficiency, and service delivery.

The contemporary education sector, particularly tertiary education, now operates within an increasingly complex and technology-driven environment characterized by rising student enrolment, expanding administrative responsibilities, increasing demand for accountability, and heightened expectations for quality educational services. Tertiary institutions serve as centres for knowledge generation, manpower development, research, innovation, and professional training. Consequently, the effectiveness of institutional management remains fundamental to educational development and national transformation. However, the growing complexity of tertiary institution administration has continued to expose the limitations of traditional management systems that depend heavily on manual documentation, bureaucratic procedures, fragmented communication channels, and conventional decision-making processes. Fullan (2016) observed that educational institutions in the contemporary digital era must embrace technological innovation in order to remain effective, competitive, and responsive to societal demands. This growing need for institutional efficiency has intensified the integration of digital technologies, especially Artificial Intelligence, into tertiary institution management systems globally.

Artificial Intelligence utilization in tertiary institutions involves the deployment of AI-powered technologies and intelligent digital systems to support academic, administrative, managerial, and institutional operations. AI utilization extends beyond basic digitalization to include the application of intelligent systems capable of automating routine activities, analyzing institutional data, supporting planning processes, facilitating communication, improving decision-making, and strengthening institutional monitoring mechanisms. Luckin, Holmes, Griffiths, and Forcier (2016) argued that Artificial Intelligence possesses considerable potential for improving educational administration through automation, personalization of services, and evidence-based institutional management. The increasing adoption of AI technologies within tertiary institutions therefore reflects the growing recognition of AI as a strategic tool for enhancing institutional sustainability,

operational efficiency, and educational effectiveness.

One important dimension of AI utilization in tertiary institutions is the application of AI administrative management tools. Modern tertiary institutions generate large volumes of data relating to admissions, examinations, finance, staff records, students' academic profiles, and institutional operations. Managing these data manually often results in delays, duplication of functions, poor coordination, administrative inefficiency, and increased susceptibility to human error. Consequently, many tertiary institutions across the world increasingly utilize AI-powered technologies such as Student Information Systems (SIS), Enterprise Resource Planning (ERP) systems, automated admission platforms, biometric attendance systems, and intelligent document management systems to facilitate institutional administration. Holmes, Bialik, and Fadel (2019) maintained that AI-driven administrative systems improve organizational efficiency through automation of repetitive operations, improved information management, reduction of human error, and enhanced institutional coordination. Through these technologies, institutional administrators are able to process information more efficiently, improve records accessibility, and facilitate timely administrative operations.

Another critical aspect of AI utilization in tertiary institutions relates to academic planning and decision-support systems. Effective educational management depends largely on timely access to reliable institutional data for planning, forecasting, monitoring, evaluation, and policy implementation. AI-powered technologies such as predictive analytics systems, learning analytics platforms, intelligent scheduling software, and decision-support systems assist administrators in analyzing institutional data for evidence-based decision-making. Siemens and Baker (2012) explained that learning analytics technologies enable educational institutions to monitor students' learning patterns, identify academic risks, predict performance outcomes, and improve planning processes. The integration of AI technologies into institutional planning may therefore contribute significantly to proactive governance, effective resource allocation, improved academic coordination, and data-driven administrative decision-making within tertiary institutions.

Similarly, AI communication and service delivery tools have increasingly transformed communication systems and institutional support services within tertiary institutions. Effective communication remains central to institutional management because it promotes coordination, transparency,

participation, responsiveness, and administrative efficiency. The growing adoption of AI-powered communication systems such as chatbots, automated email systems, virtual assistants, and Learning Management Systems (LMS) has improved interaction among administrators, staff, and students. Zawacki-Richter, Marin, Bond, and Gouverneur (2019) noted that AI-supported communication technologies improve accessibility to institutional services, strengthen educational support systems, and enhance responsiveness to students' needs. In addition, Learning Management Systems such as Moodle and Google Classroom have expanded opportunities for online learning, digital interaction, and virtual academic support services within tertiary institutions. These developments underscore the increasing relevance of AI technologies in improving institutional communication and service delivery effectiveness.

Beyond communication and planning processes, AI technologies have also become increasingly relevant in institutional monitoring, security administration, and quality assurance practices. Quality assurance constitutes a major component of tertiary institution management because it promotes accountability, institutional credibility, and compliance with academic standards. AI-supported technologies such as plagiarism detection software, Computer-Based Test (CBT) systems, surveillance technologies, and automated performance evaluation platforms are increasingly utilized to strengthen institutional monitoring and quality assurance mechanisms. UNESCO (2021) emphasized that AI technologies possess considerable capacity to improve educational governance through enhanced monitoring systems, institutional accountability, and intelligent data management. Similarly, plagiarism detection tools such as Turnitin contribute significantly to maintaining academic integrity and promoting ethical scholarly practices within tertiary institutions. Consequently, the integration of AI-driven monitoring and evaluation systems may improve institutional effectiveness and strengthen educational quality assurance processes.

The concept of management effectiveness in tertiary institutions refers to the ability of institutional administrators to efficiently coordinate human and material resources toward the realization of educational goals and organizational objectives. Management effectiveness is reflected in administrative efficiency, institutional coordination, policy implementation, staff productivity, transparency, accountability, quality service delivery, and effective decision-making processes. Peretomode (2012) maintained that effective management in higher education involves proper coordination of institutional resources for the

realization of educational goals and organizational efficiency. In contemporary educational systems, institutional effectiveness increasingly depends on the extent to which tertiary institutions are able to integrate innovative technologies into their administrative and academic operations. Consequently, institutions that fail to adequately adapt to technological innovations may continue to experience administrative inefficiencies, delayed service delivery, weak institutional coordination, and poor organizational responsiveness.

Globally, universities and other higher education institutions across Europe, North America, and Asia have made significant progress in integrating Artificial Intelligence into institutional management and educational administration. AI technologies are now widely utilized for academic monitoring, students' support services, institutional planning, online learning management, security administration, automated communication systems, and quality assurance processes. These developments reflect the growing recognition of AI as an indispensable component of modern tertiary institution governance. The increasing globalization of education and the emergence of smart educational systems have further intensified pressure on tertiary institutions in developing countries to align with global trends in educational digitalization and intelligent institutional management.

Within Africa, and particularly in Nigeria, the integration of Artificial Intelligence technologies into tertiary institution administration is gradually expanding. Several Nigerian tertiary institutions now utilize digital technologies such as electronic registration systems, Learning Management Systems, biometric attendance platforms, Computer-Based Testing systems, and online communication tools for academic and administrative purposes. Okebukola (2020) observed that the digitalization of higher education administration in Nigeria has contributed to improved institutional communication and increased access to educational services. Nevertheless, the level of AI utilization within many Nigerian tertiary institutions remains relatively low and uneven due to persistent infrastructural and institutional challenges.

Several factors continue to hinder effective AI integration within tertiary institutions in Nigeria. These include inadequate technological infrastructure, unstable electricity supply, poor internet connectivity, insufficient funding, shortage of technical manpower, inadequate staff training opportunities, resistance to technological innovation, and weak institutional policies supporting digital transformation. Afolabi and Oyetoro (2022) noted that many Nigerian tertiary

institutions still face significant challenges relating to technological readiness and digital integration. Consequently, administrative bottlenecks, delays in institutional processes, ineffective communication systems, poor data management practices, and weak monitoring mechanisms continue to affect the effectiveness of tertiary institution management in several parts of the country.

In Edo State, tertiary institutions continue to experience increasing demands for effective institutional governance, improved academic coordination, quality service delivery, and enhanced accountability. The expansion of tertiary education within the state has further increased administrative workload and intensified the need for innovative management approaches capable of addressing contemporary institutional challenges. Although some institutions have introduced technologies such as Learning Management Systems, electronic admission platforms, Computer-Based Testing systems, and biometric attendance systems into their operations, observations suggest that the utilization of advanced AI-driven systems for comprehensive institutional management remains relatively limited and inconsistent across institutions.

Furthermore, many tertiary institutions within Edo State still appear to experience challenges relating to administrative bottlenecks, delays in service delivery, ineffective communication systems, weak institutional coordination, inadequate monitoring practices, and limitations in academic planning and quality assurance processes. These challenges raise concerns regarding the effectiveness of institutional management and the extent to which Artificial Intelligence technologies are currently utilized to improve administrative efficiency and organizational performance. Despite the growing importance of Artificial Intelligence in educational management, there appears to be limited empirical evidence regarding the relationship between AI utilization and management effectiveness within tertiary institutions in Edo State.

Most existing studies in Nigeria have focused primarily on Information and Communication Technology (ICT) integration, e-learning adoption, computer literacy, and digital instructional delivery, with limited scholarly attention devoted specifically to Artificial Intelligence utilization in tertiary institution management and its relationship with management effectiveness. This situation creates a significant empirical and knowledge gap requiring further scholarly investigation. It is against this backdrop that this study investigates the relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State.

1.2 Research Questions

To guide this study, the following research questions were raised:

- What is the level of AI utilization in tertiary institutions in Edo State?
- What is the level of management effectiveness in tertiary institutions in Edo State?
- What relationship exists between AI utilization and management effectiveness?

1.3 Hypothesis

To further investigate the relationship between the variables, research question three was formulated into a null hypothesis and tested at the 0.05 level of significance.

H₀₁: There is no significant relationship between artificial intelligence utilization and management effectiveness in tertiary institutions in Edo State.

2. Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM) developed by Fred Davis in 1989 and supported by Systems Theory propounded by Ludwig von Bertalanffy in 1968. The combination of these theories provides an appropriate theoretical foundation for explaining the utilization of Artificial Intelligence technologies and their relationship with management effectiveness in tertiary institutions.

The Technology Acceptance Model (TAM) was developed by Davis (1989) to explain users' acceptance and utilization of technological innovations within organizational settings. The theory posits that individuals' willingness to adopt and utilize a technological system is primarily influenced by two major determinants, namely perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which an individual believes that the use of a particular technology will improve job performance, while perceived ease of use refers to the extent to which an individual believes that utilizing a technology will be free from difficulty or excessive effort.

According to Davis (1989), when users perceive a technological innovation as useful and easy to use, they are more likely to develop positive attitudes toward the technology, leading to greater acceptance, adoption, and utilization. Over the years, the Technology Acceptance Model has been widely utilized in studies relating to technology adoption, digital transformation, information

systems utilization, e-learning, and organizational technological innovation.

The relevance of the Technology Acceptance Model to this study lies in its ability to explain the extent to which tertiary institutions and their stakeholders adopt and utilize Artificial Intelligence technologies for administrative and academic purposes. The utilization of AI-powered technologies such as Student Information Systems (SIS), Enterprise Resource Planning (ERP) systems, Learning Management Systems (LMS), predictive analytics tools, automated admission systems, biometric attendance systems, and AI-supported communication platforms largely depends on how useful and accessible these technologies are perceived by administrators, staff, and students.

In the context of this study, the Technology Acceptance Model explains that tertiary institutions are more likely to effectively utilize Artificial Intelligence technologies when stakeholders perceive such technologies as capable of improving institutional Management, communication, planning, monitoring, decision-making, and service delivery. The Model further suggests that the effectiveness of institutional management may improve where AI technologies are adequately accepted and utilized by institutional units. Thus, TAM provides a suitable explanation for the relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State.

The study is supported by the Systems Theory developed by Ludwig von Bertalanffy (1968). Systems Theory views an organization as an interconnected and interdependent structure made up of various components working together toward the achievement of common goals and objectives. The theory emphasizes that organizations function effectively when the various units and subsystems operate in a coordinated and integrated manner.

Within the context of educational management, tertiary institutions are viewed as open systems consisting of interrelated units such as academic departments, administrative divisions, students' services, registry units, quality assurance units, ICT units, and management structures. The effectiveness of the institution depends on the degree of interaction, coordination, communication, and information flow among these units.

Systems Theory posits that the introduction of technological innovations into any aspect of an organization affects the functioning of the entire system. Consequently, the integration of Artificial Intelligence technologies into tertiary institution management has implications for institutional

coordination, administrative efficiency, decision-making, communication systems, quality assurance practices, and overall management effectiveness. AI technologies facilitate data processing, information management, institutional monitoring, communication, and integration of administrative operations across various units within tertiary institutions.

The theory is relevant to this study because Artificial Intelligence technologies function as integral components of the institutional management system. The utilization of AI administrative management tools, AI academic planning systems, AI communication platforms, and AI monitoring technologies contributes to improved coordination and operational efficiency within tertiary institutions. Through Systems Theory, the study explains how the effective integration of Artificial Intelligence technologies into institutional subsystems may enhance overall management effectiveness.

The choice of the Technology Acceptance Model and Systems Theory for this study is justified because both theories adequately explain the major variables of the study and the relationship existing between them. The Technology Acceptance Model provides explanation for the adoption and utilization of Artificial Intelligence technologies within tertiary institutions, while Systems Theory explains how such technological integration influences institutional coordination and management effectiveness.

Specifically, TAM explains why Academic Staff, Non-Teaching Staff, and Students may accept and utilize Artificial Intelligence technologies within tertiary institutions based on perceived usefulness and ease of use. This directly relates to the independent variable of the study, which is Artificial Intelligence utilization. On the other hand, Systems Theory explains how the integration of AI technologies into institutional operations can improve administrative efficiency, decision-making, communication systems, quality assurance, and overall institutional effectiveness, which relate to the dependent variable of management effectiveness.

The theories therefore provide adequate conceptual and theoretical support for understanding how Artificial Intelligence utilization may relate to management effectiveness in tertiary institutions in Edo State. Consequently, the integration of both theories offers a comprehensive framework for explaining the relationship between Artificial Intelligence utilization and management effectiveness within the context of tertiary institution.

3. Research Methodology

This study adopted the correlational research design to examine the relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State. The design was considered appropriate because the study sought to determine the degree and direction of relationship existing between the variables without manipulating them. The population of the study comprised all the nine (9) Federal and State-owned tertiary institutions in Edo State, consisting of universities, polytechnics/monotechnics, and colleges of education. The sample for the study comprised six (6) tertiary institutions of one Federal University, one State University, one Federal Polytechnic, one State Polytechnic, one Federal College of Education, and one State College of Education. The selection ensured adequate representation of the major categories of public tertiary institutions in Edo State. The respondents for the study comprised 300 Academic Staff, Non-Teaching Staff, and Students drawn from the selected tertiary institutions. These categories of respondents were considered appropriate because they are directly involved in institutional administration, academic activities, service delivery, and utilization of technological systems within the institutions. Their experiences and perceptions were considered relevant for assessing the level of Artificial Intelligence utilization and management effectiveness in tertiary institutions. A multi-stage sampling procedure was adopted for the study. At the first stage, purposive sampling technique was used to select the six (6) tertiary institutions representing the categories of public tertiary institutions in Edo State. At the second stage, stratified sampling technique was employed to classify respondents into Academic Staff, Non-Teaching Staff, and Students. Thereafter, convenient sampling technique was used to select the 300 respondents from the various strata across the selected institutions based on accessibility and willingness to participate in the study. This procedure ensured adequate representation of the respondent groups and enhanced the reliability of the findings. Data for the study were collected using a structured questionnaire titled *Artificial Intelligence Utilization and Management Effectiveness Questionnaire (AIUMEQ)* developed by the researcher based on the objectives of the study and relevant literature reviewed. The instrument consisted of three sections. Section A elicited demographic information from respondents, while Sections B and C contained items on Artificial Intelligence utilization and management effectiveness respectively. The questionnaire items on Artificial Intelligence utilization were organized under four thematic areas, namely: Utilization of AI

Administrative Management Tools; Utilization of AI Academic Planning and Decision-Support Tools; Utilization of AI Communication and Service Delivery Tools; and Utilization of AI Monitoring, Security, and Quality Assurance Tools. Similarly, the items on management effectiveness were grouped under Administrative Efficiency and Institutional Coordination; Decision-Making and Institutional Planning Effectiveness; Staff Productivity and Human Resource Management Effectiveness; and Service Delivery and Quality Assurance Effectiveness. The instrument was structured on a four-point Likert rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), weighted 4, 3, 2, and 1 respectively. The face and content validity of the instrument were established by researcher who examined the instrument in terms of clarity, relevance, adequacy of content coverage, and appropriateness of the items for measuring the variables under study before the final version of the instrument. To pilot test the instrument, copies of the questionnaire were administered to respondents from tertiary institutions outside the sampled institutions but possessing characteristics similar to the study population. Data obtained from the pilot test were analyzed using Cronbach Alpha reliability method to determine the internal consistency of the instrument. A reliability coefficient of 0.70 and above was considered adequate for the study. The researcher, with the assistance of trained research assistants, administered the questionnaire directly to the respondents. Respondents were informed about the purpose of the study and assured that information provided would be treated with confidentiality and used strictly for academic purposes. Copies of the questionnaire were retrieved immediately after completion to ensure high return rate and minimize data loss. Data collected for the study were analyzed using both descriptive and inferential statistics. Research questions one and two were answered using mean and standard deviation, while research question three and the corresponding hypothesis were analyzed using Pearson Product Moment Correlation (PPMC) at the 0.05 level of significance. The choice of Pearson Product Moment Correlation was based on the need to determine the degree and direction of relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State.

4. Presentation of Results and Discussion of Finding

The results presented in this section were interpreted based on the established decision criteria for the study. Mean scores ranging from 3.50–4.00 were interpreted as High, 2.50–3.49 as Moderate, while mean scores ranging from 1.00–2.49 were

interpreted as Low. Furthermore, the hypothesis formulated for the study was tested at the 0.05 level of significance. The null hypothesis was rejected

where the calculated p-value was less than or equal to 0.05, but retained where the calculated p-value was greater than 0.05.

Research Question 1: What is the level of Artificial Intelligence utilization in tertiary institutions in Edo State?

Table 1: Mean and Standard Deviation on the Level of Artificial Intelligence Utilization in Tertiary Institutions in Edo State

S/N	Areas of Artificial Intelligence Utilization	Mean	SD	Remark
A	Utilization of AI Administrative Management Tools	2.69	0.88	Moderate
B	Utilization of AI Academic Planning and Decision-Support Tools	2.13	0.90	Low
C	Utilization of AI Communication and Service Delivery Tools	2.35	0.87	Low
D	Utilization of AI Monitoring, Security, and Quality Assurance Tools	2.45	0.89	Low
Grand Mean		2.41	0.89	Low

The result presented in Table 1 revealed that the overall level of Artificial Intelligence utilization in tertiary institutions in Edo State was low, with a grand mean score of 2.41 and standard deviation of 0.89. The result further showed that the utilization of AI Administrative Management Tools recorded a moderate level with a mean score of 2.69, while AI Academic Planning and Decision-Support Tools, AI Communication and Service Delivery Tools, as well as AI Monitoring, Security, and Quality Assurance Tools recorded low levels of utilization.

Research Question 2: What is the level of management effectiveness in tertiary institutions in Edo State?

Table 2: Mean and Standard Deviation on the Level of Management Effectiveness in Tertiary Institutions in Edo State

S/N	Indices of Management Effectiveness	Mean	SD	Decision
A	Administrative Efficiency and Institutional Coordination	2.71	0.87	Moderate
B	Decision-Making and Institutional Planning Effectiveness	2.63	0.88	Moderate
C	Staff Productivity and Human Resource Management Effectiveness	2.67	0.88	Moderate
D	Service Delivery and Quality Assurance Effectiveness	2.67	0.87	Moderate
Grand Mean		2.67	0.88	Moderate

The findings in Table 2 indicated that the overall level of management effectiveness in tertiary institutions in Edo State was moderate, with a grand mean score of 2.67 and standard deviation of 0.88. The result showed moderate levels across all the dimensions of management effectiveness examined in the study, namely Administrative Efficiency and Institutional Coordination, Decision-Making and Institutional Planning Effectiveness, Staff Productivity and Human Resource Management Effectiveness, and Service Delivery and Quality Assurance Effectiveness.

H₀₁: There is no significant relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State.

Table 3: Pearson Product Moment Correlation Analysis Showing the Relationship Between Artificial Intelligence Utilization and Management Effectiveness in Tertiary Institutions in Edo State

Variables	N	Mean	SD	r-value	r ²	p-value	Decision
Artificial Intelligence Utilization	300	2.41	0.89	0.64	0.41	0.000	Significant
Management Effectiveness	300	2.67	0.88				

The result presented in Table 3 revealed that there was a significant positive relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State. The analysis produced an r-value of 0.64 with a corresponding p-value of 0.000, which was less than the 0.05 level of significance. This implies that increased utilization of Artificial Intelligence technologies is associated with improved management effectiveness in tertiary institutions in Edo State. The result further revealed a coefficient of determination (r²) value of 0.41, indicating that Artificial Intelligence utilization accounted for approximately 41% of the variation in management effectiveness in tertiary institutions in Edo State, while the remaining 59% may be attributed to other

variables not examined in the study. Since the calculated p-value of 0.000 was less than the 0.05 level of significance, the null hypothesis was rejected. The study therefore concluded that there was a significant positive relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State.

5. Discussion of Findings

The findings of the study revealed that the overall level of Artificial Intelligence utilization in tertiary institutions in Edo State was low. Specifically, AI Administrative Management Tools recorded a moderate level of utilization, while AI Academic Planning and Decision-Support Tools, AI

Communication and Service Delivery Tools, as well as AI Monitoring, Security, and Quality Assurance Tools recorded low levels. This finding suggests that although some tertiary institutions in Edo State have embraced basic digitalization, the integration of advanced AI-driven technologies into institutional administration remains considerably limited.

The moderate utilization of AI Administrative Management Tools may be linked to the increasing adoption of technologies such as electronic admission platforms, Computer-Based Test systems, digital records management systems, and automated registration platforms within several tertiary institutions in the state. Nevertheless, many institutions still operate largely within conventional administrative frameworks where advanced intelligent systems capable of supporting automation, predictive analysis, and integrated institutional coordination are minimally utilized. Similarly, the low utilization of AI Academic Planning and Decision-Support Tools indicates that institutional planning and administrative decision-making processes still rely heavily on manual procedures and traditional administrative practices. Technologies such as predictive analytics systems, intelligent scheduling platforms, and AI-driven decision-support systems appear not to have been substantially integrated into institutional planning structures.

The findings also revealed low utilization of AI Communication and Service Delivery Tools as well as AI Monitoring, Security, and Quality Assurance Tools. This indicates that technologies such as AI-powered chatbots, virtual assistants, automated response systems, AI-supported surveillance systems, and intelligent quality assurance platforms are still rarely utilized within tertiary institutions in Edo State. Consequently, many institutions continue to depend largely on manual communication and supervision systems characterized by delays, inefficiency, and weak institutional responsiveness.

The generally low level of AI utilization observed in this study may be associated with several institutional and infrastructural challenges affecting tertiary institutions in Edo State and Nigeria at large. These include inadequate technological infrastructure, unstable electricity supply, poor internet connectivity, insufficient funding, shortage of technical manpower, inadequate staff training opportunities, weak maintenance culture, and resistance to technological innovation. The finding corroborates the observation of Okebukola (2020), who noted that although Nigerian tertiary institutions are gradually embracing digital technologies, the integration of advanced intelligent systems remains relatively limited due to infrastructural and institutional constraints. The

finding also aligns with Afolabi and Oyetoro (2022), who reported that many tertiary institutions in Nigeria still face significant technological readiness challenges affecting digital transformation and innovation. Similarly, Fullan (2016) maintained that educational institutions that fail to adequately adapt to technological innovations may continue to experience operational inefficiencies and institutional management challenges.

The study further revealed that management effectiveness in tertiary institutions in Edo State was moderate across all the dimensions examined, namely Administrative Efficiency and Institutional Coordination, Decision-Making and Institutional Planning Effectiveness, Staff Productivity and Human Resource Management Effectiveness, as well as Service Delivery and Quality Assurance Effectiveness. This finding suggests that although institutional management systems remain fairly functional, several administrative and operational limitations continue to affect optimal institutional performance. In many institutions, delays in service delivery, fragmented communication systems, weak supervision mechanisms, and inadequate technological support structures still affect the efficiency of institutional operations.

The moderate level of management effectiveness may partly be explained by the relatively low integration of AI-supported technologies within institutional management processes. Effective institutional planning, staff supervision, monitoring, accountability, and service delivery increasingly depend on reliable data systems and intelligent technologies capable of supporting evidence-based administration. However, many tertiary institutions still depend heavily on manual administrative systems, thereby limiting operational efficiency and institutional responsiveness. The finding supports the position of Peretomode (2012), who maintained that effective management in tertiary institutions depends on efficient coordination of institutional resources, supervision, accountability, communication systems, and proper administrative practices. The finding also agrees with Fullan (2016), who emphasized that educational institutions operating within the contemporary digital environment must continuously adapt to technological innovation in order to remain effective and competitive.

Furthermore, the study revealed a significant positive relationship between Artificial Intelligence utilization and management effectiveness in tertiary institutions in Edo State. The coefficient of determination showed that Artificial Intelligence utilization accounted for approximately 41% of the variation in management effectiveness within tertiary institutions in Edo State. This finding

implies that increased utilization of AI-driven technologies contributes substantially to improved institutional coordination, communication systems, planning processes, monitoring mechanisms, quality assurance practices, and service delivery effectiveness.

The finding reinforces the position of Holmes, Bialik, and Fadel (2019), who argued that AI-driven systems improve organizational efficiency through automation, intelligent information management, and enhanced institutional coordination. Similarly, Siemens and Baker (2012) maintained that AI-supported analytical systems improve educational planning, monitoring, forecasting, and evidence-based decision-making processes within educational institutions. The finding also supports the Technology Acceptance Model developed by Davis (1989), which explains that organizations are more likely to adopt technologies perceived as useful and beneficial to organizational performance. In the same vein, the finding aligns with Systems Theory developed by Bertalanffy (1968), which emphasizes that organizations function more effectively when their various units and subsystems are properly coordinated and integrated.

Overall, the findings indicate that tertiary institutions in Edo State are still at the transitional stage of comprehensive Artificial Intelligence integration despite moderate progress in institutional digitalization. The study therefore underscores the need for increased investment in technological infrastructure, internet facilities, staff capacity development, technical support systems, and institutional policies capable of promoting effective AI integration for improved management effectiveness within tertiary institutions in Edo State.

6. Conclusion and Recommendation

The increasing complexity of tertiary education administration in contemporary educational systems has continued to intensify the need for innovative and technology-driven approaches to institutional governance and educational management. The findings of this study revealed that effective integration of Artificial Intelligence technologies possesses considerable potential for strengthening institutional administration, improving operational efficiency, enhancing evidence-based decision-making, and promoting management effectiveness within tertiary institutions in Edo State. The study further established that increased utilization of Artificial Intelligence technologies contributes significantly to improved institutional coordination, communication systems, planning processes, monitoring mechanisms, and service delivery effectiveness. The study therefore submits that the

sustainability, competitiveness, and responsiveness of tertiary institutions may increasingly depend on the capacity of institutional administrators and policymakers to embrace Artificial Intelligence-supported management frameworks capable of promoting efficient, transparent, data-driven, and innovation-oriented educational governance.

Based on the findings of the study, the following recommendations were made:

- Management of tertiary institutions in Edo State should deploy AI-based systems such as automated admission platforms, predictive analytics tools, Learning Management Systems, and digital monitoring technologies to improve administrative efficiency and institutional management.
- Government and institutional authorities should provide reliable internet facilities, stable electricity supply, functional ICT centres, and regular staff training programmes to support effective utilization of Artificial Intelligence technologies in tertiary institutions.
- Regulatory agencies and institutional management should establish practical guidelines for the use of Artificial Intelligence technologies in institutional planning, communication, quality assurance, students' management, and administrative decision-making within tertiary institutions in Edo State.

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