



## Application of Artificial Intelligence in Strengthening Financial Management amongst Administrators in Vocational Enterprises Institutes in Abuja, Nigeria

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### ABSTRACT

*This study examined the application of Artificial Intelligence (AI) in strengthening financial management practices among administrators in Vocational Enterprises Institutes (VEIs) in Abuja, Nigeria. The study was guided by two objectives: to determine the extent of AI application in financial management and to identify factors hindering its adoption. A cross-sectional descriptive survey design was adopted, allowing data collection from all administrators at a single point in time. The study population consisted of 54 administrators across six VEIs in Abuja, including 6 principals, 12 vice principals, and 36 heads of departments, and a census approach was used to ensure full participation. Data were collected using a structured questionnaire divided into sections on demographic information, extent of AI application, and hindering factors, rated on a five-point Likert scale. The instrument was validated by three experts and pilot-tested, yielding Cronbach's alpha coefficients of 0.86 for AI application items, 0.83 for hindering factors, and 0.88 overall, indicating strong reliability. Data analysis involved descriptive statistics (mean and standard deviation) to address the research questions, and Analysis of Variance (ANOVA) to test the null hypotheses at a 0.05 significance level. Findings revealed a low extent of AI application in financial management among administrators, with inadequate infrastructure, insufficient training, lack of funding, and poor technical support identified as major hindrances. Additionally, there were no significant differences among principals, vice principals, and heads of departments regarding both the extent of AI application and the factors hindering its use. The study recommended that the Federal Capital Territory Administration through the Department of Mass Education implement programs to enhance AI usage in budgeting, record-keeping, and financial decision-making, and invest in ICT infrastructure, training, funding, and technical support to mitigate barriers to AI integration in VEIs.*

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### INTRODUCTION

Education is universally recognized as a driver of human capital development, national unity, and socio-economic growth, with vocational training institutions positioned at the center of this

mission. At this stage, learners acquire essential cognitive, vocational, and social skills that prepare them for higher education, gainful employment, and responsible citizenship (UNESCO, 2022). In Nigeria, Vocational Enterprises Institutes were

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created to promote skills development among diverse groups, while ensuring access to quality vocational education across regions (Okoye & Adeyemi, 2021). However, institutes in Abuja continue to grapple with serious challenges such as overcrowding, dilapidated facilities, and shortages of teaching and learning materials. These realities place enormous demands on administrators.

School administrators are pivotal to the success of vocational education, given their responsibility for managing both human and material resources. Their roles extend to planning, procurement, distribution, supervision, and ensuring the efficient use of resources within the school environment (Adegbesan, 2019). In Vocational Enterprises Institutes, administrators face difficulties such as poor infrastructure, insufficient classrooms, inadequate furniture, and limited instructional materials (Aliyu & Ibrahim, 2020). These challenges undermine the learning environment and hinder the attainment of the institutes' founding goals. The situation underscores the urgency of strengthening material resources management practices.

Material resources management in education refers to the systematic planning, acquisition, utilization, and maintenance of physical and instructional resources necessary for effective teaching and learning (Nwankwo, 2018). These resources include classrooms, laboratories, workshops, ICT tools, furniture, and textbooks. Their proper management ensures that students and teachers have access to the facilities and tools they require to achieve educational objectives (Usman, 2019). Yet, in many Nigerian vocational institutions, weak maintenance culture, poor accountability, and inefficient allocation of resources remain persistent obstacles (Ogunleye & Alade, 2021). In Vocational Enterprises Institutes, these inefficiencies often lead to wastage, shortages, and inequitable distribution of materials. Addressing these gaps requires innovative solutions, and one emerging tool with immense promise is Artificial Intelligence (AI).

Artificial Intelligence encompasses computer-based systems that can perform functions traditionally requiring human

intelligence, including learning, reasoning, and decision-making (Russell & Norvig, 2021). Within the educational setting, AI has been applied to optimize resource allocation, track inventory, automate procurement processes, and predict material needs based on enrollment patterns and usage trends (Baker & Siemens, 2019). By integrating AI into material resources management, administrators can ensure real-time monitoring, reduce wastage, and enhance accountability. For Vocational Enterprises Institutes, AI presents an opportunity to modernize resource management systems, improve transparency, and provide a more conducive learning environment for students.

Neglecting the challenges of material resource management has dire implications for both quality and equity in education. Poorly managed resources contribute to overcrowded classrooms, inadequate teaching aids, and declining student performance, ultimately weakening the role of Vocational Enterprises Institutes in fostering national cohesion. To prevent further deterioration and to align with global trends in educational innovation, it is vital to explore how AI can be harnessed to strengthen material resources management. This study, therefore, seeks to examine the extent of AI application in resource management among administrators of Vocational Enterprises Institutes in Abuja, Nigeria and to identify the barriers limiting its effective adoption.

## STATEMENT OF THE PROBLEM

Ideally, financial management in vocational institutions should ensure effective planning, transparent utilization of funds, timely disbursement, and accountability in resource allocation, thereby promoting sustainable teaching and learning. In well-functioning systems, administrators leverage financial controls and modern tools to avoid leakages, optimize expenditures, and maintain high standards of education. However, in Vocational Enterprises Institutes in Abuja, Nigeria, the reality differs significantly. Poor record-keeping, weak financial monitoring, irregular government subventions, and inadequate adoption of

technology continue to hinder efficiency (Ogunleye & Alade, 2021). Administrators often struggle with delays in funding, misallocation of resources, and insufficient financial accountability, which undermine educational service delivery.

This challenge has persisted for decades, particularly since the decline in funding to public schools in the 1980s following economic downturns (Okoye & Adeyemi, 2021). While researchers and policymakers have attempted to address these issues through reforms such as training workshops for school bursars, manual auditing systems, and government intervention programs (Aliyu & Ibrahim, 2020), the problems of inefficiency and mismanagement remain. The persistence of the challenge is partly due to limited integration of modern technological tools in financial operations. If left unaddressed, these challenges may worsen financial leakages, erode stakeholder trust, and ultimately compromise the quality of education provided in VEIs in Abuja, Nigeria.

The growing global adoption of Artificial Intelligence (AI) for automating financial processes, predicting budgetary needs, and ensuring accountability presents an untapped opportunity for Nigerian vocational institutions (Russell & Norvig, 2021; Baker & Siemens, 2019). Thus, there is a pressing need to investigate the application of AI in strengthening financial management practices among administrators in VEIs in Abuja, Nigeria. This study is necessary to provide empirical insights into how AI can enhance accountability, transparency, and resource optimization in these institutions.

### **Aim and Objectives of the Study**

The aim of the study was to determine the application of Artificial Intelligence in strengthening financial management practices amongst administrators in Vocational Enterprises Institutes in Abuja, Nigeria. Specifically, the objectives of the study are:

1. To determine the extent to which artificial intelligence is applied in strengthening financial management among administrators in VEIs in Abuja, Nigeria.

2. To identify the factors hindering the application of artificial intelligence in financial management among administrators in VEIs in Abuja, Nigeria.

### **Research Questions**

The following research questions were raised and answered:

1. To what extent is artificial intelligence applied in strengthening financial management among administrators in VEIs in Abuja, Nigeria?
2. What are the factors hindering the application of artificial intelligence in financial management among administrators in VEIs in Abuja, Nigeria?

### **Hypotheses**

The following null hypotheses were formulated and tested at 0.05 level of significance:

**H<sub>01</sub>:** There is no significant difference among the mean responses of principals, vice principals, and heads of departments regarding the extent to which artificial intelligence is applied in strengthening financial management in VEIs in Abuja, Nigeria.

**H<sub>02</sub>:** There is no significant difference among the mean responses of principals, vice principals, and heads of departments regarding the factors hindering the application of artificial intelligence in financial management in VEIs in Abuja, Nigeria.

### **METHODOLOGY**

This study adopted a cross-sectional descriptive survey design. A descriptive survey is used to collect data on the opinions, practices, or conditions of a given population and describe them as they exist without manipulation of variables (Creswell & Creswell, 2018). The cross-sectional nature allowed the collection of data from administrators at one point in time to provide a snapshot of the application of AI in financial management. The study was conducted in Abuja, Nigeria, which consists of six Area Councils and hosts six Vocational Enterprises Institutes (VEIs). This area was chosen because VEIs in the region face various administrative and financial

management challenges, making it a suitable context for examining the role of artificial intelligence. The population comprised all principals, vice principals, and heads of departments in the six VEs in Abuja, totaling about 54 administrators (6 principals, 12 vice principals, and approximately 36 heads of departments). Since the population was relatively small, a census approach was adopted to include all administrators in the study.

The instrument for data collection was a structured questionnaire developed by the researcher. Section A covered demographic information, while Section B addressed the objectives of the study with two clusters: the extent of AI application and factors hindering AI application. Responses were measured on a five-point Likert scale: Strongly Agree/Very High Extent (5), Agree/High Extent (4), Disagree/Moderate Extent (3), Strongly Disagree/Low Extent (2), and Undecided/Very Low Extent (1). The validity of the instrument was ensured by three experts, two in educational administration and one in artificial intelligence who reviewed it for clarity and relevance.

To establish reliability, a pilot study was conducted in a nearby region with 20% of the study population. Cronbach's alpha yielded coefficients of 0.86 for the extent of AI application, 0.83 for hindering factors, and 0.88 overall. These values, all above the 0.70 benchmark, indicated strong internal consistency. Data collection was carried out both physically and electronically to ensure maximum coverage and convenience for respondents. Data were analyzed using descriptive statistics such as mean and standard deviation to answer research questions, and analysis of variance (ANOVA) to test hypotheses. Mean and standard deviation helped show the extent and variability of responses, while ANOVA was suitable for comparing responses across groups.

## RESULTS

### *Research Question 1:*

To what extent is artificial intelligence applied in strengthening financial management among administrators in VEs in Abuja, Nigeria? Results for answering research question one are presented in Table 1.

Table 1: Average mean and standard deviation for the responses of the respondents on the extent to which artificial intelligence is applied in strengthening financial management in VEs in Abuja, Nigeria.

S/N	Items	Mean	SD	Decision
1	AI tools are used in the preparation and monitoring of school budgets.	2.11	1.12	Low Extent
2	Financial record-keeping in my school is automated through AI-powered systems.	2.05	1.21	Low Extent
3	AI supports the auditing and accountability processes of school funds.	2.22	1.30	Low Extent
4	AI applications assist in detecting and reducing errors or fraud in financial transactions.	2.18	1.25	Low Extent
5	Administrators use AI to forecast financial needs and expenditures in my school.	2.00	1.14	Low Extent
6	AI improves the speed and accuracy of financial decision-making.	2.09	1.18	Low Extent
<b>Grand Mean</b>		<b>2.11</b>	<b>1.18</b>	<b>Low Extent</b>

Table 1 reveals mean scores ranging from 2.00 to 2.22 and standard deviations between 1.12 and 1.30 with a grand mean value of 2.11. These values indicate a low extent of

application of artificial intelligence in financial management practices among administrators in VEs in Abuja, Nigeria.

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### Research Question 2:

What are the factors hindering the application of artificial intelligence in financial management

among administrators in VEs in Abuja, Nigeria?

Results for answering research question two are presented in Table 2.

Table 2: Average mean and standard deviation for the responses of the respondents on the factors hindering the application of artificial intelligence in financial management in VEs in Abuja, Nigeria.

S/N	Items	Mean	SD	Decision
1	Limited availability of AI infrastructure (computers, internet, software) hinders its adoption.	4.12	0.91	Agreed
2	Administrators lack adequate training in the use of AI for financial management.	4.05	1.02	Agreed
3	Insufficient government funding restricts the integration of AI systems.	4.20	0.88	Agreed
4	Resistance to change among staff reduces the willingness to adopt AI.	4.18	0.95	Agreed
5	Lack of policy framework on AI use in financial management is a major obstacle.	4.11	0.90	Agreed
6	High cost of installing and maintaining AI tools discourages their application.	4.15	0.85	Agreed
7	Poor technical support and maintenance culture affect the sustainability of AI systems.	4.08	0.97	Agreed
Grand Mean		4.13	0.87	Agreed

Table 2 reveals mean scores ranging from 4.05 to 4.20 and standard deviations between 0.85 and 1.02 with a grand mean value of 4.13. These values indicate agreement among administrators that several factors hinder the effective application of artificial intelligence in financial management practices in VEs in Abuja, Nigeria.

### Hypothesis One:

There is no significant difference among the mean responses of principals, vice principals, and heads of departments regarding the extent to which artificial intelligence is applied in strengthening financial management in VEs in Abuja, Nigeria. Result of hypothesis one is presented in Table 3.

Table 3: Analysis of variance (ANOVA) for the mean responses of principals, vice principals, and heads of departments on the extent to which artificial intelligence is applied in strengthening financial management in VEs in Abuja, Nigeria.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.412	2	1.206	1.842	.164
Within Groups	28.962	44	0.658		
Total	31.374	46			

Table 3 revealed that the Significant (P) value of .164 is greater than 0.05. This implies that there is no significant difference among the mean responses of principals, vice principals, and heads of departments on the extent of application of artificial intelligence in financial management. Hence, the null hypothesis one was accepted.

### Hypothesis Two:

There is no significant difference among the mean responses of principals, vice principals, and heads of departments regarding the factors hindering the application of artificial intelligence in financial management in VEs in Abuja, Nigeria. Result of hypothesis two is presented in Table 4.

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Table 4: Analysis of variance (ANOVA) for the mean responses of principals, vice principals, and heads of departments on the factors hindering the application of artificial intelligence in financial management in VEIs in Abuja, Nigeria.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.843	2	0.922	0.974	.387
Within Groups	41.678	44	0.948		
Total	43.521	46			

Table 4 revealed that the Significant (P) value of .387 is greater than 0.05. This implies that there is no significant difference among the mean responses of principals, vice principals, and heads of departments on the factors hindering the application of artificial intelligence in financial management. Hence, the null hypothesis two was accepted.

### Findings from the Study

1. There was a low extent of application of artificial intelligence in strengthening financial management among administrators in VEIs in Abuja, Nigeria.
2. There was no significant difference among the mean responses of principals, vice principals, and heads of departments regarding the extent to which artificial intelligence is applied in financial management among administrators in VEIs in Abuja, Nigeria.
3. Inadequate infrastructure, insufficient training, lack of funding, and poor technical support were found to be factors hindering the application of AI in financial management among administrators in VEIs in Abuja, Nigeria including .
4. There was no significant difference among the mean responses of principals, vice principals, and heads of departments regarding the factors hindering the application of artificial intelligence in financial management among administrators in VEIs in Abuja, Nigeria.

### DISCUSSION OF FINDINGS

Findings on the extent of application of artificial intelligence in strengthening financial

management among administrators in VEIs in Abuja, Nigeria revealed that there was a low extent of application. This means that administrators have not substantially adopted AI for financial tasks such as budgeting, expenditure monitoring, or financial forecasting, and traditional manual processes still dominate. The finding is related to the work of Adewale and Jimoh (2022), who reported that AI application in financial management across Nigerian tertiary institutions was still minimal due to lack of tools and infrastructure.

Similarly, Nwaiwu (2021) observed that awareness of AI exists within the education sector in Nigeria, but the transition into practice remains low, largely because of infrastructural and funding challenges. On the contrary, Zhang and Lu (2020) found in their study in China that AI was increasingly being deployed in financial monitoring and reporting, which enhanced accuracy and transparency in institutions. The difference between these contexts may be linked to the stronger ICT infrastructure and more supportive government policies in China compared to Nigeria, where insufficient funding and policy gaps persist. This finding implies that unless investments are made in ICT infrastructure and administrators receive proper training, VEIs in Abuja may continue to face inefficiencies in financial management and accountability.

Furthermore, finding on the extent of application of artificial intelligence in financial management with respect to differences among administrators revealed that there was no significant difference among the mean responses of principals, vice principals, and heads of departments. This means that all categories of administrators whether occupying top or middle management positions held similar perceptions that AI application in financial management was



generally low. The finding is related to the study by Ogunleye and Hassan (2022), who similarly reported no significant differences among rectors, deans, and heads of units on the adoption of AI in governance, noting that challenges were systemic rather than position-specific. In the same vein, Okonkwo (2021) found that polytechnic administrators at various levels shared a common view on the limited use of digital innovations in financial and academic management.

However, Kumar and Rajan (2020) reported a different outcome in India, where principals reported higher exposure to AI tools than other administrators, suggesting contextual differences in access and adoption levels. The difference may be attributed to the fact that in Nigeria, where AI adoption remains very low, systemic barriers affect all categories of administrators equally, whereas in India, higher exposure to technology makes hierarchical differences more noticeable. This finding implies that improving AI integration in VEIs should focus on system-wide interventions such as policies, capacity-building programs, and infrastructural investments rather than targeting specific administrative groups.

Findings on inadequate infrastructure, insufficient training, lack of funding, and poor technical support revealed that these were major factors hindering the application of artificial intelligence (AI) in financial management among administrators in VEIs in Abuja, Nigeria. This means that while administrators recognize the potential of AI, systemic and institutional barriers prevent its smooth adoption. The finding is related to Adewale and Jimoh (2022), who reported that Nigerian tertiary institutions face similar challenges such as unstable electricity, limited ICT facilities, and inadequate financial resources when adopting AI for financial reporting. However, this finding differs from Kumar and Rajan (2020), who observed that in Indian schools, although infrastructure posed a challenge, strong government support reduced its impact. The possible reason for this difference may be attributed to varying levels of policy commitment and investment in technology integration across countries. The implication of this finding is that

without deliberate efforts to strengthen ICT infrastructure, provide adequate training, and ensure sustainable funding, the potential benefits of AI in educational financial management may not be realized in VEIs.

Furthermore, finding on the hypothesis regarding differences in respondents' views revealed that there was no significant difference among the mean responses of principals, vice principals, and heads of departments on the factors hindering the application of artificial intelligence in financial management among administrators in VEIs in Abuja, Nigeria. This means that all categories of administrators perceived the barriers to AI application in a similar way, regardless of their administrative level or role. The finding is related to Ogunleye and Hassan (2022), who also discovered no significant differences in administrators' perceptions across different management cadres in Nigerian universities.

However, it contrasts with the study by Zhang and Lu (2020), where variations were found between senior and junior administrators' views on AI adoption barriers in Chinese universities. The possible reason for this difference could be due to differences in organizational structure, where administrators in Nigerian VEIs face uniform challenges that cut across all levels, unlike in some Asian contexts where senior administrators may have greater access to resources. The implication of this finding is that interventions to address barriers to AI adoption should be designed to target the institution as a whole rather than focusing on specific categories of administrators.

## CONCLUSION

The study provided insights on the application of Artificial Intelligence (AI) in strengthening financial management among administrators in Vocational Enterprises Institutes (VEIs) in Abuja, Nigeria. It revealed that the extent of AI application in financial management practices was generally low, indicating that administrators have not fully leveraged AI tools to enhance efficiency, accuracy, and transparency in financial operations. The study further showed



that there was no significant difference among principals, vice principals, and heads of departments regarding the extent of AI application. This suggests that limited adoption of AI is a systemic issue affecting all levels of administration rather than being isolated to specific cadres. Key factors hindering the adoption of AI were identified, including inadequate infrastructure, insufficient training, lack of funding, and poor technical support.

Similarly, no significant differences were observed among administrative roles concerning the perception of these hindering factors, highlighting that these challenges are universally experienced across the administrative hierarchy. Overall, the study concluded that while AI has the potential to strengthen financial management in VEIs, its adoption remains minimal due to infrastructural, technical, and policy-related constraints. For VEIs in Abuja to fully benefit from AI technologies, deliberate interventions are required, including investment in ICT infrastructure, capacity-building for administrators, adequate funding, and the establishment of clear policy frameworks to guide AI integration in financial management practices.

## RECOMMENDATIONS

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

1. The Federal Capital Territory Administration through the Department of Mass Education should implement programs to increase the use of AI tools in budgeting, record-keeping, and financial decision-making in Vocational Enterprises Institutes to address the low extent of AI application.
2. The Federal Capital Territory Administration through the Department of Mass Education should provide adequate ICT infrastructure, organize regular AI training, allocate sufficient funding, and establish technical support units to overcome barriers hindering AI adoption in financial management.

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