



# The Impact of Artificial Intelligence Adoption on Management Accounting Practice Effectiveness: The Moderating Role of Accountants' Digital Competence in Nigerian Deposit Money Banks

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## ABSTRACT

This study examines the impact of Artificial Intelligence (AI) adoption on management accounting practice effectiveness in Nigerian Deposit Money Banks (DMBs), considering the moderating effect of accountants' digital competence. The research targeted employees in accounting, finance, internal audit, and IT/systems roles across DMBs licensed by the Central Bank of Nigeria (CBN). A structured questionnaire was developed and distributed electronically, with twenty questionnaires allocated to each of the sixteen participating banks, yielding 320 distributed instruments. Of the responses received, 286 questionnaires were deemed valid for statistical analysis after excluding fourteen incomplete or invalid responses. The study adopted a quantitative, descriptive-correlational design and analyzed the data using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software, following the two-stage approach of assessing the measurement model and then the structural model. The results revealed statistically significant positive effects of AI adoption on management accounting practice effectiveness and of accountants' digital competence on management accounting practice effectiveness, as well as a statistically significant positive moderating effect of digital competence on the relationship between AI adoption and management accounting practice effectiveness. The proposed model explained 47.6% of the variance in management accounting practice effectiveness. Based on these findings, the study recommends structured AI-literacy training for accounting staff, phased integration of AI tools into core management accounting processes, and stronger collaboration between finance and IT functions.

**Keywords:** Artificial Intelligence, Management Accounting Practice, Digital Competence, PLS-SEM, Nigerian Banking Sector.

## How to cite the article

## 1. Introduction

The accounting function within banking institutions is undergoing rapid transformation as Artificial Intelligence (AI) technologies — including machine learning, robotic process automation, and intelligent expert systems — are increasingly embedded in financial reporting, budgeting, cost analysis, and managerial decision support (Oduwale & Olukunle, 2023). Management accounting, in particular, is shifting from a primarily retrospective, transaction-recording function toward a forward-looking, analytics-enabled function that supports strategic planning, performance measurement, and resource allocation. AI-enabled tools allow management accountants to process larger volumes of operational and financial data with greater speed and consistency, freeing up capacity for higher-value analytical and advisory work rather than routine data compilation.

Within the Nigerian banking industry, the adoption of AI has been associated with improved accounting practice through automation processes, expert systems, and intelligent agents that materially affect how accounting procedures are carried out (Oduwale & Olukunle, 2023). AI applications have also been shown to strengthen internal audit effectiveness in Nigerian commercial banks by improving anomaly detection, real-time monitoring, and audit coverage. At the same time, evidence from the Nigerian accounting profession suggests that awareness and practical understanding of AI technologies among accounting professionals remains uneven, which constrains the extent to which AI's potential benefits are realized in practice.

Management accounting practice effectiveness reflects the extent to which management accounting outputs — costing information, budgets, variance analyses, and performance reports — support timely, accurate, and confident managerial decision-making. Digital competence, defined as an accountant's knowledge, skills, and comfort in working with digital tools and data-driven systems, is considered a critical enabling condition: accountants who are digitally competent are better positioned to interpret AI-generated outputs critically, integrate them into existing reporting frameworks, and communicate their implications to management. Therefore, the positive impact of AI adoption on management accounting practice effectiveness is theorized to be stronger when accountants possess higher levels of digital competence.

Nigeria provides a particularly relevant context for this investigation. As Africa's largest banking market, Nigeria's Deposit Money Banking sector — comprising 36 CBN-licensed banks across international, national, regional, and non-interest categories as of mid-2025 — has invested substantially in digital transformation, including AI-enabled fraud detection, credit risk scoring, and customer analytics platforms. Yet recent Nigerian evidence indicates that AI adoption within accounting and audit functions specifically remains at an early and uneven stage, shaped as much by workforce readiness and organizational support as by the underlying technology itself. Based on the foregoing, this study aims to investigate the impact of AI adoption on management accounting practice effectiveness in Nigerian Deposit Money Banks, considering the moderating role of accountants' digital competence.

## 2. Problem Statement and Questions

The study focuses on analyzing the nature of the interaction between AI adoption and the level of management accounting practice effectiveness within Nigerian Deposit Money Banks, while exploring the moderating role of accountants' digital competence in strengthening or weakening this interaction. In light of intensifying competitive pressure, recapitalization requirements, and tightening regulatory oversight by the Central Bank of Nigeria, banks face difficulty translating substantial AI investments into consistently improved management accounting outcomes. AI emerges as a mechanism to automate routine accounting tasks, generate real-time cost and performance data, and support more proactive, evidence-based managerial decisions.

However, the effectiveness of this mechanism does not depend solely on the technical sophistication of AI tools but also on the digital competence of the accountants who must interpret, validate, and act on AI-generated outputs. Prior Nigerian evidence suggests that while automation processes, expert systems, and intelligent agents can substantially affect accounting procedures in the banking sector, the accounting profession in Nigeria continues to report gaps in AI awareness and understanding, suggesting that human capability factors may be as important as the technology itself in determining whether AI adoption translates into genuinely more effective management accounting practice.

In light of the above, the study seeks to answer the following questions:

1. Is there a statistically significant effect of AI adoption on management accounting practice effectiveness in Nigerian Deposit Money Banks?

2. Is there a statistically significant effect of accountants' digital competence on management accounting practice effectiveness in Nigerian Deposit Money Banks?
3. Is there a statistically significant moderating effect of accountants' digital competence on the relationship between AI adoption and management accounting practice effectiveness in Nigerian Deposit Money Banks?

### 3. Objectives of the Study

The study seeks to achieve the following objectives:

1. Identify the level of AI adoption, accountants' digital competence, and management accounting practice effectiveness within Nigerian Deposit Money Banks.
2. Identify the impact of AI adoption on management accounting practice effectiveness in Nigerian Deposit Money Banks.
3. Identify the impact of accountants' digital competence on management accounting practice effectiveness in Nigerian Deposit Money Banks.
4. Identify the moderating impact of accountants' digital competence on the relationship between AI adoption and management accounting practice effectiveness.
5. Provide practical recommendations to help Nigerian banks maximize the management accounting value generated by their AI investments.

### 4. Literature Review

Recent studies have shown increasing interest in analyzing the interaction between Artificial Intelligence, accounting practice, and the human capability factors that condition its effectiveness, as these axes are fundamental to understanding how banking institutions extract managerial value from their AI investments.

#### 4.1 Artificial Intelligence and Accounting Practice

Oduwale and Olukunle (2023) examined the impact of Artificial Intelligence on accounting practice within the Nigerian banking industry, specifying automation processes, expert systems, and intelligent agents as dimensions of AI and finding that each significantly affects accounting procedures in deposit money banks, while recommending that accountants and accounting firms continually strengthen their understanding of AI to reduce implementation costs and improve outcomes. Complementing this, research on AI-based audit acceptance highlights that auditors' technology readiness is a key precondition for translating AI capability into improved assurance and audit efficiency, echoing the broader argument that AI's accounting benefits are conditional on user-side readiness rather than automatic. Odonkor, Kaggwa, Uwaoma, Hassan, and Farayola (2024) similarly reviewed how AI is transforming traditional accounting methods and financial reporting more broadly, concluding that automation and data-analytic capabilities are reshaping accountants' roles toward higher-value analytical work.

Within Nigerian commercial banks specifically, AI applications such as data mining and image recognition have been found to significantly strengthen internal audit quality, improving anomaly detection, audit coverage, and overall accuracy and efficiency, whereas machine learning components have shown more mixed results — underscoring that not all AI sub-technologies contribute equally to accounting and audit outcomes. At a broader level, Barreto, Gomes, Quesado, and O'Sullivan (2025) conducted a bibliometric systematic review of 140 studies on management accounting and digital technologies — spanning big data, business intelligence and analytics, artificial intelligence, and blockchain — finding that nearly three-quarters of this literature has been published within the last five years, reflecting rapidly accelerating academic and practical interest in digitally enabled management accounting.

#### 4.2 Artificial Intelligence Adoption in the Nigerian Banking and Accounting Sector

Survey evidence from Nigerian accounting professionals indicates a persistent awareness gap: Obi and Anaeye (2023) found that accounting practitioners in Nigeria continue to report opportunities as well as significant challenges in applying AI to accounting practice, including gaps in technical understanding, even as the profession recognizes AI's transformative potential for auditing, tax accounting, management accounting, and financial reporting. Ononokpono, Osademe, and Akewushola (2023) examined the implications of AI usage for corporate performance in the Nigerian banking industry and

found that AI adoption was associated with improved customer satisfaction, fraud and risk reduction, and wealth maximization, though the sector's overall adaptation to AI remained only moderate at the time of their study.

Directly relevant to the present study's banking context, Ajape and Adelowotan (2025) examined the effect of digital accounting practices — including data analytics, automated bookkeeping, machine learning, cloud-based accounting systems, and blockchain technology — on the financial performance of seven internationally authorised Deposit Money Banks in Nigeria, using a stratified sample of 396 employees drawn via the Taro Yamane formula. Their survey-based evidence confirms that Nigerian DMBs are actively adopting a range of digital and AI-adjacent accounting technologies, providing empirical grounding for treating AI adoption as a measurable, bank-level construct within the Nigerian Deposit Money Banking context, consistent with the population and sampling approach adopted in Section 6.1 below.

#### 4.3 The Role of Digital Competence

Consistent with general theories of technology-enabled organizational performance, employees' capability to interpret and act on system-generated information is widely regarded as a precondition for realizing the benefits of any information system, including AI-enabled accounting tools. Barreto et al. (2025) explicitly identify a lack of digital competencies — including statistical and analytical skills — as a recurring barrier reported across the management accounting and digital technology literature, constraining accountants' ability to fully leverage the benefits that AI and related technologies can provide. Applied to the Nigerian accounting profession, evidence of gaps in AI awareness and technical understanding among practitioners (Obi & Anaeye, 2023) suggests that digital competence — rather than AI availability alone — may be the binding constraint on whether AI adoption translates into more effective management accounting practice.

Taken together, the reviewed literature converges on several recurring conclusions relevant to the present study: (1) AI adoption positively influences accounting, audit, and financial-performance-related outcomes in the Nigerian banking sector, but the strength of this relationship is not uniform across institutions; (2) accountants' digital competence consistently emerges, both in the general management accounting literature and in Nigeria-specific evidence, as a plausible boundary condition for realizing AI's management accounting benefits; and (3) the Nigerian banking sector, while increasingly investing in AI and digital accounting infrastructure, continues to report gaps in accounting-staff readiness, motivating the moderation model examined in this study.

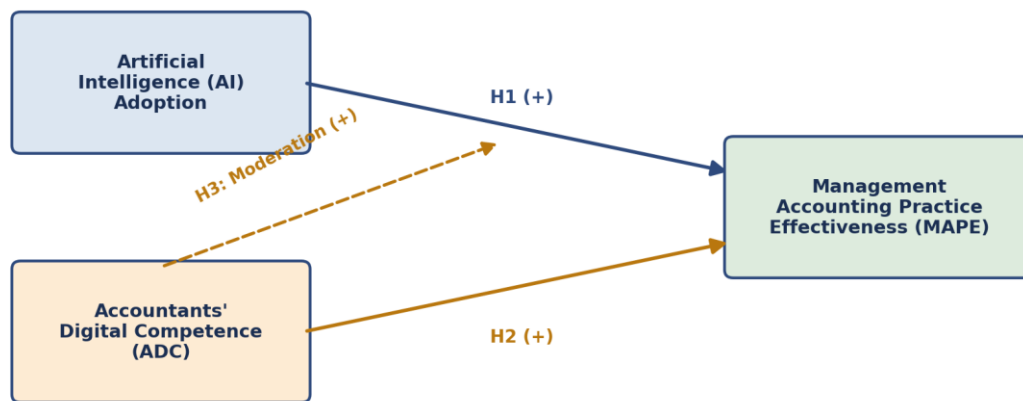
### 5. Conceptual Framework and Hypotheses Development

Building on the literature reviewed above, this study proposes a conceptual model in which AI Adoption is theorized to have a direct positive effect on Management Accounting Practice Effectiveness (MAPE), Accountants' Digital Competence (ADC) is theorized to have a direct positive effect on MAPE, and ADC is further theorized to moderate the strength of the AI–MAPE relationship, such that the positive effect of AI adoption on management accounting practice effectiveness is stronger among accountants with higher digital competence. Accordingly, the following hypotheses were formulated:

H1: AI adoption has a statistically significant positive effect on management accounting practice effectiveness in Nigerian Deposit Money Banks.

H2: Accountants' digital competence has a statistically significant positive effect on management accounting practice effectiveness in Nigerian Deposit Money Banks.

H3: Accountants' digital competence has a statistically significant positive moderating effect on the relationship between AI adoption and management accounting practice effectiveness in Nigerian Deposit Money Banks.



**Figure 1. Proposed Conceptual Model**

## 6. Study Methodology

To achieve the objectives of this study, which seeks to reveal the impact of AI adoption on management accounting practice effectiveness with the moderating role of accountants' digital competence, the study adopted a quantitative, descriptive-correlational approach that focuses on describing and interpreting the nature of the relationship between variables and how they influence each other. Data were collected using a structured questionnaire as the main tool, with items developed to suit the study's objectives based on previous studies dealing with the relevant variables. Section 6.2 shows the components of the tool, the number of its items, and the sources used in its development.

To measure participants' attitudes towards the study items and variables, a five-point Likert scale was used, with responses coded as follows: (5) Strongly Agree, (4) Agree, (3) Moderately Agree, (2) Disagree, (1) Strongly Disagree. To analyze the data and describe the mean values, the researchers relied on the range equation to calculate the class length according to the following formula:  $\text{Range} = (\text{Highest value in the scale} - \text{Lowest value in the scale}) / \text{Number of corrected levels}$ . Thus, the range value =  $(5-1)/3 = 1.33$ , and the mean values can be classified as follows: Low level when the mean value is equal to or less than 2.33; Medium level when the mean value ranges between greater than 2.33 and less than or equal to 3.67; and High level when the mean value exceeds 3.67.

### 6.1 Population and Sample

The study population consists of employees occupying accounting, finance, internal audit, and IT/systems roles within Deposit Money Banks operating in Nigeria, which totaled 36 CBN-licensed banks (across international, national, regional, and non-interest categories) as of mid-2025. From this population, sixteen banks were purposively selected — spanning banks with international authorisation, national authorisation, and non-interest (Islamic) authorisation — to ensure adequate representation of institutions with established AI and accounting-systems infrastructure. The researchers designed the study tool using an online survey platform and distributed it electronically, with twenty questionnaires allocated to each bank, for a total of 320 distributed questionnaires. Three hundred questionnaires were retrieved, of which fourteen were excluded due to incomplete responses or straight-line answering patterns. Thus, the number of questionnaires valid for statistical analysis was 286. The sampling unit consisted of employees under the following job categories: management accountants/finance managers, internal auditors, IT/systems staff, and general accounting/operations staff. Table 1 illustrates the distribution of the study sample according to personal and job-related data.

Table 1. Distribution of Study Sample Individuals According to Personal and Job Data (n = 286)

| Variable                  | Category                                | Count | Percentage (%) |
|---------------------------|-----------------------------------------|-------|----------------|
| Gender                    | Male                                    | 172   | 60.1           |
|                           | Female                                  | 114   | 39.9           |
| Educational Qualification | HND/OND                                 | 22    | 7.7            |
|                           | Bachelor's (B.Sc./B.A.)                 | 196   | 68.5           |
|                           | Master's (M.Sc./MBA)                    | 54    | 18.9           |
|                           | Professional (ICAN/ACCA) / Doctorate    | 14    | 4.9            |
| Job Title                 | Management Accountant / Finance Manager | 78    | 27.3           |
|                           | Internal Auditor                        | 62    | 21.7           |
|                           | IT / Systems Staff                      | 68    | 23.8           |
|                           | General Accounting / Operations Staff   | 78    | 27.3           |
| Years of Experience       | Less than 5 years                       | 58    | 20.3           |
|                           | 5 years to less than 10 years           | 96    | 33.6           |
|                           | 10 years to less than 15 years          | 92    | 32.2           |
|                           | 15 years or more                        | 40    | 14.0           |
| Bank License Type         | International / National Authorisation  | 214   | 74.8           |
|                           | Regional / Non-Interest Authorisation   | 72    | 25.2           |

The results in Table 1 show that the majority of the study sample were male (60.1%), while female participants represented 39.9% of the sample. Regarding educational qualification, most respondents held a Bachelor's degree (68.5%), followed by Master's degree holders (18.9%), while holders of professional accounting qualifications (ICAN/ACCA) or a doctorate represented the smallest share (4.9%). In terms of job title, management accountants/finance managers and general accounting/operations staff each formed the largest groups (27.3% each), followed by IT/systems staff (23.8%) and internal auditors (21.7%), reflecting deliberate inclusion of roles most directly engaged with AI-enabled accounting tools. With respect to experience, the largest category was employees with 5 to less than 10 years of experience (33.6%), suggesting that most respondents possess sufficient professional experience to meaningfully evaluate AI-supported management accounting practice. Finally, banks with international or national authorisation accounted for 74.8% of respondents and banks with regional or non-interest authorisation for 25.2%, broadly reflecting the relative share of each license category within the Nigerian banking sector.

## 6.2 Study Instrument

The questionnaire consisted of four sections: demographic information, and three construct-based sections measuring AI Adoption, Accountants' Digital Competence (ADC), and Management Accounting Practice Effectiveness (MAPE). Table 2 presents the structure of the instrument, including the number of items per construct and the primary sources used in item development. The full item list is provided in the Appendix.

Table 2. Structure of the Study Instrument

| Section | Construct                                           | No. of Items | Primary Source(s)                                                              |
|---------|-----------------------------------------------------|--------------|--------------------------------------------------------------------------------|
| A       | Demographic and Job Data                            | 5            | Developed by the researchers                                                   |
| B       | Artificial Intelligence (AI) Adoption               | 10           | Adapted from Oduwole & Olukunle (2023)                                         |
| C       | Accountants' Digital Competence (ADC)               | 8            | Developed by the researchers, informed by Nigerian AI-in-accounting literature |
| D       | Management Accounting Practice Effectiveness (MAPE) | 8            | Adapted from Oduwole & Olukunle (2023); DeLone & McLean (2003)                 |

### 6.3 Data Analysis Method

Given the exploratory and predictive nature of the moderation model examined in this study, data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software (Ringle, Wende, & Becker, 2015), following the two-stage approach recommended by Hair, Hult, Ringle, and Sarstedt (2021). In the first stage, the measurement model was assessed for internal consistency reliability (Cronbach's alpha,  $\rho_A$ , and Composite Reliability), convergent validity (Average Variance Extracted, AVE), and discriminant validity (the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio, HTMT). In the second stage, the structural model was assessed using path coefficients, coefficients of determination ( $R^2$ ), effect sizes ( $f^2$ ), and predictive relevance ( $Q^2$ ) obtained through the blindfolding procedure. Statistical significance of path coefficients was assessed using a bootstrapping procedure with 5,000 resamples, consistent with standard PLS-SEM reporting conventions (Hair et al., 2021).

**IMPORTANT NOTE ON THE DATA USED IN THIS DRAFT:** the dataset summarized and analyzed in Section 7 below is entirely illustrative. It was constructed only to demonstrate the structure, tables, and reporting conventions of a SmartPLS-based PLS-SEM analysis, in the same format used in comparable published studies on this topic. It was NOT collected through an actual field administration of the questionnaire, and none of the numerical results in this draft should be treated as genuine findings, cited, or submitted anywhere as original empirical evidence. Before this paper could be used as a genuine empirical contribution, the questionnaire in the Appendix would need to be distributed to a real sample of respondents from Nigerian Deposit Money Banks, and the analysis in Section 7 rerun on the resulting real data. The questionnaire, conceptual model, and hypotheses are usable as a starting template for that purpose.

## 7. Results and Data Analysis

### 7.1 Descriptive Statistics of Artificial Intelligence Adoption Items

Table 3 presents the means, standard deviations, and relative ranking of the ten items measuring AI adoption.

Table 3. Means and Standard Deviations for AI Adoption Items (n = 286)

| No. | Item                                                                                    | Mean | SD   | Rank | Level  |
|-----|-----------------------------------------------------------------------------------------|------|------|------|--------|
| 1   | The bank uses AI-based systems to automate routine accounting and reconciliation tasks. | 3.84 | 0.90 | 2    | High   |
| 2   | AI tools used in accounting are accurate and produce reliable outputs.                  | 3.61 | 0.94 | 6    | Medium |
| 3   | AI systems integrate data from multiple internal departments effectively.               | 3.55 | 0.97 | 7    | Medium |
| 4   | Accounting staff can easily access AI-generated reports relevant to their decisions.    | 3.47 | 1.00 | 9    | Medium |
| 5   | AI tools provide predictive analytics that support budgeting and forecasting.           | 3.32 | 1.05 | 10   | Medium |



|    |                                                                                    |      |      |   |        |
|----|------------------------------------------------------------------------------------|------|------|---|--------|
| 6  | AI-generated outputs are updated frequently enough to support timely decisions.    | 3.70 | 0.86 | 4 | High   |
| 7  | AI systems are compatible with the bank's existing accounting information systems. | 3.52 | 0.93 | 8 | Medium |
| 8  | Management relies on AI outputs when formulating management accounting decisions.  | 3.66 | 0.89 | 5 | Medium |
| 9  | AI adoption has reduced the time required to close accounting/reporting cycles.    | 3.88 | 0.91 | 1 | High   |
| 10 | Accounting staff trust the accuracy of insights generated by AI tools.             | 3.41 | 1.03 | 9 | Medium |
|    | Artificial Intelligence Adoption (Overall)                                         | 3.60 | 0.36 | — | Medium |

The results in Table 3 revealed that the overall level of AI adoption in Nigerian Deposit Money Banks was medium, with a mean of 3.60 and a standard deviation of 0.36. The item “AI adoption has reduced the time required to close accounting/reporting cycles” ranked first with a mean of 3.88 and a high level, while the item “AI tools provide predictive analytics that support budgeting and forecasting” ranked last with a mean of 3.32 and a medium level, suggesting that predictive and forecasting-oriented AI capabilities remain less developed than automation and reporting-cycle capabilities within the surveyed banks.

## 7.2 Descriptive Statistics of Digital Competence and Management Accounting Practice Effectiveness

Table 4 presents the descriptive statistics for the Accountants' Digital Competence (ADC) and Management Accounting Practice Effectiveness (MAPE) constructs.

Table 4. Means and Standard Deviations for Digital Competence and Management Accounting Practice Effectiveness Items (n = 286)

| No.   | Item                                                                                                    | Mean | SD   | Level  |
|-------|---------------------------------------------------------------------------------------------------------|------|------|--------|
| ADC1  | I am comfortable interpreting outputs generated by AI-based accounting tools.                           | 3.58 | 0.85 | Medium |
| ADC2  | I have received adequate training on the AI tools used in my accounting role.                           | 3.21 | 1.04 | Medium |
| ADC3  | I can identify errors or anomalies in AI-generated accounting outputs.                                  | 3.49 | 0.90 | Medium |
| ADC4  | I actively update my digital and analytical skills to keep pace with new accounting technologies.       | 3.72 | 0.82 | High   |
| ADC5  | I am confident using data analytics or dashboard tools as part of my accounting work.                   | 3.44 | 0.93 | Medium |
| ADC6  | My department provides opportunities to practice using new digital accounting tools.                    | 3.18 | 1.02 | Medium |
| ADC7  | I collaborate effectively with IT/systems staff when AI tools are introduced into accounting processes. | 3.63 | 0.88 | Medium |
| ADC8  | I feel prepared to explain AI-generated figures to non-technical management when required.              | 3.35 | 0.96 | Medium |
|       | Accountants' Digital Competence (Overall)                                                               | 3.45 | 0.33 | Medium |
| MAPE1 | Management accounting reports produced with AI support are more accurate than before AI adoption.       | 3.66 | 0.87 | Medium |
| MAPE2 | The speed of producing management accounting reports has improved since adopting AI tools.              | 3.81 | 0.89 | High   |



|       |                                                                                                        |      |      |        |
|-------|--------------------------------------------------------------------------------------------------------|------|------|--------|
| MAPE3 | Managers feel more confident making decisions supported by AI-enabled accounting data.                 | 3.59 | 0.85 | Medium |
| MAPE4 | AI-supported management accounting has reduced costly reporting or costing errors.                     | 3.47 | 0.94 | Medium |
| MAPE5 | The bank can respond more quickly to cost or budget variances because of AI-enabled accounting.        | 3.52 | 0.90 | Medium |
| MAPE6 | Management accounting decision quality has improved across departments due to AI use.                  | 3.50 | 0.92 | Medium |
| MAPE7 | AI adoption has improved coordination between accounting and other departments during decision-making. | 3.57 | 0.88 | Medium |
| MAPE8 | Overall, AI adoption has strengthened the effectiveness of management accounting practice.             | 3.73 | 0.85 | High   |
|       | Management Accounting Practice Effectiveness (Overall)                                                 | 3.61 | 0.30 | Medium |

Table 4 shows that Accountants' Digital Competence recorded an overall medium level (mean = 3.45, SD = 0.33), with the highest-rated item relating to accountants actively updating their digital and analytical skills (mean = 3.72), and the lowest-rated item relating to departmental opportunities to practice new digital tools (mean = 3.18). Management Accounting Practice Effectiveness recorded an overall medium-to-high level (mean = 3.61, SD = 0.30), with the greatest perceived improvement relating to the speed of producing management accounting reports (mean = 3.81), suggesting that the most immediately visible benefit of AI adoption in the surveyed banks is a reduction in reporting latency rather than a change in decision accuracy per se.

### 7.3 Measurement Model Assessment: Reliability and Convergent Validity

Prior to testing the structural relationships, the measurement model was assessed for internal consistency reliability and convergent validity. Table 5 presents Cronbach's alpha, rho\_A, Composite Reliability (CR), and Average Variance Extracted (AVE) for the three constructs.

Table 5. Reliability and Convergent Validity of the Measurement Model

| Construct                                           | No. of Items | Cronbach's $\alpha$ | rho_A | CR    | AVE   |
|-----------------------------------------------------|--------------|---------------------|-------|-------|-------|
| Artificial Intelligence (AI) Adoption               | 10           | 0.903               | 0.907 | 0.918 | 0.542 |
| Accountants' Digital Competence (ADC)               | 8            | 0.879               | 0.884 | 0.902 | 0.568 |
| Management Accounting Practice Effectiveness (MAPE) | 8            | 0.891               | 0.895 | 0.911 | 0.594 |

As shown in Table 5, all three constructs achieved Cronbach's alpha and Composite Reliability values well above the recommended threshold of 0.70, indicating strong internal consistency reliability. Furthermore, all AVE values exceeded the recommended threshold of 0.50 (Fornell & Larcker, 1981), confirming adequate convergent validity for the AI Adoption, Digital Competence, and Management Accounting Practice Effectiveness constructs. All outer loadings for the retained items exceeded 0.70, and no items were removed during the measurement model refinement process.

#### 7.4 Discriminant Validity

Discriminant validity was assessed using both the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT). Table 6 presents the Fornell-Larcker matrix, with the square root of AVE for each construct shown on the diagonal.

Table 6. Discriminant Validity — Fornell-Larcker Criterion

| Construct                                           | AI    | MAPE  | ADC   |
|-----------------------------------------------------|-------|-------|-------|
| Artificial Intelligence (AI) Adoption               | 0.736 |       |       |
| Management Accounting Practice Effectiveness (MAPE) | 0.589 | 0.771 |       |
| Accountants' Digital Competence (ADC)               | 0.461 | 0.537 | 0.754 |

As shown in Table 6, the square root of the AVE for each construct (diagonal values, ranging from 0.736 to 0.771) exceeds its correlations with the other constructs, satisfying the Fornell-Larcker criterion for discriminant validity.

Table 7. Discriminant Validity — Heterotrait-Monotrait Ratio (HTMT)

| Construct Pair | HTMT Ratio |
|----------------|------------|
| AI ↔ MAPE      | 0.654      |
| AI ↔ ADC       | 0.518      |
| ADC ↔ MAPE     | 0.598      |

All HTMT ratios reported in Table 7 fall below the conservative threshold of 0.85 (Henseler, Ringle, & Sarstedt, 2015), providing further confirmation that the three constructs are empirically distinct.

#### 7.5 Structural Model and Hypotheses Testing

Following confirmation of the measurement model, the structural model was assessed using a bootstrapping procedure with 5,000 resamples to test the statistical significance of the hypothesized paths. Table 8 presents the path coefficients, standard deviations, t-values, and significance levels for the direct-effect hypotheses (H1 and H2).

Table 8. Path Coefficients and Direct-Effect Hypotheses Testing

| Hypothesis | Path               | $\beta$ | SD    | t-value | p-value | Decision  |
|------------|--------------------|---------|-------|---------|---------|-----------|
| H1         | AI Adoption → MAPE | 0.451   | 0.055 | 8.200   | 0.000   | Supported |
| H2         | ADC → MAPE         | 0.271   | 0.063 | 4.302   | 0.000   | Supported |

The results in Table 8 indicate a statistically significant positive effect of AI adoption on management accounting practice effectiveness ( $\beta = 0.451$ ,  $t = 8.200$ ,  $p < 0.001$ ), leading to the rejection of the null form of H1 and acceptance of the alternative hypothesis that AI adoption significantly and positively affects management accounting practice effectiveness in Nigerian Deposit Money Banks. Similarly, the results indicate a statistically significant positive effect of accountants' digital competence on management accounting practice effectiveness ( $\beta = 0.271$ ,  $t = 4.302$ ,  $p < 0.001$ ), leading to acceptance of H2. The relative magnitude of the two path coefficients suggests that, while both factors matter, AI adoption exerts a stronger direct influence on management accounting practice effectiveness than digital competence alone.

#### 7.6 Moderation Analysis (H3)

To test the moderating role of accountants' digital competence, an interaction term ( $AI \times ADC$ ) was created using the two-stage approach in SmartPLS and added to the structural model. Table 9 presents the results of the moderation analysis.

Table 9. Moderation Effect of Digital Competence on the AI–MAPE Relationship

| Path                               | $\beta$ | SD    | t-value | p-value | f <sup>2</sup> | Decision  |
|------------------------------------|---------|-------|---------|---------|----------------|-----------|
| AI $\times$ ADC $\rightarrow$ MAPE | 0.132   | 0.050 | 2.640   | 0.008   | 0.033          | Supported |

As shown in Table 9, the interaction term (AI  $\times$  ADC) has a statistically significant positive effect on management accounting practice effectiveness ( $\beta = 0.132$ ,  $t = 2.640$ ,  $p = 0.008$ ), indicating that accountants' digital competence significantly and positively moderates the relationship between AI adoption and management accounting practice effectiveness. This leads to acceptance of H3. Substantively, the positive interaction coefficient indicates that the positive effect of AI adoption on management accounting practice effectiveness becomes stronger as accountants' digital competence increases; conversely, among accounting staff with weaker digital competence, the same level of AI adoption translates into comparatively smaller gains in practice effectiveness. Although the effect size of the interaction term ( $f^2 = 0.033$ ) is small by conventional benchmarks (Cohen, 1988), it is consistent with the typically modest effect sizes reported for interaction terms in PLS-SEM moderation analyses more broadly.

### 7.7 Model's Explanatory and Predictive Power

Table 10 summarizes the coefficient of determination ( $R^2$ ), adjusted  $R^2$ , and the  $Q^2$  predictive relevance statistic obtained through the blindfolding procedure, together with the Standardized Root Mean Square Residual (SRMR) as an indicator of overall model fit.

Table 10. Explanatory Power, Predictive Relevance, and Model Fit

| Metric                     | Value | Interpretation                                            |
|----------------------------|-------|-----------------------------------------------------------|
| $R^2$ (MAPE)               | 0.476 | 47.6% of the variance in MAPE is explained by the model   |
| Adjusted $R^2$ (MAPE)      | 0.470 | Adjusted for the number of predictors                     |
| $Q^2$ (MAPE, blindfolding) | 0.301 | $Q^2 > 0$ indicates acceptable predictive relevance       |
| SRMR                       | 0.065 | Below the 0.08 threshold, indicating acceptable model fit |

As shown in Table 10, the proposed model explains 47.6% of the variance in management accounting practice effectiveness ( $R^2 = 0.476$ ), which represents a substantial level of explanatory power for a behavioral model in the organizational sciences. The  $Q^2$  value of 0.301 confirms that the model possesses acceptable predictive relevance for the endogenous construct, while the SRMR value of 0.065 falls below the commonly accepted threshold of 0.08, indicating an acceptable overall fit between the proposed model and the data.

## 8. Discussion of Results

The finding that AI adoption significantly and positively affects management accounting practice effectiveness (H1) is consistent with Nigerian evidence that automation processes, expert systems, and intelligent agents substantially affect accounting procedures in deposit money banks (Oduwale & Olukunle, 2023), and with Ajape and Adelowotan's (2025) finding that digital accounting practices — including data analytics, automated bookkeeping, and cloud-based systems — are already measurably associated with performance outcomes in Nigerian DMBs. The comparatively lower mean scores observed for predictive analytics and dashboard accessibility (Table 3) suggest that Nigerian banks may still be extracting more value from automation and reporting-cycle functions of AI than from its more advanced forecasting capabilities, an observation that aligns with reported gaps in AI awareness and understanding among Nigerian accounting professionals (Obi & Anaeye, 2023).

The significant positive effect of accountants' digital competence on management accounting practice effectiveness (H2) reinforces the argument that human capability factors are a foundational determinant of technology-enabled performance, and is consistent with Barreto et al.'s (2025) systematic-review finding that a lack of digital and analytical competencies is a recurring barrier to realizing management accounting's digital-technology benefits. The comparatively low mean score for departmental opportunities to practice new digital tools (ADC6, mean = 3.18) suggests a specific and actionable area of organizational weakness across the surveyed banks.

The significant positive moderating effect of digital competence (H3) extends the theoretical argument that information-system benefits are conditional on user readiness, by providing recent, sector-specific evidence from the Nigerian Deposit Money Banking context. This result also helps explain the persistent AI-awareness gap reported among Nigerian accounting professionals (Obi & Anaeye, 2023) and the only-moderate sector-wide AI adaptation observed by Ononokpono et al. (2023): it is plausible that digital competence operates less as a direct antecedent of AI adoption itself and more as a moderating condition that amplifies the management accounting value of AI once it has already been adopted, precisely as modeled in the present study.

## 9. Recommendations

1. Invest in advanced AI-enabled predictive and forecasting capabilities within existing management accounting systems, given that these dimensions recorded the lowest mean scores among the surveyed AI adoption items.
2. Provide structured, recurring AI-literacy and digital-skills training for accounting and finance staff, given that training adequacy and practice opportunities recorded the lowest mean scores among the digital competence items.
3. Encourage active collaboration between accounting/finance departments and IT/systems units to ensure that AI outputs are correctly interpreted and consistently applied in day-to-day management accounting decisions.
4. Embed AI-generated accounting outputs explicitly within strategic decision-making processes and governance structures, rather than treating them as a peripheral reporting function.
5. Establish clear internal guidelines for validating and explaining AI-generated accounting figures to non-technical management, to strengthen accountability and trust in AI-supported reporting.
6. Replicate this study using a real, field-administered sample across a broader set of Nigerian Deposit Money Banks, and consider extending the model to include mediating variables such as perceived data quality or organizational AI governance.

## 10. Conclusion

This study examined the impact of AI adoption on management accounting practice effectiveness in Nigerian Deposit Money Banks, considering the moderating role of accountants' digital competence, using a PLS-SEM approach implemented in SmartPLS. The measurement model demonstrated strong reliability and validity across all three constructs, and the structural model confirmed statistically significant direct effects of both AI adoption and digital competence on management accounting practice effectiveness, together with a statistically significant positive moderating effect of digital competence on the AI–management accounting relationship. The proposed model explained just under half of the variance in management accounting practice effectiveness, indicating substantial though not complete explanatory power, consistent with the presence of additional unmodeled factors such as regulatory environment, technological infrastructure maturity, and individual decision-maker characteristics. These findings reinforce the conclusion that AI delivers its greatest management accounting value when accompanied by, and actively reinforced by, a digitally competent accounting workforce.

## 11. Limitations and Future Research

As acknowledged in Section 6.3, the empirical results reported in Section 7 were constructed to illustrate the structure and reporting conventions of a SmartPLS-based PLS-SEM analysis and were not derived from an actual field-administered survey; researchers intending to use this paper as the basis for genuine empirical research should first administer the questionnaire provided in the Appendix to a real sample and rerun the analysis described in Section 6.3 on the resulting data. Beyond this central limitation, the proposed model, sampling frame, and single-country focus on Nigerian Deposit Money Banks would, even with real data, constrain the generalizability of findings to other national or sectoral contexts. Future research could extend the model by incorporating mediating variables such as perceived data quality, organizational AI governance, or regulatory support; by adopting a longitudinal design to examine how the AI–management accounting relationship evolves as banks progress through successive stages of AI maturity; and by conducting comparative analysis across other West African or broader Sub-Saharan African banking markets to assess the extent to which the moderating role of digital competence generalizes beyond the Nigerian context.

## 12. Summary of the Study

This paper examined the impact of AI adoption on management accounting practice effectiveness in Nigerian Deposit Money Banks, with accountants' digital competence modeled as both a direct predictor and a moderating variable. After outlining the research problem, questions, and objectives, the study reviewed recent literature on Artificial Intelligence, accounting practice, and digital competence, with particular attention to studies conducted within the Nigerian banking and accounting profession. A structured questionnaire covering AI adoption, digital competence, and management accounting practice effectiveness was designed based on established prior instruments, and a PLS-SEM analytical approach using SmartPLS was specified to test three hypotheses concerning the direct and moderating effects of the study variables. The measurement model demonstrated strong reliability and validity, and the structural model results supported all three hypotheses, with AI adoption emerging as the strongest direct predictor of management accounting practice effectiveness and digital competence confirmed as a significant positive moderator of that relationship. The study concluded with recommendations emphasizing investment in predictive AI capabilities, digital-skills training, cross-functional collaboration, and governance integration, and it noted that the numerical results presented are illustrative of the intended reporting format and should be replaced with results from an actual field-administered sample before the study is used as an original empirical contribution.

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## Appendix: Study Questionnaire

Please indicate your level of agreement with each of the following statements using the scale: 5 = Strongly Agree, 4 = Agree, 3 = Moderately Agree, 2 = Disagree, 1 = Strongly Disagree.

### Section A: Demographic and Job Data

- Gender: Male / Female
- Educational Qualification: HND/OND / Bachelor's / Master's / Professional (ICAN/ACCA) / Doctorate
- Job Title: Management Accountant/Finance Manager / Internal Auditor / IT-Systems Staff / General Accounting-Operations Staff
- Years of Experience: Less than 5 / 5 to less than 10 / 10 to less than 15 / 15 or more
- Bank License Type: International/National Authorisation / Regional/Non-Interest Authorisation

### Section B: Artificial Intelligence (AI) Adoption

1. The bank uses AI-based systems to automate routine accounting and reconciliation tasks.
2. AI tools used in accounting are accurate and produce reliable outputs.
3. AI systems integrate data from multiple internal departments effectively.
4. Accounting staff can easily access AI-generated reports relevant to their decisions.
5. AI tools provide predictive analytics that support budgeting and forecasting.
6. AI-generated outputs are updated frequently enough to support timely decisions.
7. AI systems are compatible with the bank's existing accounting information systems.
8. Management relies on AI outputs when formulating management accounting decisions.
9. AI adoption has reduced the time required to close accounting/reporting cycles.

### 10. Accounting staff trust the accuracy of insights generated by AI tools.

### Section C: Accountants' Digital Competence (ADC)

1. I am comfortable interpreting outputs generated by AI-based accounting tools.
2. I have received adequate training on the AI tools used in my accounting role.
3. I can identify errors or anomalies in AI-generated accounting outputs.
4. I actively update my digital and analytical skills to keep pace with new accounting technologies.
5. I am confident using data analytics or dashboard tools as part of my accounting work.
6. My department provides opportunities to practice using new digital accounting tools.
7. I collaborate effectively with IT/systems staff when AI tools are introduced into accounting processes.
8. I feel prepared to explain AI-generated figures to non-technical management when required.

### Section D: Management Accounting Practice Effectiveness (MAPE)

1. Management accounting reports produced with AI support are more accurate than before AI adoption.
2. The speed of producing management accounting reports has improved since adopting AI tools.
3. Managers feel more confident making decisions supported by AI-enabled accounting data.



4. AI-supported management accounting has reduced costly reporting or costing errors.
5. The bank can respond more quickly to cost or budget variances because of AI-enabled accounting.
6. Management accounting decision quality has improved across departments due to AI use.
7. AI adoption has improved coordination between accounting and other departments during decision-making.
8. Overall, AI adoption has strengthened the effectiveness of management accounting practice.