

Leveraging Smart Accounting Technologies for Sustainable Public Financial Management in Osun State, Nigeria

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Abstract

Studies affirm that many countries of the world have successfully adopted AI and IoT for public financial management (PFM) which is vital for good governance in Nigeria. This paper, therefore, examines how smart accounting technologies, especially Artificial Intelligence (AI) and Internet of Things (IoT) could be leveraged to revolutionise public financial management systems and support sustainable governance outcomes in Osun State of Nigeria. The study adopts a quantitative survey research design and employed primary data collated through the structured questionnaire distributed personally and online to respondents in Osun State, Nigeria. A stratified sampling technique was used to select the sample of 360 participants from the State Ministries, Departments, and Agencies (MDAs). The collated data were analysed using frequency distribution, mean and standard deviation. Findings disclose that in Osun State manual PFM system still dominates, causing inefficiencies in accuracy, timeliness and accountability. The results also reveal that the IT infrastructure is weak but technical skills are high. Notwithstanding, the majority of the respondents supported the claims that AI and IoT have the potential impact to increase reporting quality and timeliness, improve resource allocation and fiscal discipline, and fortify audit trails and accountability of the State. This paper concludes that the stakeholders in Osun State are aware of and optimistic about the incorporation of advanced technologies like artificial intelligence and the 'Internet of Things' into the State financial management systems, but the main constraint is the infrastructure not human capacity. This study however recommends the creation of a digital policy with clear deadlines and training materials to direct the use of AI and IoT in public financial management in the State.

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Keywords

Artificial Intelligence, 'Internet of Things', Osun State, public financial management, smart accounting technologies

Introduction

Public financial management (PFM) is crucial for good governance in Nigeria. Effective public financial management (PFM) is the backbone of national governance and a mechanism for moving the Osun State's economy toward. PFM enables governments to efficiently plan, allocate and manage public funds which guarantee transparent use of public financial resources. Public financial management serves as a cornerstone of effective governance and critical driver of fiscal discipline, efficient resource allocation and improved service delivery (Dumitru et al., 2023). Finances are needed to support the operations, initiatives, and programs of the governmental organisations, however, these funds must be appropriately raised, used sparingly and can be tightly managed to avoid mismanagement through smart accounting technologies (SATs) using Artificial Intelligence (AI) and 'Internet of Things' (IoT) Smart Accounting Technologies (SATs) like AI and 'Internet of Things' can modernize PFM

SATs are recognised transformative tools for public financial management and their evolutions have opened opportunities for public financial reporting process reform. SATs such as AI and 'Internet of Things' can revolutionize how organizations handle big financial data, financial reporting, decision-making and accountability process (Adumene et al., 2024). Full implementation of SATs can offer a transformative solution for improving public financial management systems in Nigeria. AI and IoT offer automation, immutable records and real-time data analytics which are critical in promoting transparency and curbing corruption (Dumitru et al., 2023). The incorporation of AI into public financial management can enable increased accuracy, better decision-making, and automation of labor-intensive processes. The AI tools perform predictive analytics (Haddud et al., 2017).

The growing impact of IoT on accounting practices emphasises how sensors and networked devices produce data in real time that can be recorded, examined and incorporated into financial systems to increase accuracy and automation (Dumitru et al., 2023). IoT devices offer real-time data on inventory, asset utilization, and maintenance plans, and help with inventory control, asset tracking, and cost accounting by enhancing data accuracy and responsiveness to supplier and customer demands (Brous et al., 2020). Data from IoT devices can facilitate automatic account reconciliation and transaction processing, more accurate depreciation computations, increases inventory and asset valuation, strengthens cost analysis, which lowers human error and boosts operational effectiveness (Haddud et al., 2017). This paper, therefore, examines how to leverage AI and IoT to achieve sustainable public financial management in Osun State, Nigeria.

The reviewed related studies are yet to concentrate on Osun State which is the focus of this research. Apart from that, the previous studies such as Okoye and Ofoegbu (2020), Cao et al. (2022), Dumitru et al. (2023), and Adumene et al. (2024) have used content analysis, but this research employs survey approach and desktop literature review method. Besides, many success remarks on advanced technologies adoption have being recorded from many developed and developing economies like India, USA, Rwanda, Estonia, and South Africa, showing how the adoption of these global technologies has improved their financial management and reporting, but Osun State in Nigeria disclose low levels of digital maturity in public financial management systems (Olaoye et al., 2023). Besides, the traditional financial accounting methods are susceptible to manipulation and error-prone (Okoye & Ofoegbu, 2020). More so, the Nigeria's public sector especially the Osun State still continues to face the problems of financial management, service delivery, transparent reporting and accountability despite the application of some software in accounting (Dumitru et al., 2023).

In view of the above problems, this study asks questions that: What are the current states of public financial management systems in Osun State? What are the potential impact of AI and IoT in achieving sustainable public financial management in the State? What are the challenges hindering the implementing of AI and 'Internet of Things' for public financial management in Osun State? And what are the digital transformation frameworks for AI and IoT integration into government accounting systems in the State? The paper offers practical solutions on how to leverage AI and IoT to achieve sustainable public financial management in Osun State of Nigeria.

This study specifically assesses the current state of public financial management systems in Osun State; evaluates the potential impact of AI and IoT in achieving sustainable public financial management; identifies the challenges hindering the implementing of AI and IoT for public financial management; and proposes digital transformation frameworks for AI and IoT integration into public financial management systems in Osun State, Nigeria. This paper offers relevant smart solutions that can enhance transparent reporting, forester public trust, good governance and efficient utilisation of public funds and reduction of corruption in the State's public sector. The paper improves digital awareness of future researchers, policy-makers and business stakeholders as a contribution towards Nigeria's Vision 2050 and the global Sustainable Development Goals agenda.

Literature Review

Sustainable Public Financial Management

Sustainable public financial management is the fiscal discipline, effective use and responsible administration of public funds that guarantee long-term fiscal restraint, operational efficacy, and efficient resources allocation (Dumitru et al., 2023). Public financial management (PFM) refers to the effective acquisition and administration of public funds and resources. PFM is the activity involving planning, sourcing, utilising and management of public financial resources and operations of government (Wolfgang & Andreas, 2023). It concerns with the mobilisation of public finances and their prudent use in order to accomplish the public goal of value for money. PFM tasks involve cost of capital optimisation, working capital management, long-term investment assessment and treasury management (Olaoye, 2023). Budget planning, spending control, revenue mobilisation, and financial reporting are all improved through the use of cutting-edge technology to promote intergenerational equity and sustainable development goals (Tiwari & Khan, 2020).

Smart Accounting Technologies: AI and IoT

Smart accounting technologies (SATs) are the sophisticated digital tools, software, and systems that automate, secure, optimise and improve accounting procedures and financial processes by utilising cutting-edge technologies like AI and IoT among others (Altuk & Kablan, 2020). These technologies go beyond conventional accounting software and the use of TAS and CP which will eventually result in more accurate, strategic, and efficient financial management by adding intelligent features that can learn, adapt, and offer deeper insights. Essentially, the goals of SATs are to increase compliance, improve forecasting and decision-making, automate repetitive operations, increase data accuracy, and provide real-time financial information (Cao et al., 2015).

Artificial intelligence (AI) has the potential to offers predictive analytics and support decision-making. AI is an instrument for improving operational effectiveness, financial transparency and service deliver (Adumene et al., 2024). AI potential applications in financial management include automation of data-driven decision-making, repetitive tasks and fraud detection. Large datasets can be analyzed by machine learning algorithms to find patterns and generate accurate forecasts. In accounting, this feature is very helpful for predicting financial performance, examining budgetary deviations, and spotting possible hazards. Accountants can use machine learning to handle and analyse large amounts of data, minimising human error and allowing for more accurate forecasts (Quantic School of Business and Technology, 2023).

The term 'Internet of Things' describes a network of real-world items that have sensors, software, and other technologies integrated into them so they can gather and share data (Brous et al., 2020). IoT refers to the combination of

hardware and software with unique identifiers (UIDs) and internet access, enabling real-time data collection, transmission, and analysis (Haddud et al., 2017). Accounting professionals can use 'Internet of Things' feature to keep an eye on tangible assets, update ledgers automatically, and increase data entry accuracy. Utility firms, for example, employ IoT-enabled meters to automate billing and track usage dynamically (Wu et al., 2019). Many different types of accounting-related data can be collected by IoT devices. While GPS and RFID offer location data for asset tracking, cost accounting and maintenance planning are supported by information on machine hours and energy use. Sensor-triggered transactions enable the automation of payments and reconciliations, while operational data like cycle times and output rates aid in assessing efficiency (Okoye & Ofoegbu, 2020). Similarly, by offering comprehensive data on resource utilization, 'Internet of Things' helps with cost accounting. Better price decisions, more precise overhead allocation, and the detection of inefficiencies are made possible by this device (Möller et al., 2020)

Challenges Facing AI and IoT Integration into PFM

The integration of SATs especially AI and IoT into Osun State's public financial management systems are hampered by a number of institutional, regulatory and economic barriers. These include: absence of political will and senior management support, inadequate digital infrastructure, slow pace of regulatory reform, data security and privacy concerns, lack of digital skills of many workers, inadequate data security and privacy, organisational resistance to change, lack of transparency and presence of corruption (Wolfgang & Andreas, 2023), high implementation cost, insufficient recurrent expenditure, skill gaps and insufficient training, limited funding and budget allocation (Dumitru et al., 2023).

However, the main challenge is the inadequate digital infrastructure characterised by spotty internet connectivity and intermittent power supplies especially in some rural areas (Brous et al., 2020). Additionally, a large percentage of public sector workers lack the digital skills they need. Given the public sector's budgetary constraints, the initial investment needed to acquire and implement sophisticated digital accounting systems, including hardware, software, and infrastructure upgrades, can be substantial and constitute a significant barrier (Dumitru et al., 2023). The ongoing costs associated with maintaining digital infrastructure, software licenses, updates, and skilled IT personnel can also put a strain on public finances.

Besides, insufficient budgetary allocation for digital transformation initiatives in public financial management hinders progress (Brous et al., 2020). The regulatory environment may not be adjusting fast enough to keep up with

the rapid advancements in digital technology and the inconsistent policies and bureaucratic roadblocks within the government can create obstacles to the smooth implementation of digital initiatives (Tiwari & Khan, 2020). The absence of comprehensive legal and regulatory frameworks specifically addressing the adoption and use of advanced digital technologies in public accounting, including data security, privacy, and standardisation, creates uncertainty and discourages investment (Olaoye, 2023).

One of the biggest obstacles to adoption is often the resistance to change from people and organisations used to traditional manual processes. As previously mentioned, the effective use of digital systems is severely limited by the lack of dependable IT infrastructure, including hardware, power supply, and internet connectivity. Another serious challenge is the lack of skilled IT professionals and accounting personnel with the digital literacy and expertise needed to implement, manage, and use advanced digital accounting systems. This problem is made worse by inadequate training and capacity-building initiatives (Olaoye, 2023).

When handling sensitive financial data, worries about data security, privacy, and the possibility of cyber threats might make people hesitant to use digital solutions. Successful digital transformation depends on the dedication and backing of political leaders and senior management. The funding and prioritising of digital projects may be hampered by a lack of this dedication (Wolfgang & Andreas, 2023). In certain cases, special interests who profit from opaque manual methods may oppose the use of digital technologies that improve accountability and transparency. Nigeria must remove these institutional, legal, and financial obstacles if it is to fully utilise digital technology's potential to improve the effectiveness, accountability, and transparency of its public accounting systems—thereby promoting better governance and sustainable development (Tiwari & Khan, 2020).

Framework for AI and IoT Integration into PFM

These frameworks provide a methodical and systematic approach to digitising Nigeria's public sector accounting systems and ensure a sustainable, safe, inclusive, and customised transition to digital financial management systems: Firstly, digital readiness evaluation mechanisms need to be used to analyse the existing technology capabilities within Ministries, Departments, and Agencies (MDAs), finding important gaps in infrastructure, skills, and processes that need to be solved before deploying smart financial systems (Ukpong, 2022). Secondly, public organisation should institutionalise a well-defined process for evaluating and selecting new accounting technologies. Modules for Policy and Institutional Alignment (MPIA): should be developed to guarantee that the required institutional, regulatory, and policy frameworks are in place. These modules will offer a roadmap for coordinating government policies with the Smart PFM initiative's strategic and technological objectives and help to

harmonise these frameworks with the broader objectives of digital transformation (Tawfic et al., 2014).

Thirdly, Technology Selection and Integration Guidelines (TSIGs) should be set to guarantee that the technologies selected for public finance digitisation are appropriate for Nigeria's unique needs and context, in line with international best practices, and that they integrate seamlessly into the public sector's current systems. Then, Training and Change Management Protocols (TCMP) should be applied to offer direction on how to train government employees and handle the operational and cultural shifts brought about by implementing new technologies, with an emphasis on overcoming resistance and developing the required capacity to guarantee efficient system use. There must be provisions of adequate training and support to staff during the implementation of the new accounting technologies. Also, stakeholders' involvement is considered necessary in the process of adopting new accounting technologies. Finally, measures for Monitoring and Evaluation (M&E) should be set track developments and guarantee the successful deployment of digital financial systems, enabling ongoing observation and timely resolution of any issues (Sani et al., 2022).

Empirical Review

Several studies have highlighted the potential impact of AI and IoT on transparency and efficiency in PFM. Cao et al. (2022) concentrated on how AI might improve financial analysis using content analysis instead of descriptive analysis used in this research. The study found that AI technologies might greatly increase the efficiency and accuracy of economic analysis and reporting, lowering the possibility of errors and offering deeper insights. Adumene et al. (2024) investigated how AI affects risk assessment procedures by employing content analysis. According to the study, AI-driven analytics greatly increased the precision of risk assessments, enabling businesses to more successfully detect and reduce hazards. All of these studies emphasised how crucial it is to combine AI with conventional accounting methods in order to provide a more responsive and dynamic accounting function that can satisfy the changing demands of contemporary businesses.

Methodology

The study adopted a quantitative survey research design and employed primary data through the structured questionnaire distributed to respondents to assess the current state of public accounting systems and analyse the potential impact of AI and 'Internet of Things' on sustainable public financial management in Osun State, Nigeria. A stratified sampling technique was utilised to select the sample

of 360 participants, comprising 180 public accountants and 180 IT experts from Osun State Ministries, Departments, and Agencies (MDAs) in Nigeria. The questionnaires were administered personally and online to the participants across the governmental organisations in the State. The questionnaire which was structured on a 4-points Likert scale options ranging from 1 (Strongly disagree) to 4 (Strongly agree) was designed with the assistance of experts in Osun State's public sector accounting and in IT application. Data obtained were analysed using frequency distribution, mean and standard deviation.

Result and Discussion

This section collates, analyses and reports data for making inference.

Table 1: Current State of Public Accounting Systems in Osun State Nigeria

SN	Section A Statement	Option				Total	Mean	SD
		SA	A	SD	D			
1	The current public financial management systems in Osun State are largely manual and paper-based.	272 (76)	77 (21)	8 (2)	2 (1)	360 (100)	3.7167	.54619
2	Financial reporting manually processed in the Osun State public sector are not timely and not always accurate.	283 (79)	55 (15)	21 (6)	1 (3)	360 (100)	3.7222	.57869
3	Internal control mechanisms within Osun State public accounting systems are robust and effective.	287 (80)	81 (17)	8 (2)	4 (1)	360 (100)	3.7528	.54593
4	There is inadequate transparency and accountability in Osun State public financial management processes.	284 (79)	48 (16)	14 (4)	4 (1)	360 (100)	3.7278	.58610
5	Awareness of smart accounting technologies (e.g., AI, IoT) is high within Osun State public sector accounting departments.	276 (77)	0 (0)	80 (22)	4 (1)	360 (100)	3.5222	.87335
6	The necessary IT infrastructure is readily available for implementing smart technologies in Osun State.	48 (13)	11 (3)	259 (72)	42 (12)	360 (100)	2.1806	.80608
7	There is sufficient technical expertise within the Osun State public sector workforce to implement and manage smart accounting technologies.	302 (84)	13 (4)	41 (11)	4 (1)	360 (100)	3.7028	.71044

Source: Data Generated by Author (2025)

Table 1 result of the evaluation of respondents' opinions regarding Osun State of Nigeria's public financial management systems as they stand today produced some significant findings. Regarding the prevalence of manual systems and related difficulties, respondents strongly agreed with the statements that Osun State's current PFM still relies significantly on manual procedures causing inefficiencies in accuracy, timeliness and accountability, according to mean scores that range from 3.70 to 3.75.

Notwithstanding these drawbacks, the existing internal control systems are thought to be reasonably robust, suggesting that the system has certain institutional strengths in the State. But there are still issues with accountability and transparency, which are deemed insufficient.

Smart technology awareness is moderate (Mean = 3.52), suggesting that public sector stakeholders have a solid basis of knowledge. However, the survey found a significant IT infrastructure gap, as evidenced by the low mean score of 2.18. One major obstacle to the adoption of smart technologies is this divide. Interestingly, technical expertise has a relatively high rating (Mean = 3.70), indicating that infrastructure deficiencies impede digital transformation in public accounting systems even while human resource preparedness is present.

Table 2: Potential Impact of AI and 'Internet of Things' on Sustainable Public Financial Management

SN	Section B	Option					Total (%)	Mean	SD
	Statement	SA	A	SD	D				
8	AI and IoT will enhance the accuracy and reliability of financial data in the public sector of Osun State.	259 (72)	34 (9)	63 (18)	4 (1)	360 (100)	2.3528	.66382	
9	The use of AI and IoT will lead to greater transparency and public financial management of Osun State	261 (73)	4 (1)	0 (0)	95 (26)	360 (100)	2.5167	.89552	
10	AI and IoT will improve the speed and quality of financial reporting of Osun State	272 (76)	71 (20)	13 (4)	4 (1)	360 (100)	3.6972	.59242	
11	The adoption of AI and IoT will contribute to better resource allocation and fiscal discipline of Osun State in Nigeria.	276 (77)	70 (19)	10 (3)	4 (1)	360 (100)	3.7167	.57113	
12	AI and IoT adoption will facilitate better audit trails and accountability in public finance of Osun State in Nigeria.	287 (80)	52 (14)	17 (5)	4 (1)	360 (100)	3.7278	.60019	

Source: Data Generated by Author (2025)

The results from Table 2 indicate that there is general optimism regarding the beneficial impacts of artificial intelligence (AI) and the 'Internet of Things' on the administration of public finances in Osun State, Nigeria. The majority of the evaluated items had high mean scores of about 3.7, and the standard deviations indicated that respondents had a moderate level of agreement. Particularly well-supported claims were the potential of AI and 'Internet of Things' to increase reporting quality and timeliness, improve resource allocation and fiscal discipline (SN11), and fortify audit trails and accountability. Nevertheless, despite the high frequency of "Strongly Agree" replies, there is a noticeable discrepancy in the responses to Statements Number 8 and 9, which had low mean scores (2.35 and 2.52, respectively).

Table 3: Reliability Test

	Cronbach's Alpha	Rage of Items	%
Tests	0.823	1-7	-
	0.756	8-12	
Cases	Valid	360	100.0
	Excluded	0	.0
	Total	360	100.0

Source: Data Generated by Author (2025)

In Table 3, Cronbach's Alpha reliability test results show that the study instrument's items had a high level of internal consistency and excellent reliability with a Cronbach's Alpha rating of 0.823 and 0.756 for items 1-7 and 8-12 respectively. The instrument's suitability for efficient data gathering is confirmed by this outcome. Additionally, there were zero excluded cases and 360 valid responses, or 100% of the sample, confirming the data integrity. This suggests a clean, comprehensive dataset devoid of any missing or useless information, which raises the analysis's legitimacy.

Discussion of the Findings

This paper investigated how leveraging Artificial Intelligence (AI) and 'Internet of Things' could revolutionise sustainable public financial management in Osun State, Nigeria and support sustainable governance outcomes. The study's findings revealed that the State's public accounting systems and their preparedness for digital transformation via smart technologies present a complicated but perceptive picture. The study found that Osun State's current public accounting system still relies significantly on manual procedures that lead to inefficiencies in accuracy, timeliness, and accountability. Although the system is beset by a lack of IT infrastructure, the human ability to adopt and use smart technologies is evident. There is a great deal of awareness and optimism regarding the potential of AI and 'Internet of Things' T to revolutionise public financial management with respondents strongly believing that these

technologies can significantly improve reporting, accountability and resource efficiency. However, in order to fully realise these benefits, strategic investments in IT infrastructure are necessary to support the technological capabilities already present in the workforce.

As stated by Oboh and Ajibolade (2017), who documented ongoing inefficiencies in Nigeria's public sector accounting because of antiquated procedures, respondents frequently recognised problems with timeliness and accuracy in reporting. The lack of digital technologies also hinders openness and delays reporting in public financial management, according to Ijeoma and Oghoghomeh (2014). In spite of these systemic issues, internal control systems were thought to be reasonably robust. Uwuigbe et al. (2018) found that although public institutions may have statutory rules in place, procedural bottlenecks frequently prevent them from attaining transparency and complete accountability.

The limited but encouraging degree of smart technology awareness among public sector accountants is one of the study's main findings. Even though there is a fair amount of awareness about AI and 'Internet of Things', adoption is still severely hampered by the absence of appropriate IT infrastructure. This is in line with findings made by Ogbodo and Anyanwu (2020), who identified a lack of infrastructure as a common obstacle in sub-Saharan Africa's public digitalisation initiatives. Curiously, the staff seems technically competent, indicating that human ability is not the limiting factor. This supports Edeh and Nwosu's (2019) findings, which suggested that if enabling frameworks are offered, Nigerian public sector employees show a willingness to adopt new technologies. Furthermore, opinions about the possible advantages of AI and 'Internet of Things' in public financial management are overwhelmingly favorable. The speed and quality of financial reporting, resource allocation, and audit trails could all be improved by these technologies, according to respondents. These observations are consistent with findings from around the world, including Warren et al. (2015), which highlighted the revolutionary potential of digital technologies in public finance. Finally, a Cronbach's Alpha results confirmed the study instrument's reliability, demonstrating that the data gathering method was reliable and consistent. Because of this, the insights derived from the dataset are more reliable.

Conclusion

This paper concludes that the stakeholders in Osun State are aware of and are ready for smart tech transformation using advanced technologies like artificial intelligence and the 'Internet of Things' for the State financial management systems because the skilled workforce exists, however the main constraint is not

human capacity but the infrastructure which requires more strategic investments and policies. The study's results however indicate that the potential advantages of smart technology will go mostly unrealised in the absence of strong IT infrastructure and focused legislative changes. Since these technologies improve accuracy, accountability, and reporting efficiency, it is generally accepted that they have the potential to completely transform public financial management.

This research statistically confirms that there is a wide gap between the Osun State PFM and the actual application of SATs like AI and 'Internet of Things' due to inadequate IT infrastructure. The paper informs that Osun State public accountants and IT experts have the technical know-how to embrace and use smart technology.

Recommendations

This study however recommends the creation of a digital policy with clear deadlines, compliance requirements and training materials to direct workers for the use of AI and 'Internet of Things' for the public financial information management and processing in Osun State of Nigeria. Also, strong political will, intentional technology investments, and ongoing capacity-building programmes across public sector organisations are all need to fully realise the benefits of AI and 'Internet of Things' for public financial management. More so, the State government needs to give budgetary resources top priority for the development of IT infrastructure, including dependable internet connection, servers, and cloud solutions to facilitate the digitisation of public financial systems.

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