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PROMOTING GOOD GOVERNANCE IN NIGERIA THROUGH INTERNET OF THINGS-DRIVEN PUBLIC FINANCIAL MANAGEMENT

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Abstract

Applying cutting-edge technologies to enhance public accountability is essential for good governance. The research adopts a quantitative survey research design to investigate how the Internet of Things (IoT)-based public financial management (PFM) promotes good governance in Nigeria. The research employs primary data obtained through the questionnaires and a stratified sampling technique to draw the sample of 1,440 of relevant professionals comprising 720 financial managers and 720 information technology (IT) specialists in the public services of the country. The research applies frequency distribution, mean, and standard deviation for data analysis. The study is anchored on the resource-based view theory. Findings reveal that IoT-driven public financial management is effective in reducing corruption; enhance financial processing transparency and accountability, boost audit trails, improve financial information trustworthiness, encourage fiscal discipline and speed up public reporting and decision-making in Nigeria. Findings also discover that although government workers in Nigeria possess technical knowledge to implement IoT

technologies but manual paper-based financial reporting is still prevailing due to inadequate digital infrastructures causing structural governance problems like delays in reporting public budgets and finances which IoT platform could resolve in the country. These findings have strong policy implications for public governance reform in Nigeria. This research concludes that adopting IoT for public financial management Nigeria will promotes good governance. The study commends that Nigerian government should prioritize their digital reform agendas with more infrastructural investments in IoT tools before proceeding to workforce digital retraining initiatives.

Key words: *Good governance, Internet of Things-driven public financial management*

Introduction

The evolution of technologies, especially the Internet of Things (IoT) digital platforms has transformed the way public organizations conduct their activities. Public financial management digitalization can promote good governance, through effective public resources management and better service delivery. Smart tools such as the Internet of Things (IoT)) digital platforms possess capability to reform public financial management systems (Porter & Heppelmann, 2015). This can improve audit trails, fiscal discipline, stronger public resource allocation, reliable government financial reporting and financial transparency. The IoT offers real-time and service delivery through networked sensor devices to monitor public spending and infrastructure (Brous et al., 2020). Developed Countries like Estonia, South Korea and Singapore use IoT digital platforms more often to enhance administrative efficiency and financial transparency, but, the adoption of these technologies is still in its infancy stage in Nigeria (Breuer & Knetsch, 2023). The precise framework for their integration into public financial management in the country is still not well addressed (Olaniyi et al., 2024). Thus, deploying IoT digital platforms in emerging economies can reform its financial management and support good governance (Okoye & Ofoegbu, 2020).

Adopting IoT for public financial management (PFM) digitalization produces a strong foundation for good governance. These technologies automate, optimize and secure financial operations beyond the coverage and strength of conventional accounting software (Porter & Heppelmann, 2015). IoT digital platforms offers regular monitoring of resource utilization, physical assets and infrastructure projects (IoT Analytics, 2023). Moving from reactive to proactive financial oversight, allow governments to improve accountability and fiscal discipline (Zhou et al., 2016). As a way of evaluating current capabilities and pinpointing talent, infrastructure and process gaps in public institutions, it is advisable to apply a methodical approach in deploying smart financial management systems identifies as digital readiness evaluation (Okoye & Ofoegbu, 2020).

However, technology choice and integration guidelines need to guarantee government that the systems to be selected are in conformity with international best practices, Nigeria's unique requirements and the country's existing infrastructure (IoT Analytics, 2023). Complementary elements that are also required for successful digital transformation include but not limited to monitoring and evaluation frameworks (Zhou et al., 2016). But, bad internet access, inadequate digital infrastructure, inadequate IT funding, opposition to change and a sluggish regulatory environment are some of the IoT adoption obstacles (Tiwari & Khan, 2020). Adoption of this technology is further hampered by high upfront expenditures for software,

hardware and infrastructure change, especially in the eye of Nigeria's financial constraints (Smith, 2021).

Despite that some emerging economies have introduced a number of digital governance initiatives to improve public accountability nevertheless some challenges like subpar service delivery, corruption, fragmented data integration, financial leakages and weak digital monitoring systems still threaten the deployment of IoT digital platforms for effective public governance (Altuk & Kablan, 2020). Additionally, with all the efforts of these countries on digital reformation, their financial management digitalization are still hampering by manual reporting, antiquated procedures and insufficient real-time oversight measures (Bassey, 2016).

While the previously reviewed studies like Altuk and Kablan (2020); Brous et al. (2020); Dumitru et al. (2023); Olaniyi et al. (2024) among other researchers relied heavily on content analysis and case studies approach, restricting their findings' global applicability. Besides, empirical studies that have applied quantitative survey approach to investigate how the adoption of IoT digital solutions for smart public financial management promote good governance in emerging economies are limited in literature, motivating this research. The findings of this research have strong policy implications for public governance reform in emerging markets.

Addressing these gaps, this research examines the effectiveness if IoT-driven public financial management in promoting good governance in Nigeria; assesses the consequence of non-adopting digital solutions for public financial management on governance systems in Nigeria; and evaluates the current state of IoT adoption for public financial management in Nigeria.

Literature Review

Internet of Things Platforms

The Internet of Things (IoT) Platforms is an integrated network of physical items with sensors, software, and other communication technologies that enable real-time data collation, procesing and sharing (Haddud et al., 2017). IoT digital platforms make it easier for automated transaction processing, real-time asset tracking and dynamic cost accounting based on continuous operational data in financial management and in accounting records (Wu et al., 2019). There are presently billion of devices linked by the worldwide IoT digital platforms ecosystem; and by 2030, its number is expected to go up to almost 50 billion (Breuer & Knetsch, 2023). Smart meters, Global Positioning System (GPS) trackers, motion sensors, Radio Frequency Identification (RFID) readers, wearable technology and other Internet of Things devices are being applies more often in both public and commercial sectors (Möller et al., 2022).

IoT-driven Financial Management for Good Governance

IoT-driven public financial management is a digitally sourcing, planning, utilization, and management of public financial resources to achieve operational performance, fiscal discipline and efficient resource allocation (Porter & Heppelmann, 2015). The IoT-based public financial management frameworks integrate digital solutions for revenue generation and mobilization, budget planning, expenditure control and financial reporting (Van Niekerk

& Rudman, 2019). Public financial management promotes good governance, increased transparency, accountability and administrative efficiency which eventually enhance good governance (Wu et al., 2019). However, poor IT infrastructure, poor resistance to change, worries about cyber-security, limited digital literacy (Porter & Heppelmann, 2015), and a lack of commitment from political leadership and top management are among the current obstacles to the adoption in digital PFM systems in emerging economies (Huang et al., 2022). Thus, focused infrastructure investment, coordinated legislative action, and ongoing capacity-building initiatives for public sector employees are essential to overcome these obstacles (Breuer & Knetsch, 2023). The literature reviewed above establishes the governance benefits of IoT-driven public financial management, but the evidence is drawn largely from conceptual analyses, content analyses and case studies situated in developed economies. The gap this research addresses is therefore the absence of survey-based empirical evidence on how IoT-driven public financial management promotes good governance in Nigeria, and the absence of a clear account of whether the binding constraint on adoption is digital infrastructure or human capacity.

Empirical Review

Different empirical evidence has emerged the importance of internet of things in foinance and accounting management. For instance, Akinmoye (2023) examined the factors influencing the technology adoption in Nigeria's small and medium Ready-to-Wear garment industries, using a survey research approach and various barriers to technology adoption which include cost of capital, technical skills, firm ownership, competitive advantage, export orientation, top management commitment and competitive advantage. In addition, Breuer and Knetsch (2023) examined the recent trends in the digitalization of finance and accounting using primary data and found positive effects through IoT development.

Besides, Skare and Ribeiro Soriano (2021) examined the relationship between the adoption of digital technologies and globalization using panel data model and country-level data, and found significant impacts of globalization on technical spillovers, digital technology adoption, and transfers across all nations. These findings suggest a pattern of convergence in the adoption of digital technologies among countries experiencing significant technological advancements. More so, the study by Smith et al. (2021), the effectiveness of digitalization of accounting functions through IoT solutions and discovered positive effect of Iot on better performance of accounting functions.

Theoretical Review

This research is pinned on the resource-based view theory introduced by Wernerfelt (1984) and developed by Barney (1991), which established that sustainable competitive advantage derives from the possession of resources that are Valuable, Rare, Inimitable and Non-substitutable (VRIN). The theory rests on four explicit assumptions. First, resource heterogeneity: organisations operating in the same environment control different bundles of resources and capabilities. Second, resource immobility: those differences persist over time because resources are not perfectly transferable between organisations. Third, resources are deployed purposefully in pursuit of performance advantage rather than held passively. Fourth, an advantage is sustainable only where a resource satisfies all four VRIN conditions simultaneously, since failure on any one condition allows the advantage to be competed away

(Barney, 1991). The theory is applied here to IoT as a strategic resource (Zhou et al., 2016). IoT is qualifies as strategic VRIN resources in the sustainability domain as they create value through efficiency and compliance (Zhou et al., 2016). The effectively deployed IoT solutions require proprietary data ecosystems that are rare and difficult to replicate (Huang et al., 2022). Their firm-specific configurations and complementary organisational capabilities are inimitable (Breuer & Knetsch, 2023). The resource-based view theory explains why early adopters of IoT sustainability systems developed durable competitive advantages in business performance, market positioning, and access to sustainability-linked capital (Breuer & Knetsch, 2023). The theory affirmed that architectures of IoT domains operate across the various functional layers such as perception through wireless and wired transmission via 5G, Bluetooth, Wi-Fi, among others; to minimize bandwidth and latency requirements (Breuer & Knetsch, 2023). Each layer produces different outcomes from the efficiency of energy edge nodes to the cloud data centres carbon footprint (Breuer & Knetsch, 2023). The resource-based view theory is relevant in this research as ii demonstrated the important of employing new technologies resources for financial management to promote good governance in Nigeria

Methodology

The research uses a quantitative survey research design and focuses on Nigeria to investigate how Internet of Things (IoT) digital platforms adoption for smart public financial management (PFM) promotes governance systems. The research employs primary data obtained through the questionnaires and a stratified sampling technique to draw the sample of 1,440 of relevant professionals comprising 720 financial managers and 720 information technology (IT) specialists in the public services in the country. Stratification assisted to minimize the possibility of sample bias by ensuring that both occupational groups were fairly represented. All the 1,440 surveys sent out were confirmed genuine, and no cases were left out of in the study. These two groups were considered because they are the major players in the technology adoption and budgetary decision-making in the countries' public sector respectively.

Experts in public finance management and IT fields contributed to the accurate development of the questionnaire, which was distributed through online to participants. A four-point Likert scale, with 1 standing for strongly disagree, 2 strongly disagree, 3 agree, and 4 standing for strongly agree was employed to gauge responses. Prior to data collection and analysis, expert evaluation technique was applied to establish content validity and authenticity of the study's instrument.

The collated data was analyzed using descriptive statistical comprising frequency distribution, mean, and standard deviation. Based on the 4-point scale, each respondent's agreement is defined as a mean score of 2.50 or higher and means score below 2.50 for disagreement in this research. The Cronbach's Alpha coefficient test was applied to determine the internal consistency of the research instrument. Items 1 to 7 in the questionnaire had a coefficient of 0.8214, while items 8 to 12 record a coefficient of 0.7523, both of which were greater than the generally recognized threshold of 0.70 (Olaniyi et al., 2024). This confirms the dependability of the study's instrument.

Results and Discussion

This section analyzes the data collated through the primary source to draw inference on the issues under investigation.

Table 1

Result of Reliability Test

Test Cluster	Cronbach's Alpha	Range of Items	**Remark**
Cluster 1: Current state of IoT adoption for PFM in emerging economies	0.8214	Items 1 to 5	Reliable
Cluster 2: Potential impact of IoT adoption for PFM in emerging economies	0.7523	Items 6 to 9	Reliable
Cluster 2: Setback for non-adopting for PFM in emerging economies	0.8121	Items 10 to 12	Reliable

Note. Valid cases = 1,440 (100%); excluded cases = 0 (0%). Data from field survey, 2026.

Table 1 reports the results of reliability test for the study instrument. The item clusters 1 to 11 returned Cronbach's Alpha coefficients above the 0.70 benchmark: The alpha of 0.8214 for items 1 to 5 cluster determines the current state of IoT adoption for public financial management (PFM) in Nigeria. The alpha of 0.7523 for items 7 to 9 cluster evaluates the potential impact of IoT adoption for PFM in selected emerging economies. The alpha of 0.8121for items 10 to 12 cluster identifies the setback for non-adopting digital platforms for PFM in Nigeria. These alpha values discover strong internal consistency of the study's instrument, while the result reflects that all the 1,440 cases were considered valid without exclusions, indicating the integrity of the dataset.

Table 2

How IoT-Based PFM Promotes Good Governance

SN	Statement	SA	A	SD	D	Total (%)	Mean / SD	SD
1	IoT digital platforms adoption for PFM digitalization will improve the precision and trustworthiness of financial information.	1020 (71)	144 (10)	260 (18)	16 (1)	1440 (100)	Mean: 3.540	0.661
2	The adoption of IoT digital platforms for PFM digitalization will enhance transparency in public financial processes and reduces corruption.	1036 (72)	20 (1)	0 (0)	384 (27)	1440 (100)	Mean: 2.510	0.892
3	IoT digital platforms adoption for PFM digitalization will	1080 (75)	288	56 (4)	16 (1)	1,440	Mean: 3.69 0	0.590

	speed up public reporting times and decision making.		(20)			(100)		
4	IoT adoption for PFM digitalization will improve fiscal discipline and effective resource allocation.	1112 (77)	268 (19)	44 (3)	416 (1)	1,440 (100)	Mean: 3.710	0.57
5	IoT digital platforms adoption for PFM digitalization will boost audit trails and accountability in public finance.	1140 (79)	216 (15)	68 (5)	16(1)	1,440 (100)	Mean: 3.730	0.60

Note. SA = strongly agree; A = agree; D = disagree; SD = strongly disagree. Data from field survey, 2026.

Table 2 discloses the opinions of respondents on how IoT adoption for smart public financial management (PFM) digitalization promotes good governance in Nigeria. All the five items yielded mean scores above the threshold of 2.50, implying strong agreement with the views. The respondents agreed that IoT adoption for PFM digitalization will improve the precision and trustworthiness of financial information. (Mean = 3.54). The adoption of IoT for PFM digitalization will enhance transparency in public financial processes and reduces corruption. (Mean = 2.51); IoT digital platforms adoption for PFM digitalization will speed up public reporting times and decision making (Mean = 3.69). IoT adoption for PFM digitalization will improve fiscal discipline and effective resource allocation. (Mean = 3.71) and its adoption for PFM will boost audit trails and enhance accountability in public finance (Mean = 3.73).

Table 3

Consequence of Non-Adopting IoT for Public Financial Management on Governance Systems

SN	Statement	SA	A	SD	D	Total (%)	Mean	S.D
10	The 100% accuracy of manually processed public financial reports is unachievable putting doubt on the reports generated.	1116 (77)	244 (17)	72 (5)	8 (1)	1,440 (100)	3.711	0.571
11	Delays in reporting public budgets and finances affect governance systems.	1114 (76)	246 (18)	74 (4)	6 (2)	1,440 (100)	3.921	0.592
12	The processes for financial accountability and transparency remain inadequate.	1112 (77)	224 (16)	88 (6)	16 (1)	1,440 (100)	3.722	0.581

Note. SA = strongly agree; A = agree; D = disagree; SD = strongly disagree. Data from field survey, 2026.

Table 3 shows the effects of non-adopting digital solutions for processing financial reports on public financial management and governance systems in Nigeria. The majority of respondents agreed that the 100% accuracy of manually processed public financial reports is unachievable (mean = 3.71), putting doubt on the reports generated. Also, the delays in

reporting public budgets and finances affect governance systems (mean = 3.92), leading to the inadequacy in financial accountability and transparency processes (mean = 3.72), disclosing the structural governance problems digital integration could solve. These results directly affect policy that is why in Nigerian government action are required to prioritize investment in infrastructure above the workforce retraining initiatives.

Table 4

Current State of IoT-Based Public Financial Management

SN	Statement	SA	A	SD	D	Total (%)	Mean	S.D
6	Most of the public financial management activities are still dominated by manual, paper-based methods, resulting in decreased accuracy and delayed tasks.	1072 (74)	328 (23)	28 (2)	12 (1)	1,440 (100)	3.701	0.541
7	Internal control structures in the country's public financial system are considered sound and functional.	1140 (79)	288 (20)	8(1)	4 (0)	1,440 (100)	3.753	0.550
8	Awareness on digital and smart accounting tools such as AI and IoT is relatively high among the accounting professionals.	1080 (75)	0 (0)	344 (24)	16 (1)	1,440 (100)	3.512	0.870
9	There are enough skilled professionals within country's public workforce to adopt and manage AI and IoT tools.	1192 (83)	72 (5)	156 (11)	20 (1)	1,440 (100)	3.701	0.710

Note. SA = strongly agree; A = agree; D = disagree; SD = strongly disagree. Data from field survey, 2026.

Table 4 reports the opinion of respondents on current state of IoT adoption for public financial management in emerging economies. A large numbers of respondents attested that most of the public financial management activities in Nigeria are still dominated by manual paper-based methods (mean = 3.70), resulting in decreased accuracy and delayed tasks. However, despite the menace of manual methods, internal control systems were paradoxically assessed as being substantially well functioning (Mean = 3.75). This means that procedural controls are in place but this function via non-automated channels, which limits their efficacy and scalability. Notably, the study's respondents stated that accounting experts have a comparatively high degree of awareness of IoT digital platforms (mean = 3.51) and that there is wide agreement that the public sector workers possess technical knowledge to implement these smart technologies (mean = 3.70).

Discussion of Findings

The research investigated how the Internet of Things-based public financial management promotes good governance in Nigeria. Findings revealed that IoT-based PFM digitalization will improve the precision and trustworthiness of financial information, enhance transparency in public financial processes and reduces corruption; speed up public reporting times and decision making; improve fiscal discipline and effective resource allocation and boost audit trails and enhance accountability in public finance. These findings are in line with the research outcomes of Breuer and Knetsch (2023) who also confirmed that the recent trends in the digitalization of finance and accounting yielded positive effects through IoT development.

Furthermore, the findings also discovered that most of the public financial management activities in Nigeria are still dominated by manual paper-based methods, causing decreased accuracy and delayed tasks. But, despite the menace of manual methods, internal control systems were paradoxically assessed as being substantially well functioning. This means that procedural controls are in place but this function via non-automated channels, which limits their efficacy and scalability. Notably, the study found that the accounting experts in Nigeria have a very high awareness of IoT digital platforms and that the government workers possess technical knowledge to implement these smart technologies but no adequate digital facilities.

Additionally, the results on the effects of non-adopting digital solutions for processing financial reports on public financial management and governance systems in Nigeria showed that 100% accuracy of manually processed public financial reports is unachievable putting doubt on the reports generated. Also, delays in reporting public budgets and finances affect governance systems, leading to the inadequacy in financial accountability and transparency processes, the structural governance problems that digital platform could solve. This finding is in line with the research outcome of Smith et al. (2021), emphasizing on the digitalization of accounting functions through IoT solutions.

These results support the assumption of resource-based view theory explaining why early adopters of IoT were able to develop competitive advantages in business which demonstrates the important of employing new technologies resources like IoT for financial management to promote good governance.

Conclusion

This research concludes that IoT-based public financial management will promotes good governance in Nigeria. However, the study confirmed that digital infrastructure is inadequate to cater for smart public financial management as most of these digital solutions like IoT digital platforms are still in their infant stage causing most of the financial report processed in some of these emerging countries are still manual and paper-based. Although based on the finding, digital infrastructure is insufficient but human capacity for digital transform is adequate.

This research informs public stakeholders that IoT-based public financial management will result in quantifiable improved governance system, stronger audit trails, better fiscal discipline and resource allocation, improved financial reporting timeliness and quality and increased financial transparency. The results of this research align with the experiences of

developed countries like Singapore, South Korea and Estonia where IoT digital solutions deployment reforms their financial systems and promote good governance. Besides, this research advances global scholarship on digital governance system by providing unique survey-based empirical data from public institutions in emerging economies, putting forward a strategic framework for digital transformation and discovering the infrastructure-human capacity information for countries' technology adoption based on this study's empirical reality. The study discovered that delays in reporting public budgets and finances, causing structural governance problems like poor accountability and transparency processes which could be solved by deploying digital tools like IoT technologies in Nigeria

Recommendations

This research recommends that Nigerian government should prioritize their reform agendas with more digital infrastructural investments before making extensive workforce digitization retraining initiatives. Besides, government needs to create and implement a strong national digital financial management strategy in the light of the discovered transparency deficiencies in this study and the widespread general belief that IoT digital platforms will increase transparency. This policymakers need to set compliance standards, describing the roles of public institutions to provide accountability procedures for the outcomes of digital governance.

Based on the methods applied in some identified developed countries, like Estonia and Singapore, a specific regulatory agency in public finance should be created for IoT digital governance. All the public institutions handling financial information should be required to have strong uncompromised cybersecurity frameworks as part of digital transformation initiative. Change management programs and regular capacity training are also essential for managing technological change and keeping the pace of digital transformation, despite that human capability is not the major obstacle to the adoption IoT in emerging economies. But workforce in public services should have access to regular professional development courses in data analytics, IoT digital management. However, future studies should carry out longitudinal research, investigating on the role of regulatory authorities on IoT digital full adoption in emerging economies public sectors.

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