

The future of public financial management systems: embracing digital transformation and smart government services

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Abstract: The evolving landscape of public financial management (PFM) systems is undergoing significant transformation due to the integration of digital technologies. This paper explores the impact of digital transformation on PFM, focusing on the role of e-government and smart government services in enhancing transparency, efficiency, and accountability in financial management. As governments increasingly adopt digital tools, e-government initiatives are facilitating seamless public service delivery, while smart government services are automating financial processes. The synergy between digital transformation and PFM systems offers innovative solutions for improving governance, reducing corruption, and fostering economic sustainability. This paper analyzes these developments and their implications for future public finance management frameworks.

Keywords: Public financial management (PFM) systems; Digital transformation; E-Government; Smart government services (SGSs).

Jel Classification Codes : H50; O33; E42.

Résumé: Le paysage en évolution des systèmes de gestion des finances publiques subit une transformation significative en raison de l'intégration des technologies numériques. Cet article explore l'impact de la transformation numérique sur la gestion des finances publiques, en se concentrant sur le rôle de l'e-gouvernement et des services gouvernementaux intelligents dans l'amélioration de la transparence, de l'efficacité et de la responsabilité. À mesure que les gouvernements adoptent de plus en plus les outils numériques, les initiatives de gouvernement électronique facilitent la prestation des services publics sans heurts, tandis que les services gouvernementaux intelligents automatisent les processus financiers. La synergie entre la transformation numérique et les systèmes de gestion des finances publiques offre des solutions innovantes pour améliorer la gouvernance, réduire la corruption et favoriser la durabilité économique. Cet article analyse ces développements et leurs implications pour les futurs cadres de gestion des finances publiques.

Mots clés: Systèmes de gestion des finances publiques, Transformation numérique, E-gouvernement, Services gouvernementaux intelligents.

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Introduction

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In the past few years, ICTs has had an impact on public administration and governance. The development of e-government services aimed to enhance administrative efficiency and public involvement. It also aimed to create innovative government structures that empower individuals, involve them in policymaking, and promote transparency and openness (Hashim, 2024). The actual digitalization favors a new society in which human capital actively develops; the digital knowledge and skills for the future will be developed starting from childhood, while the business will be smoother and faster with automation and emerging technologies; interaction with citizens by their governments will shift into virtual platforms that require simplicity, transparency, and intuitiveness (Shevyakova et al., 2024). Fast development of information technology has inspired the growth in digital finance, an emerging financial sector in the world. Digital finance, affordable, efficient, and reaching far and wide, gradually changes the traditional finance landscape and has great influence on society and economy (Mou & Xu, 2024). Digitalization is no longer a fundamental aspect of social connections at this level of their evolution. It encompasses almost all aspects of daily life, making it indispensable in certain situations. Public finances are also seeing substantial changes in the current context. The advancement of information technology enables the expedited and more effective management of many operations in public finance, including oversight of money accumulation and spending (Zhuk et al., 2023). Digital technologies have a significant impact on people's social and economic conditions: technology is changing (Industrial robots are viewed as legitimate job market competitors), business (Internet companies have emerged as global economic development leaders), finance (Banks that do not have physical locations to serve customers) and social connections (they are increasingly moving to the Internet) (Bayev et al., 2022). Whereas in today's digital economy, new practices and rules are implemented, such as Big Data, data analysis, and the use of mobile technology. The growth of financial technology is influenced by the growth of the Internet and digitization. The developed countries tries to use some tactics of openness and transparency of information feedback, e-voting, and platform management for the implementation of digitalization of public finances (Zhuk et al., 2023). Government management should be upgraded and become more responsive to rapid technological changes. Technology and information utilization improve the quality of services provided by government and public institutions for effectiveness, efficiency, responsiveness, and accountability (A'yun & Hartaman, 2021). E-government is seen as a radical transformation that transforms government operations by leveraging information technology to enhance interactions with the public, businesses, and other government entities. This process requires significant effort and re-engineering of processes. E-government aims to increase the effectiveness and efficiency of government administration and improve the delivery of public services. Information systems have transformed the delivery of public services around the world, leading to new innovations in digital public services. Governments have used various technologies to improve internal processes, increase efficiency, and generate value for stakeholders. However, little is known about the true public benefit of digital services, especially in developing countries. Smart government services facilitate efficient information exchange and service delivery, enhancing collaboration between agencies and citizens. The developed countries is using tactics like openness, transparency, feedback, e-voting, and platform management to digitalize public finances. Public Financial Management (PFM) is a crucial framework for managing government income, allocating resources, and reporting on these activities. It covers the budget process, strategy planning, medium-term expenditure frameworks, annual budgeting, revenue management, budget execution, accounting, control, monitoring, reporting, and evaluation. PFM systems promote transparency, accountability, and long-term economic prosperity at the national level. Research on PFM systems focuses on planning, budgeting, budget execution, and auditing systems. They are essential for effective governance and public service delivery. In the context of the previous ideas, the following problem was posed:

How can digital transformation and smart government services improve public financial management systems?

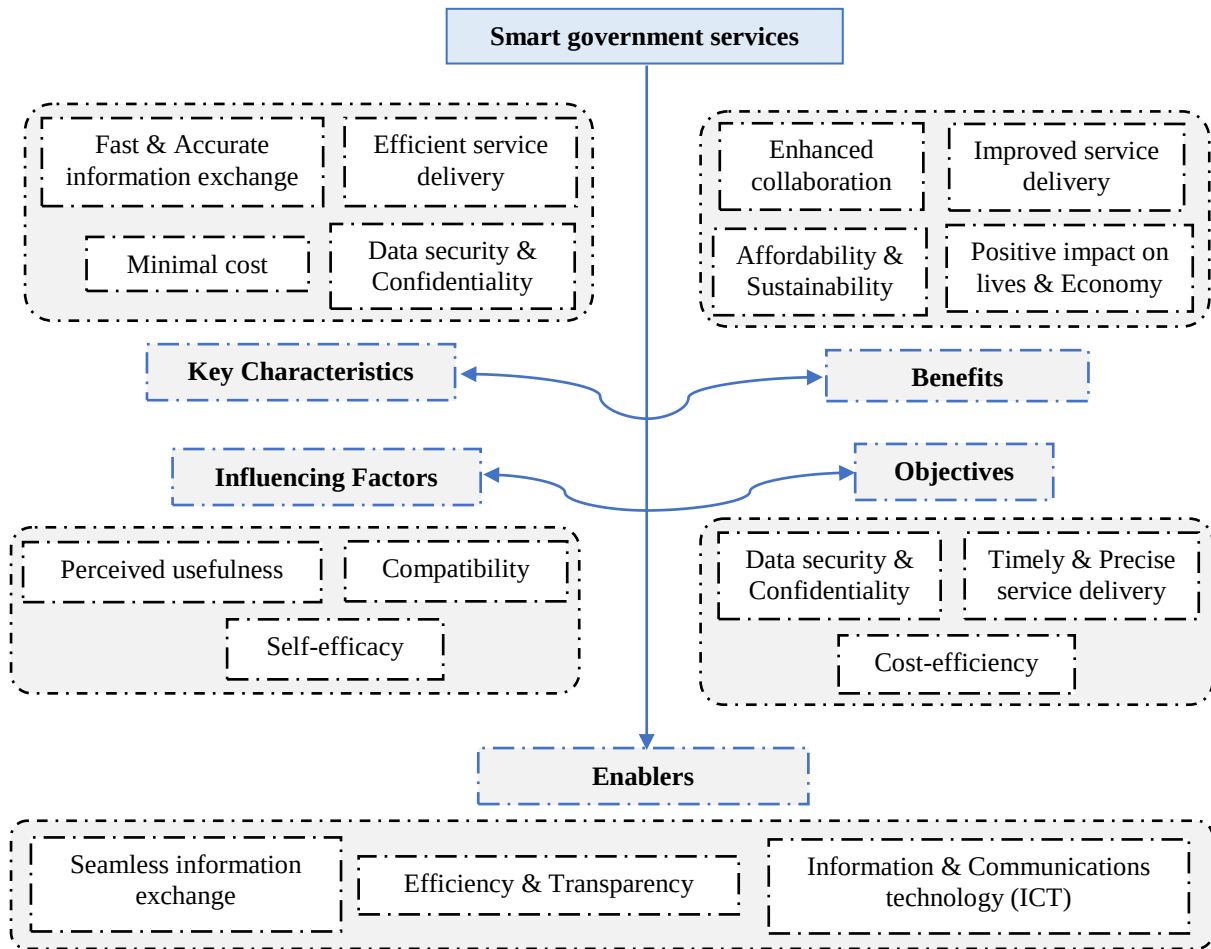
I Public value, E-Government and digital services

Beyond just digitizing government offices, the objective of e-Government is to fundamentally alter the way the government operates. The term "e-Government" refers to the ways in which government agencies are transforming their interactions with the public, businesses, and other parts of the government via the use of information technology. Nevertheless, a significant amount of effort and process re-engineering will be necessary for the method. Hence, e-Government is a huge paradigm shift that will drastically alter the delivery of public services; it is not just another way to do current responsibilities (Hashim, 2024). There is no set chronology; rather, it is progressive. Every efficient e-government plan is centered on delivering the user whether they are a citizen, a firm, or a government agency enhanced administration e-service. Additionally, it tries to increase effectiveness and efficiency government's management. An e-government program must address a number of challenges and implement a number of e-government framework components in order to be successful (Alhujaili et al., 2023). The delivery of public services around the world has been transformed by Information Systems (IS) and has led to new innovations in delivering digital public services. E-Government is the application of information technology in government activities, influencing public service provision, citizen contentment, and democratic values. Information technology plays a crucial role in government transformation, reliant on public administrators leveraging IT to improve the streamlining of government processes. While worldwide government efforts on e-Government initiatives result in changes like focusing on customer needs, distributing decision-making authority, and monitoring performance, digital technology adoption in the public sector is what ultimately leads to digital government (Arias & Maçada, 2018). Governments have used numerous technologies throughout the years to improve internal processes, increase efficiency, and generate value for a variety of stakeholders, including consumers, via digitally provided public services. While previous research has helped to understand the institutional and organizational drivers of government digital services, less is known about their use and the real public benefit they provide from the viewpoint of citizens, especially in poor countries. Some studies on technology, economics, and other social divisions shows that the usage and usefulness of digital services may be restricted (Buyannemekh et al., 2024).

I. 1. Smart government services (SGSs)

Government services that are smart involve the exchange of information and delivery of services quickly and accurately, both among sectors and between citizens and businesses, all at minimal cost while ensuring the confidentiality and security of the shared information (Molobela, 2023). Smart government services enhance collaboration between agencies and citizens through technology, improve service delivery, affordability, and sustainability, positively impacting lives and economic growth. Factors influencing the use of smart government include perceived usefulness, compatibility, and self-efficacy. To effectively serve businesses, individuals, and industries, smart government services should ensure timely, precise, and cost-efficient delivery while upholding data security and confidentiality. Enabling seamless information exchange is crucial for enhancing public affairs management and service provision, achieved through the use of information and communications technology to promote efficiency and transparency (Benotmane & Benhammou, 2024). The following illustration shows smart government services details:

Figure (1): Smart government services (SGSs)



Source: authors.

I. 2. E-Budgeting

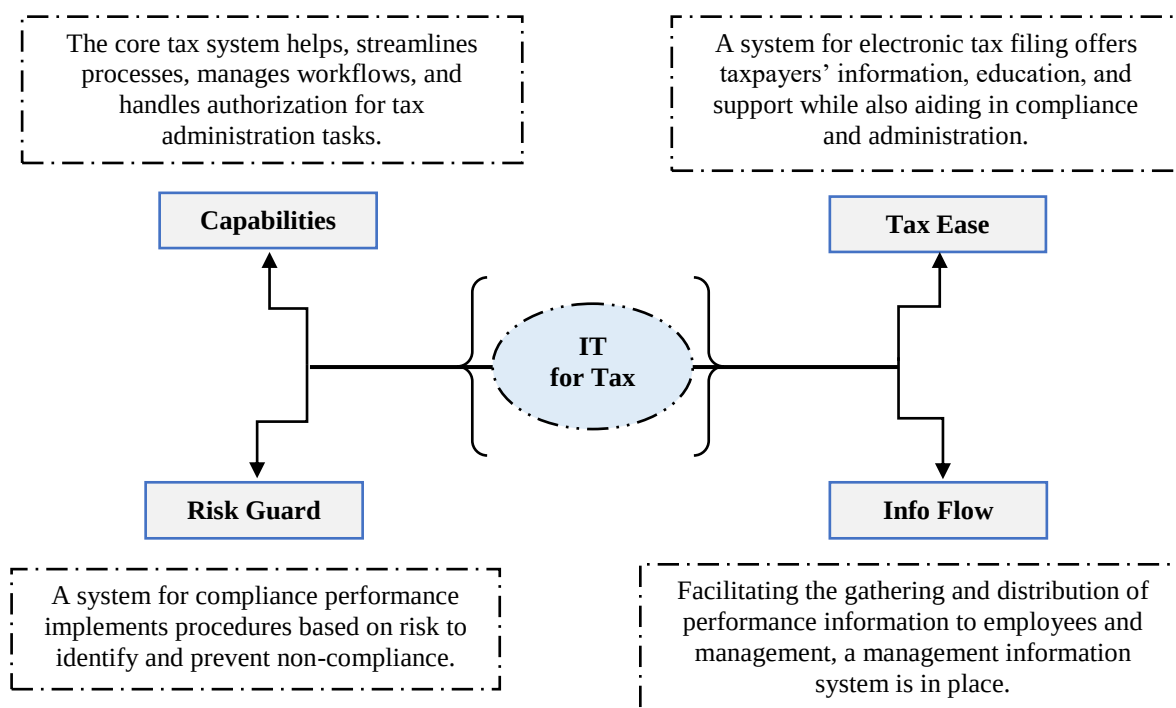
The E-Budgeting System is an online, remote-accessible tool designed to streamline the budgeting process for the public. It allows authorized individuals to access the system during board meetings or oversight activities. The system provides a comprehensive view of government performance and regional financial circulation, enabling community oversight of public sector budget development. Originating from the Government Resource Management System (GRMS), the E-Budgeting program is a web-based automated tool for preparing regional revenue and expenditure budgets and modifying the activity budget within the government (A'yun & Hartaman, 2021). Budget management is crucial and utilizing digital technologies is essential. Governments should leverage e-budgeting as it can provide higher quality information compared to traditional budget management methods. E-budgeting relies on the use of information technology to assist in budget management. The use of e-budgeting in budget management processes can lead to transparency, accountability, and efficiency. Furthermore, an e-budgeting information system can enhance operational efficiency in budget planning and execution (Sidik et al., 2021).

I. 3. Tax collection through automation

Taxes provide a large portion of government revenue. Tax collection is essential to maintaining the long-term viability of public finances. Governments collect taxes from several sources, including labor. (Hötte et al., 2024). Worldwide, tax administrations rely on information

technology (IT) solutions to address both operational and strategic requirements in a constantly evolving corporate and public administrations landscape and technical landscape. While there are many different types of modern technological solutions for tax administration and collection, there are essentially four basics which are illustrated in the following diagram:

Figure (2): IT for Tax administration



Source: authors based on (USAID, 2013).

I. 4. Digitization of payments

One of the notable achievements of the digital age is the transformative potential of digital payments in enhancing outcomes for governments, organizations, and individuals, particularly in promoting financial inclusion. Payments plays a pivotal role in the transfer and receipt of financial resources by governments; however, the methods by which these payments are made and the potential for improvement are often underemphasized in the discourse on public financial management (PFM). This is despite the fact that many of the benefits derived from effective payment digitalization closely align with the objectives traditionally associated with robust PFM systems. While digitalizing payments is not a panacea for addressing PFM challenges, it must be pursued within a comprehensive framework. Such an approach requires strong leadership from central agencies, including the finance ministry, to fully leverage the synergies offered by the diverse payment methods enabled by digital technologies (Cangiano et al., 2019). Globally, governments, companies and international organizations deal with billions of dollars in cash payments for salaries, benefits, pensions, social programs, humanitarian aid, sanctions and taxes. With the pace of technological developments in various fields, especially in the financial field, i.e. everything related to financial and monetary systems, and with the development of the uses of mobile phones and their widespread use in daily life, and the rapid spread of creativity and innovation in the field of financial technology and facilitating payment and transfer operations, all of this has a significant impact on public finance systems. The following table shows the types of possible payment networks between different parties:

Table (1): Payment grid "Types of payments by (Payer and Payee)"

Payer	Payee			
		Government	Business	Person (individual)
	Government	G2G Budgetary allocations, funding	G2B Grants, payments for goods and services	G2P Welfare programs, salaries, pensions
	Business	B2G Taxes, fees for licenses	B2B Payments for goods and services	B2P Salaries and benefits
	Person (individual)	P2G Taxes, utilities	P2B Purchases	P2P Remittances, gifts
	Development community	D2G Taxes	D2B Payments for goods and services	D2P Cash transfers

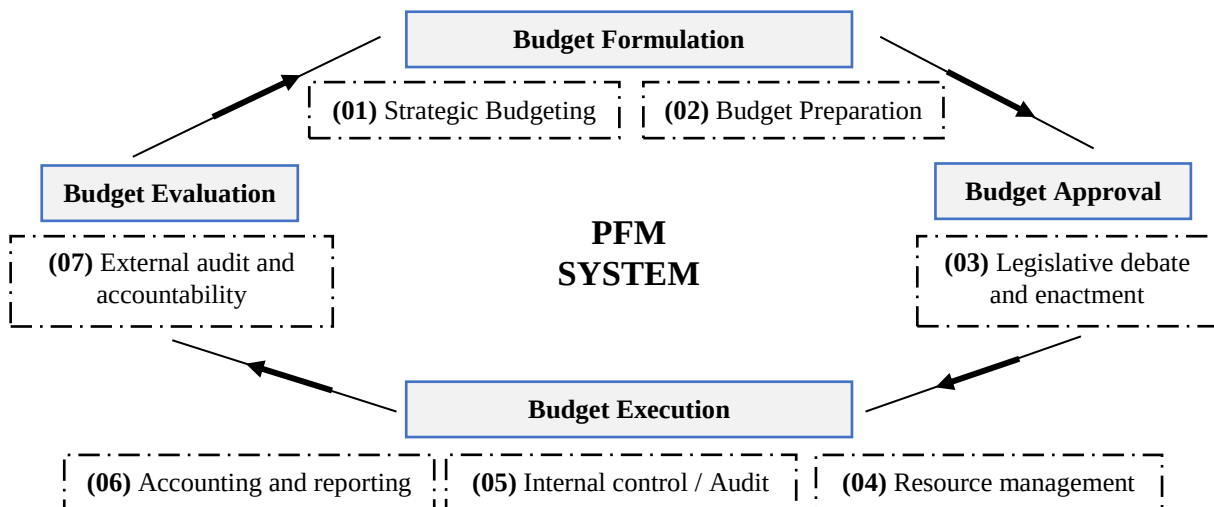
Source: ("Digital Revolutions in Public Finance," 2017b).

The government's goal in digitalizing payments is to promote a modern and inclusive economy. The G20 has clearly acknowledged the advantages of digitizing payments for governments, including increased transparency and accountability as well as cost savings. Digital payments improve openness and accountability between governments and people, linking services and taxes. Furthermore, the chance to drive financial inclusion via payment digitization helps both consumers and economies. Digitizing person to government (P2G) and business to government (B2G) payments may substantially reduce transaction costs and enhance efficiency. Nonetheless, a comprehensive digital payments strategy, along with connectivity and interoperability across payment instruments and systems, is essential for optimizing these benefits (Pillai, 2016).

II Public Financial Management (PFM) Systems

Public Financial Management (PFM) refers to the methodologies employed by governments to administer public resources (income and expenditure), influencing both the economy and society. PFM pertains to both the processes by which governments administer resources and the resultant results, encompassing the immediate, medium, and long-term effects of financial transactions. (Andrews et al., 2014). The following diagram provides a simplified view of the public finance management system:

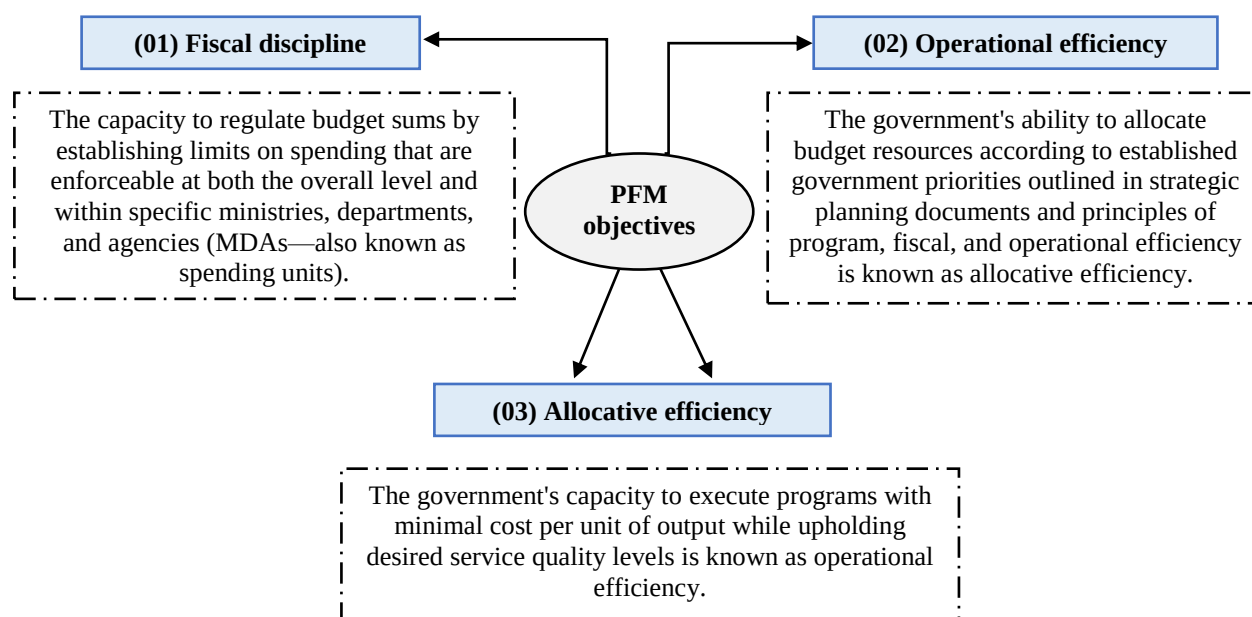
Figure (3): A simplified view of a typical PFM System



Source: authors based on (Andrews et al., 2014).

Mobilizing government income, allocating and spending resources, and reporting on these activities are the key components of Public Financial Management (PFM). The budget process and fiscal situation are covered by a PFM system, including first, the planning of strategy, medium-term expenditure frameworks, and annual budgeting at the upstream end, and management of revenue, budget execution, accounting, control, monitoring, reporting, and evaluation, audit and oversight at the downstream end (USAID, 2018). Public finance management has three main objectives, which can be illustrated in the following diagram:

Figure (4): Public Financial Management objectives



Source: authors based on (USAID, 2013).

The promotion of transparency, accountability, and long-term economic prosperity at the national level is facilitated by effective Public Financial Management (PFM) systems. There is active research in the landscape of PFM systems and reforms, with a particular emphasis on conducting comparative assessments of PFM systems across regions and nations. Studies on PFM often concentrate on planning, budgeting, budget execution (including procurement, receipt and payment, accounting, and reporting), and external and internal auditing systems. Evaluation studies of PFM encompass a wide range of focuses, including analyzing their comprehensiveness and robustness in monitoring public expenditures and revenues, as well as the efficacy of internal and external audit procedures to ensure the integrity of reports generated and follow-up methods (Mishra, 2015). PFM systems are essential frameworks that govern the allocation, management, and accountability of public resources. They encompass various components, including budgeting, accounting, and reporting, which are crucial for effective governance and public service delivery.

II. 1. Key Components of PFM Systems

Public financial management (PFM) systems encompass several key components, each integral to effective governance and resource management. (1) Budgeting and financial reporting: PFM systems integrate public sector budgeting with financial reporting, emphasizing full accrual accounting under International Public Sector Accounting Standards (IPSAS) to enhance transparency (Bergmann, 2008). (2) Reform initiatives: many countries have implemented medium term expenditure frameworks (MTEF) and integrated financial management information systems

(IFMIS) to improve resource allocation and accountability, though challenges remain in their effective adoption (Wynne, 2005). (3) International support and impact: the world bank has played a significant role in supporting PFM reforms, focusing on budget planning, execution, and strengthening accountability institutions (Wescott, 2008). While PFM systems aim to enhance governance, their effectiveness can be hindered by contextual factors and the complexity of reform processes, suggesting a need for tailored approaches in different environments (Alkaraan, 2018).

II. 2. The digitization of Public Financial Management

In current technological advancement age, the public finance management sector is witnessing significant alterations with the rise of digital technology. Government financial processes are being digitized to make them more efficient, transparent, and responsive. As digital tools and platforms transform public finance management technologies from process-driven to outcome-driven, they also unlock new opportunities for governance and public service delivery (Egamkulovna, 2022). In the sphere of public administration, the digital transformation of contact between local governments and the populace is growing important. The field of initiative budgeting is one where information and communication technologies are fast finding applications. The needs for digital tools are becoming stricter as electronic citizen involvement develops (Derbeneva & Starodubets, 2021). The digitization of public financial management (PFM) is transforming how public institutions operate, enhancing efficiency, transparency, and accountability (Lastanti & Djasuli, 2024). This transition involves implementing integrated financial information systems, e-procurement, and digital ecosystems, which collectively improve financial governance and service delivery (Yatsukh et al., 2024). The effective use of digital applications in certain public financial management tasks has shown their capacity to enhance transaction speed and broaden governmental engagement with people, hence improving the effectiveness of these operations (Griffin et al., 2023).

II. 3. Key benefits of PFM digitization

The process of digitizing public finance management has many important benefits that can be summarized in the following points:

- Efficiency gains: digital technologies significantly enhance financial management efficiency, as evidenced by a positive correlation between digitization costs and management effectiveness in state institutions, In addition, the process of automating tasks leads to saving time, reducing costs and improving internal processes.
- Transparency and accountability: the digitalization of budget processes fosters greater transparency, allowing for better public oversight and trust in financial systems (3BOHKOB, 2023), the use of digital technologies in public finance management systems also facilitates data collection and analysis, and thus the accuracy of the decision-making process.
- Improved services: enhanced digital infrastructure leads to better public services, as it streamlines processes and reduces bureaucratic delays (Lastanti & Djasuli, 2024).

II. 4. Challenges to implementation

Technological barriers are the most significant obstacles and challenges to digitizing the public finance management system, with inadequate infrastructure and cybersecurity risks posing major challenges to effective digital transformation. Another factor is human resource constraints, as the lack of skilled personnel to manage and implement digital systems can hinder progress. While digitization provides significant advantages, it also brings obstacles that must be addressed via strategic investments and training to ensure that public finance management can fully capitalize on digital innovations (Lastanti & Djasuli, 2024).

using smart contracts to simplify and execute agreements and disbursements in the public sector, All of these technologies contribute to improving the efficiency of the public finance management system par excellence. Expanding the use of digital platforms by citizens allows them to participate in preparing the general budget and express their opinions on important and essential priorities in government spending. Applications and mobile phones also allow access to these platforms and participation in them, which enhances inclusiveness and participation in the state's public finance management system. The adoption of public finance management systems on cloud computing technologies contributes to achieving the ability to expand and adopt new policies and systems, as well as to carry out real-time monitoring and adjust various financial policies based on environmental and economic changes. The inclusion of unified digital ecosystems in public finance management systems facilitates the connection between various government departments, agencies and public facilities, facilitates the process of communication, information exchange and cooperation between them, and works on compatibility and integration, thus resulting in the ability to analyze big data and discover different patterns of revenue collection and monitoring public spending. These systems also help in building predictive models to anticipate potential financial risks and opportunities.

Digital transformation in PFM is reshaping how governments handle financial operations, enhancing efficiency, transparency and accountability. This transformation involves integrating digital technologies into financial systems, which can improve decision-making and public service delivery. Challenges such as technology infrastructure, cybersecurity and institutional capacity must be addressed to fully realize these benefits. Digital tools such as integrated financial information systems, e-procurement, and various digital platforms enhance efficiency and transparency in public finance management by streamlining processes and reducing manual errors (Krynytsia, 2024). Digitization enhances public participation in the budget preparation process through several practices such as participatory budgeting, where citizens' needs for public goods and services are considered. Various digital tools are used to enhance the stability and transparency of the financial system while enhancing democratic participation (Звонков, 2023). Although the digital transformation of public financial management systems offers many benefits, potential drawbacks, particularly the digital divide and privacy security concerns, must be considered. Ensuring equitable access to digital tools and protecting data privacy are essential to maximizing the positive impacts of digital transformation of PFM systems.

III. 2. Future possibilities for the PFM systems

The future of public financial management systems is about to undergo a major transformation, driven primarily by digital technologies, artificial intelligence (AI) and cutting-edge research trends in various technologies. As governments seek to enhance efficiency, transparency and accountability, the integration of digital tools, AI systems, fintech and innovative practices will play a crucial role in shaping public financial management systems. The following points highlight the key possibilities for the future of public financial management systems:

- Integration of technologies: the adoption of integrated financial information systems and e-procurement can streamline processes and improve service delivery.
- Local budget digitalization: emphasizing the digitalization of local budgets is essential for optimizing resource allocation and enhancing governance (Morozov, 2024).
- AI-powered fiscal policy formulation represents a major transformational approach to economic governance and public finance management systems. Integrating AI into macroeconomic models and financial analysis enables more accurate forecasting and risk management, ultimately shaping national fiscal and economic policies. AI improves macroeconomic and financial models by processing large data sets, including unstructured

data. These results lead to more accurate economic insights. Machine learning algorithms can also identify structural, complex, and nonlinear relationships in economic and financial data, enhancing the power of forecasts and predictive models of revenues and expenditures (Z. Chen, 2024).

- Real-time analytics: AI-powered financial analytics provide real-time insights that enable policymakers to anticipate economic and financial trends and mitigate risks. Various studies in this area show that AI tools have boosted economic growth, improved financial oversight, and supported data-driven policymaking (N. J. Campbell & Koffi, 2024).
- Optimizing tax policies: AI-powered approaches can improve tax policies and collection methods to promote economic equality and productivity and outperform traditional frameworks (Zheng et al., 2020), AI simulates the outcomes of different fiscal policy scenarios, helping policymakers make more informed decisions.
- Blockchain-based governance: blockchain technology offers transformative potential for governance and public financial management systems by enhancing transparency, security and efficiency. The decentralized nature of blockchain technology allows for tamper-resistant recording of data, which is critical for accountability in the public sector. Blockchain technology can combat corruption by providing immutable and stable records of transactions, making it difficult for officials to manipulate data and information. Reliance on decentralized autonomous facilities and smart contracts can automate processes, reducing human intervention and potential corruption (Ibrahimy et al., 2023). Blockchain technology improves data management and security. A public services framework based on this technology can simplify data sharing and reduce the costs associated with managing fragmented data. The integration of cryptographic methods ensures secure information exchange, which enhances the overall security of digital governance systems (Shukri et al., 2023). Blockchain technology facilitates continuous auditing by providing reliable, real-time data, which is essential for public finance management. The use of smart contracts can automate compliance and decision-making processes while improving efficiency and accountability in public sector operations (Morgan, 2024).
- Integration of universal digital identity: integrating a universal digital identity into public financial management systems represents a transformative approach that enhances transparency, efficiency and accountability in government operations. This integration facilitates better management of resources and improves service delivery to citizens, ultimately enhancing public trust and participation in governance, digital identities enable real-time tracking of public funds, reducing corruption and mismanagement and increasing transparency in various financial transactions and operations, also streamlined processes through digital identity reduce bureaucratic delays, leading to faster service delivery and increased efficiency (Krynytsia, 2024b). Finally, this technology improves decision-making as access to accurate data through digital identities supports informed budgeting and financial planning.
- Integration with sustainable development goals: integrating the SDGs into public financial management systems is crucial to enhancing accountability and promoting sustainable practices. Research in this area indicates that effective accounting practices and financial management systems contribute significantly to achieving the SDGs, especially in key areas such as health, energy and climate action. Improved accounting practices positively impact human development and environmental sustainability, particularly in relation to the SDGs (Good health and well-being), (Affordable and clean energy), and (Climate action). Policymakers are encouraged to prioritize improvements in accounting systems to better align with the SDGs (Nakpodia et al., 2024).

Conclusion

Modernizing public finance management systems is of utmost importance, especially in light of the tremendous technological development in all areas of life, as smart government services in the field of public finance benefit from technology to enhance efficiency, transparency and citizen engagement. Integrating smart governance frameworks into public finance management is of pivotal importance to improving local government operations. While keeping pace with these developments, there are challenges and risks facing these systems regarding information security and potential threats that must be taken into consideration for the success of this transformation.

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