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Digital public financial management and green budgeting policy outcomes: A regional case study in Indonesia

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Abstract Using a regional case study design, this research examines the implementation of digital public financial management at the subnational government level in Indonesia. The green economy has become a central policy priority as governments seek to balance economic development with environmental sustainability. However, the effectiveness of sustainability-oriented policies often depends on governance capacity, particularly the ability of public financial management systems to ensure transparency, accountability, and effective allocation of public resources. Although digital public financial management has been widely promoted as a governance reform, its role in supporting green economy policy outcomes remains insufficiently explored, especially in decentralized governance contexts. This study aims to examine the effect of digital public financial management on green economy policy outcomes at the local government level in Indonesia. Employing a quantitative explanatory research design, data were collected through structured questionnaires administered to local government officials involved in budgeting, financial management, and policy implementation in Deli Serdang Regency. A purposive sampling technique was applied, yielding 62 respondents, and the data were analyzed using partial least squares structural equation modeling (PLS-SEM) to evaluate both the measurement and structural models. The findings reveal that digital public financial management has a positive and significant effect on green economy policy outcomes, indicating that improved digital financial systems enhance policy implementation, financial accountability, and transparency in sustainability-related public spending. By strengthening the quality, accessibility, and traceability of financial information, digital public financial management facilitates the translation of sustainability commitments into measurable public outcomes. This study contributes to multidisciplinary research by bridging the literature on digital governance, public financial management, and sustainability policy. It reframes digital public financial management as a policy-enabling infrastructure rather than merely a technical reform and provides empirical evidence from a decentralized governance context in Southeast Asia. The findings offer practical insights for policymakers seeking to strengthen green economy initiatives through digital governance reforms and highlight the importance of institutional capacity in achieving sustainability goals.

Keywords: digital management, green economy policies, digital governance, local government, PLS-SEM

1. Introduction

The green economy has emerged as a central public policy in Asian contexts across Asia, as governments seek to balance economic growth, environmental sustainability, and social development. Asian countries face mounting pressures related to climate change, environmental degradation, rapid urbanization, and uneven development trajectories, which have intensified the need for sustainability-oriented public policies (United Nations Environment Programme (UNEP), 2021; Organization for Economic Co-operation and Development (OECD), 2020; Asian Development Bank, 2020). In response, green economy initiatives have increasingly been incorporated into national and subnational policy frameworks, emphasizing environmentally responsible growth, sustainable public investment, and long-term ecological resilience.

Green economy policies are becoming more popular, but they haven't been put into place in the same way across Asia. A significant number of public policy agendas in Asia indicate that the region's policy issues frequently stem not from policy formation but from deficiencies in implementation, coordination, and accountability (Wu et al., 2015; Andrews et al., 2017). These issues are especially clear in decentralized governance systems, where different levels of government are in charge of different policies, yet the institutions that are supposed to carry them out often don't have enough ability.

Decentralization changes throughout Asia have augmented the powers of local governments regarding public expenditure and policy execution, particularly in sustainability-related domains (Smoke, 2015; World Bank, 2020).

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Decentralization lets policies be adjusted to fit the needs of each area, but it also makes governance harder, since it makes it harder to keep an eye on things, be open, and ensure that national policy priorities match how they are put into action in each area. Weak subnational governance capability might make green economy initiatives less effective and less accountable. These policies often require long-term investment and cooperation across sectors.

In this study, digital public financial management is operationalized through several specific digital technologies commonly implemented in local governments, including e-budgeting systems, real-time financial monitoring platforms, electronic procurement systems, and digital audit trails. These technologies function as institutional control mechanisms that enhance transparency, strengthen monitoring capacity, reduce information asymmetry, and minimize opportunities for resource diversion in green economy programs. From a theoretical perspective, these digital tools contribute to strengthening accountability and improving the effectiveness of sustainability-oriented public spending.

Recent governance reforms across Asia have increasingly emphasized digital transformation in public financial management. Digital public financial management refers to the integration of digital technologies into budgeting, accounting, reporting, and financial oversight processes, often through integrated financial management information systems. These reforms are commonly promoted as tools to enhance transparency, accountability, and evidence-based decision-making in the public sector (Janssen & Estevez, 2013; Mergel et al., 2019). From the perspective of public policy in Asian contexts, digital public financial management can be understood not merely as an administrative upgrade, but also as a governance infrastructure that strengthens the institutional capacity for policy implementation (Luna-Reyes & Gil-Garcia, 2014). Digital governance reforms are also shaped by institutional contexts that influence how new systems are adopted and used in practice (Michael & Scott, n.d.; Heeks, 2006).

Existing research on digital governance in Asia has focused on service delivery, administrative efficiency, and transparency outcomes, whereas scholarship on the green economy has primarily examined policy design and macro-level environmental or economic impacts (Barbier et al., 2011; UNEP, 2021). As a result, limited empirical attention has been given to the role of digital public financial management as a governance mechanism that supports the implementation of sustainability-oriented public policies. In particular, there is a lack of empirical evidence from Asian contexts examining how digital public financial management influences green economy policy outcomes at the subnational level, where many implementation challenges are most pronounced.

To address this gap, this study examines the role of digital public financial management in supporting green economy policy outcomes at the local government level in Indonesia. Indonesia provides a relevant case for public policy in Asian context analysis its extensive decentralization reforms, growing commitment to green economy initiatives, and ongoing digital governance transformation (World Bank, 2020). By focusing on local governments, this study highlights the importance of subnational governance capacity in translating commitments to national sustainability into effective public action.

This study contributes to the public policy agenda in Asian scholarship in three key ways. First, it empirically links digital public financial management reforms to sustainability-oriented policy outcomes, bridging the literature on digital governance and green economy policy. Second, it reframes digital public financial management as a policy-enabling infrastructure rather than a purely technical or administrative reform, emphasizing its role in strengthening policy implementation capacity in decentralized governance systems. Third, by providing empirical evidence from a Southeast Asian context, the study offers insights that are relevant to other Asian countries facing similar governance and sustainability challenges.

Guided by an institutional perspective, this study proposes that digital public financial management enhances green economy policy outcomes by strengthening transparency, accountability, and the quality of the financial information used in policy monitoring and decision-making.

Therefore, this study aims to examine the role of digital public financial management in supporting green economy policy outcomes at the local government level in Indonesia. Specifically, the study investigates how digital financial systems enhance transparency, accountability, and the quality of financial information used in policy implementation. By focusing on a decentralized governance context, this study seeks to provide empirical evidence of the institutional mechanisms through which digital public financial management contributes to the effectiveness of sustainability-oriented policies. Based on this theoretical argument, the study tests the following hypothesis: H1: Digital public financial management has a positive and significant effect on green economy policy outcomes. Figure 1. Conceptual framework.

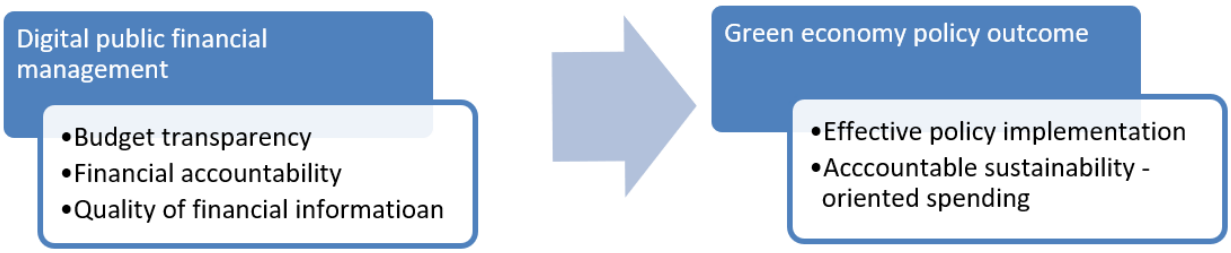

Figure 1 illustrates the conceptual framework linking digital public financial management and green economy policy outcomes.

2. Materials and Methods

This study employed a quantitative explanatory research design to examine the relationship between digital public financial management and green economy policy outcomes at the local government level. The empirical setting was Deli Serdang Regency, Indonesia, which represents a decentralized governance context in which local governments play a key role in policy implementation (World Bank, 2020). Data were collected through structured questionnaires distributed to local government officials involved in financial management, budgeting, and policy implementation. A purposive sampling technique was applied, selecting respondents with direct involvement in public financial management processes, experience with digital financial systems, and a minimum of three years of service.

A purposive sampling technique was employed to select respondents with direct involvement in public financial management processes, including budgeting, financial reporting, and policy implementation activities. The target population consisted of local government officials working in units responsible for financial management and sustainability-related program implementation within Deli Serdang Regency. Respondents were selected based on specific criteria, including experience with digital financial management systems and a minimum of three years of professional service, ensuring that participants possessed relevant institutional knowledge.

The final sample consisted of 62 respondents. This sample size is considered adequate for partial least squares structural equation modeling (PLS-SEM), which is appropriate for exploratory and explanatory research involving relatively small samples and complex institutional relationships. Following the minimum sample size rule, which recommends at least ten times the maximum number of structural paths directed at a construct, the sample meets the methodological requirements for reliable estimation. Furthermore, the use of purposive sampling is consistent with governance and public administration research that prioritizes respondent expertise over population representativeness.

By focusing on knowledgeable officials directly involved in financial management processes, the study ensures that the data accurately reflect institutional practices related to digital public financial management and green economy policy implementation within a decentralized governance context.

The measurement instrument was developed using structured questionnaire items adapted from prior studies on digital governance, public financial management, and sustainability policy implementation. All constructs were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire consisted of 12 measurement items, including six items measuring digital public financial management and six items measuring green economy policy outcomes. Table 1 presents the measurement indicators and sources used to operationalize the constructs in this study.

Table 1 Measurement Indicators and Sources.

Construct	Code	Indicator (Item statement)	Source
Digital Public Financial Management (DPFM)	DPFM1	Digital budgeting improves transparency of green project funding	Adapted from digital governance literature
	DPFM2	Real-time financial monitoring supports better spending control	
	DPFM3	Digital systems reduce administrative inefficiencies	
	DPFM4	Financial data accessibility improves decision making	
Transparency	TR1	Budget information for green programs is accessible	Adapted from public sector transparency studies
	TR2	Procurement processes are digitally traceable	
	TR3	Reporting of green spending is clear	
Accountability	AC1	Digital records strengthen audit processes	Adapted from accountability literature
	AC2	Financial responsibility is easier to monitor	
	AC3	Misuse of funds is easier to detect	
Green Policy Implementation	GPI1	Green programs are implemented more efficiently	Adapted from sustainability policy studies
	GPI2	Budget execution aligns with environmental targets	
	GPI3	Digital monitoring improves project outcomes	

The indicator table above presents the measurement items used for each construct. The items capture the role of digital financial systems in improving transparency, accountability, and the effectiveness of green policy implementation in local government settings. Example indicators include the extent to which digital financial systems improve transparency in budget execution, support real-time financial monitoring, and facilitate coordination across government units.

Measurement items for green economy policy outcomes were derived from sustainability policy and public policy implementation literature, focusing on policy effectiveness, accountability of environmentally oriented public spending, and

alignment between sustainability objectives and actual program implementation. Example indicators include improvements in monitoring sustainability-related expenditures, greater accountability for green project funding, and greater consistency between policy commitments and implementation outcomes.

The data were analyzed via partial least squares–structural equation modeling (PLS-SEM). This analytical approach is particularly suitable for policy-oriented research examining institutional mechanisms in decentralized governance settings, where relationships between governance systems and policy outcomes are complex and not directly observable. PLS-SEM allows for the simultaneous assessment of measurement and structural models and is appropriate for exploratory and explanatory research with relatively small samples. The analysis was conducted by bootstrapping procedures to assess path significance and model explanatory power (Hair Jr et al., 2021). The measurement model evaluation included tests of convergent validity, discriminant validity, and construct reliability, whereas the structural model was assessed through path coefficient analysis, bootstrapping procedures, and coefficients of determination (R^2).

This approach allowed the study to assess how digital public financial management functions as a governance mechanism supporting the implementation of a green economy policy. Ethical considerations, including voluntary participation, respondent anonymity, and the confidentiality of responses, were observed throughout the research process.

Qualitative insights from local government practice indicate that digital traceability features play a critical role in preventing the diversion of resources allocated to green projects. For example, real-time budget tracking allows supervisors to monitor expenditure flows continuously, reducing opportunities for unauthorized reallocations. Electronic procurement records create transparent documentation of vendor selection and contract execution, while audit trails record each financial transaction and approval step. These mechanisms make financial activities visible and verifiable, thereby limiting discretionary manipulation and strengthening accountability in sustainability-related spending.

To further justify the adequacy of the sample size, a post-hoc statistical power analysis was conducted following recommended procedures in PLS-SEM research. Considering the model complexity and assuming a medium effect size at a significance level of 0.05, the sample of 62 respondents achieves the recommended statistical power threshold (power > 0.80). This indicates that the sample size is sufficient to detect meaningful relationships among constructs and supports the robustness of the structural model estimation. A post-hoc power analysis was performed using G*Power to ascertain sample adequacy. The research demonstrates that the sample size (n = 62) attains a statistical power over 0.80 for identifying medium effect sizes, hence validating the sample's appropriateness for PLS-SEM analysis.

3. Results

The measurement model evaluation indicated that all the constructs met the required criteria for validity and reliability. The indicator loadings exceeded the recommended threshold, and the average variance extracted (AVE) values confirmed adequate convergent validity. Composite. The composite reliability and Cronbach's alpha values were above the acceptable level, indicating satisfactory internal consistency of the constructs. Table 2 reports the results of construct reliability and convergent validity.

Table 2 Construct Validity and Reliability.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Digital Public Financial Management	0.960	0.962	0.966	0.781
Green economy policy outcomes	0.972	0.972	0.975	0.763

The discriminant validity of the constructs was further evaluated using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT), as presented in Table 3.

Table 3 Fornell–Larcker and HTMT.

	Digital Public Financial Management	Green economy policy outcomes
Digital Public Financial Management	0.884	
Green economy policy outcomes	0.389	0.874

Table 4 shows the coefficient of determination (R^2) for the endogenous construct. The structural model demonstrated strong explanatory power. The coefficient of determination (R^2) showed that digital public financial management explained a substantial proportion of the variance in green economy policy outcomes at the local government level. Hypothesis testing using a bootstrapping procedure revealed that digital public financial management had a positive and statistically significant effect on green economy policy outcomes ($\beta = 0.389$; $t = 3.035$; $p < 0.05$). This result indicates that improvements in digital public financial management systems are associated with more effective implementation and accountability of environmentally oriented public spending. Table 5 presents the results of hypothesis testing and structural path coefficients.

Table 4 R Square.

	R-square	Adjusted R-square
Green economy policy outcomes	0.752	0.742

Table 5 Path Coefficients.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Digital Public Financial Management -> Green economy policy outcomes	0.389	0.396	0.128	3,035	0.002

Hypothesis testing was conducted via a bootstrapping procedure with a sampling size of 62. The results of the analysis show that digital public financial management has a positive and significant effect on green economy policy outcomes, with a path coefficient value of β=0.389, a tstatistic = 3.035, and a pvalue of 0.002 < 0.05. Thus, the research hypothesis is supported.

4. Discussion

The findings of this study contribute directly to key debates in public policy in Asian contexts concerning policy implementation capacity, decentralized governance, and sustainability-oriented reforms. The positive and significant relationship between digital public financial management and green economy policy outcomes suggests that digital financial systems function not merely as technical or administrative tools, but also as institutional infrastructures that shape policy implementation processes. In many Asian contexts, policy challenges are less frequently associated with deficiencies in policy formulation than with weaknesses in implementation, monitoring, and accountability (Wu et al., 2015; Andrews et al., 2017). This study provides empirical evidence that strengthening digital public financial management can enhance governments' ability to translate sustainability-oriented policy commitments into measurable and accountable public outcomes.

From an Asian governance perspective, the results highlight the central role of institutional capacity in determining policy effectiveness. Decentralized governance arrangements, which are widely adopted across Asia, grant significant fiscal authority to subnational governments while simultaneously creating coordination and oversight challenges (Smoke, 2015). The findings indicate that digital public financial management systems can mitigate these challenges by improving transparency, data integration, and traceability of public expenditures related to green economy initiatives. By strengthening financial information quality and accessibility, digital systems support more effective policy monitoring and reduce information asymmetries between central and local governments.

This finding supports prior research showing that the digitization of public financial management strengthens transparency and resource control mechanisms (Vásquez, 2024). Digital financial systems reduce information asymmetry and enable continuous monitoring of public expenditure. A significant conclusion of these findings is the function of digital public financial management (DPFM) in alleviating budgetary greenwashing. In decentralized governance frameworks, spending designated for environmental purposes may not consistently yield significant ecological results, hence posing hazards of superficial green economy. The findings indicate that DPFM narrows this disparity by enhancing fiscal transparency, expenditure traceability, and real-time oversight of green initiatives. Digital systems enhance verification processes and reduce the chances of misclassifying expenditures as environmentally focused through these techniques. This role is especially important in the context of decentralization in Indonesia, where differences in local administrative capability might make greenwashing more likely. Recent studies emphasize that transparent climate budget tagging, clear methodologies, and digital monitoring are essential to prevent governments from overstating environmental expenditures and to ensure accountability of green spending outcomes (OECD, 2024; United Nations, 2024; Asian Development Bank & OECD, 2025).

Although this study focuses on Indonesia, the findings have broader relevance for Asian countries facing similar governance and sustainability challenges. Rapid economic transformation, environmental pressures, and fiscal decentralization characterize many Asian governance systems. In such contexts, green economy policies often compete with other development priorities, increasing the risk that sustainability-oriented expenditures may be weakly monitored or inconsistently implemented. The results suggest that digital public financial management reforms can serve as a governance mechanism that aligns local government spending with national and regional sustainability objectives, thereby supporting policy coherence in decentralized systems.

These results are consistent with studies demonstrating that digital transparency in local governments is influenced by e-government maturity and accountability systems (Octavio & Urumsah, 2024). In contrast, limited digital infrastructure often leads to fragmented monitoring and weaker policy implementation. This study also contributes to the literature on public policy in Asian contexts by bridging the literature on digital governance and sustainability policy. While existing research on digital government in Asia has largely emphasized service delivery, transparency, and administrative efficiency, this study demonstrates that digital public financial management can also strengthen policy implementation capacity. By reframing digital public financial management as a policy-enabling infrastructure rather than a purely technical reform, this study aligns with emerging approaches in the public policy agenda in Asia that emphasize governance quality and institutional capacity as

determinants of policy success. Furthermore, by focusing on the local government level, the findings underscore the importance of subnational governance in achieving sustainability goals in Asia. Local governments play a decisive role in implementing environmental and development policies, yet they often face capacity constraints related to financial management and accountability.

This perspective supports institutional theory arguments that governance reforms influence policy outcomes by shaping organizational routines, information flows, and accountability mechanisms (Michael & Scott, n.d.). Accordingly, digital public financial management should be understood as an institutional capability that enables effective policy execution rather than merely a technological innovation.

The results indicate that investments in digital public financial management can strengthen subnational policy capacity and improve the effectiveness of decentralized governance arrangements. This insight is particularly relevant for Asian policymakers seeking to enhance the implementation of green economy policies without recentralizing authority. Overall, the findings reinforce the argument that sustainability-oriented public policies should be understood as governance challenges rather than solely as environmental or economic initiatives. In Asian contexts, where implementation capacity varies significantly across administrative levels, digital public financial management reforms represent a strategic policy lever for strengthening accountability, coordination, and long-term policy effectiveness.

Qualitative insights indicate that digital traceability features such as real-time budget tracking, electronic procurement documentation, and audit trails help prevent diversion of resources allocated to green projects. These mechanisms create verifiable financial records, limit discretionary manipulation, and strengthen accountability across administrative units (Arwani & Priyadi, 2024); (Lakadawala et al., 2026).

Digital public financial management also plays a critical role in mitigating budgetary greenwashing, which occurs when sustainability expenditures are reported without corresponding environmental outcomes. Traceability features such as real-time monitoring, digital procurement documentation, and audit trails enable verification of whether funds allocated to green projects are used as intended. In decentralized governance contexts, these mechanisms reduce opportunities for symbolic compliance and strengthen substantive accountability in sustainability policy implementation. For instance, digital audit trails and climate budget tagging systems allow governments to detect misclassification of expenditures labeled as environmentally oriented (OECD, 2024).

5. Conclusions

This study examined the role of digital public financial management in supporting green economy policy outcomes at the local government level in Indonesia. The findings provide empirical evidence that digital public financial management has a positive and significant effect on the implementation and accountability of sustainability-oriented public policies. By improving the quality, accessibility, and traceability of financial information, digital financial systems strengthen governments' capacity to translate green economy policy commitments into concrete and measurable public outcomes.

From a public policy agenda from an Asian perspective, the results highlight the importance of policy implementation capacity in decentralized governance systems. Across Asia, sustainability-oriented public policies are increasingly adopted at the national level, yet their effectiveness depends heavily on the subnational institutions responsible for implementation. This study demonstrates that digital public financial management can function as a governance infrastructure that enhances coordination, transparency, and accountability between levels of government. In doing so, it helps address persistent implementation gaps that characterize many decentralized Asian governance systems.

5.1. Policy Implications for Asian Governments

The findings have several important policy implications for governments across Asia. First, digital public financial management reforms should be viewed as strategic investments in policy implementation capacity rather than as purely technical or administrative upgrades. For sustainability-oriented policy agendas such as the green economy, strengthening digital financial systems can improve monitoring, reduce information asymmetries, and enhance accountability in public spending. Asian policymakers should therefore integrate digital public financial management reforms into broader green economy and sustainability strategies.

Second, the results underscore the need to strengthen subnational governance capacity in decentralized systems. Local governments play a decisive role in implementing green economy policies, yet they often face constraints related to financial management and oversight. Investments in digital public financial management at the local level can enhance the effectiveness of decentralized governance arrangements without undermining local autonomy. This approach allows national governments to support policy coherence while respecting the principles of decentralization that characterize many Asian governance systems.

Third, the findings suggest opportunities for regional policy learning and cooperation within Asia. As many Asian countries pursue digital governance and sustainability reforms simultaneously, cross-country policy learning platforms and regional governance forums may facilitate the diffusion of effective digital public financial management practices. Sharing

experiences and best practices can help governments adapt digital financial reforms to their specific institutional contexts while maintaining a shared commitment to sustainability and inclusive development.

5.2. Limitations and Directions for Future Research

While this study provides valuable insights, it also has limitations that should be acknowledged. The analysis focuses on a single local government context, which may limit the generalizability of the findings. Future research could extend this analysis through comparative studies across multiple Asian countries or subnational jurisdictions to further examine the role of digital public financial management in different institutional settings. In addition, future studies may incorporate objective environmental performance indicators or explore the political and organizational factors that influence the effectiveness of digital public financial management reforms.

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6. Declarations

6.1. Ethical considerations

Not applicable. This study did not involve clinical trials or experiments with human or animal subjects. Participation in the survey was voluntary, and all responses were collected anonymously.

6.2. Use of artificial intelligence (AI)

The authors declare that the generative artificial intelligence (AI) tool ChatGPT and Grammarly was used exclusively for language editing and/or grammatical improvement. The use of AI did not influence the scientific content, study design, data analysis, data interpretation, results, or conclusions of the manuscript. Full responsibility for the content remains with the authors.

6.3. Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

6.4. Funding

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