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A Digital Governance Model for Regional Financial Planning and Budgeting to Strengthen Effectiveness and Transparency at the Directorate General of Regional Financial Development

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Abstract: Digital transformation in regional financial planning and budgeting requires integrated data, substantive validation, process traceability, and accountable decision-making. However, the Regional Government Information System has not fully resolved limitations in data quality, substantive validation, interoperability, system stability, user capacity, and evaluation traceability. This study aims to analyze the existing digital governance of regional financial planning and budgeting, identify factors affecting effectiveness and transparency, and formulate a digital governance model. A qualitative approach with an embedded single-case study was conducted at the Directorate General of Regional Financial Development. Data were collected from 16 purposively selected informants through in-depth interviews, non-participant observation, and document analysis, followed by data condensation, thematic coding, data display, and verification. The findings show that digital governance has shifted regional budgeting from fragmented arrangements toward a more integrated and standardized ecosystem, improving procedural effectiveness and transparency, while substantive weaknesses remain in data quality, validation, audit trails, evaluation tracking, and interoperability. The novelty is the Integrative-Substantive Digital Governance Model, which positions digital governance as a socio-technical and institutional ecosystem integrating data quality, traceability, interoperability, accountability, and central-regional collaboration to strengthen regional budget governance.

Keywords: Digital Governance, SIPD, Regional Financial Planning and Budgeting, Digital Era Governance, Good Governance.

INTRODUCTION

Regional financial planning and budgeting constitute important components of public governance because they determine how public resources are allocated and provide a basis for effectiveness, transparency, and accountability in public financial management. The development of digital technology has changed public-sector management from conventional

administrative procedures toward integrated digital processes. Digital transformation, however, should not be understood merely as the adoption of information systems. It requires the integration of data, business processes, institutional arrangements, and governance mechanisms so that digital systems contribute to better decision-making and public-sector performance (Cordella & Bonina, 2012; Dunleavy et al., 2006; Haug et al., 2024). The United Nations E-Government Survey 2024 shows that Indonesia has reached the very high category of digital government development, with an E-Government Development Index score of 0.7991 and a global rank of 64th. Nevertheless, such aggregate indicators do not directly measure the quality of digitalization in regional financial planning and budgeting (OECD, 2020; United Nations, 2024).

In Indonesia, digital transformation in regional budgeting involves 552 regional governments, consisting of 38 provinces, 416 regencies, and 98 cities. This scale creates requirements for standardized data and processes, system integration, interoperability, institutional capacity, and effective central-regional coordination. The transformation is supported by Presidential Regulation Number 95 of 2018 concerning Electronic-Based Government Administration and Presidential Regulation Number 132 of 2022 concerning the National Electronic-Based Government Architecture. At the operational level, Minister of Home Affairs Regulation Number 70 of 2019 establishes the Regional Government Information System, while Minister of Home Affairs Regulation Number 90 of 2019 provides standards for the classification, coding, and nomenclature of regional development planning and finance. These arrangements position SIPD as an important instrument for integrating regional planning and financial information. Digital public financial management likewise requires attention to system integration, data quality, control, transparency, and reporting (Dener et al., 2011; Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 70 Tahun 2019 Tentang Sistem Informasi Pemerintahan Daerah, 2019; Rivero del Paso et al., 2023).

Despite the regulatory and technological foundation, the existence of a national digital system does not automatically ensure uniform governance quality. The dissertation identifies continuing challenges related to infrastructure, variations in human-resource capacity, system and data fragmentation, process consistency, validation, interoperability, and central-regional capacity differences. The national context also indicates that improvements in digital-government maturity should not be equated directly with the maturity of SIPD or fiscal transparency, because these require more specific assessment of data integration, process standardization, document status, audit trails, correction records, and evaluation tracking.

Previous studies have mainly examined e-budgeting implementation and its determinants at the regional-government level. Rahman et al., (2019) found that e-budgeting implementation in DKI Jakarta improved transparency and efficiency but still encountered delayed data input, non-uniform procedures, and bureaucratic resistance. A'yun & Hartaman, (2021) identified improvements in efficiency and transparency in Maros while highlighting human-resource and infrastructure limitations. Pattiasina et al., (2023) identified structural, managerial, and regulatory challenges in regional budgeting, whereas Subiyanto et al., (2023) synthesized determinants including resources, organizational factors, coordination, institutional capacity, and resistance to change. Idris, (2025) examined the relationship between e-budgeting and budget-management transparency, Faisal, (2025) examined SIPD as a national information system, and Meilani et al., (2024) examined human-resource, technological, and organizational factors affecting e-budgeting implementation.

These studies provide important empirical evidence but predominantly focus on regional implementation, implementation factors, or governance outcomes. They have not adequately explained how digital budgeting is systematically governed by the national institution responsible for policy guidance, standardization, evaluation, and supervision, particularly the Directorate General of Regional Financial Development. The dissertation identifies this as a

conceptual and empirical gap: digital budgeting has tended to be understood as a technical-operational issue at the regional level rather than as an institutional governance process designed, orchestrated, and controlled by the central government.

This study addresses the gap by integrating Digital Era Governance and Good Governance, with SIPD positioned as the operational instrument. Digital Era Governance emphasizes reintegration, needs-based holism, and substantive digitalization, shifting attention from fragmented administrative systems toward integrated digital governance (Dunleavy et al., 2006; Margetts & Dunleavy, 2013). Good Governance provides the governance perspective for examining effectiveness, transparency, and accountability, while digital public-sector research emphasizes that technology must remain connected to institutional arrangements and public-sector practices (Bovens, 2007; Dawes, 2010; OECD, 2019). The resulting framework positions SIPD not merely as an application but as part of an institutional and socio-technical governance ecosystem connecting regulation, data, processes, actors, control, evaluation, and central-regional relations.

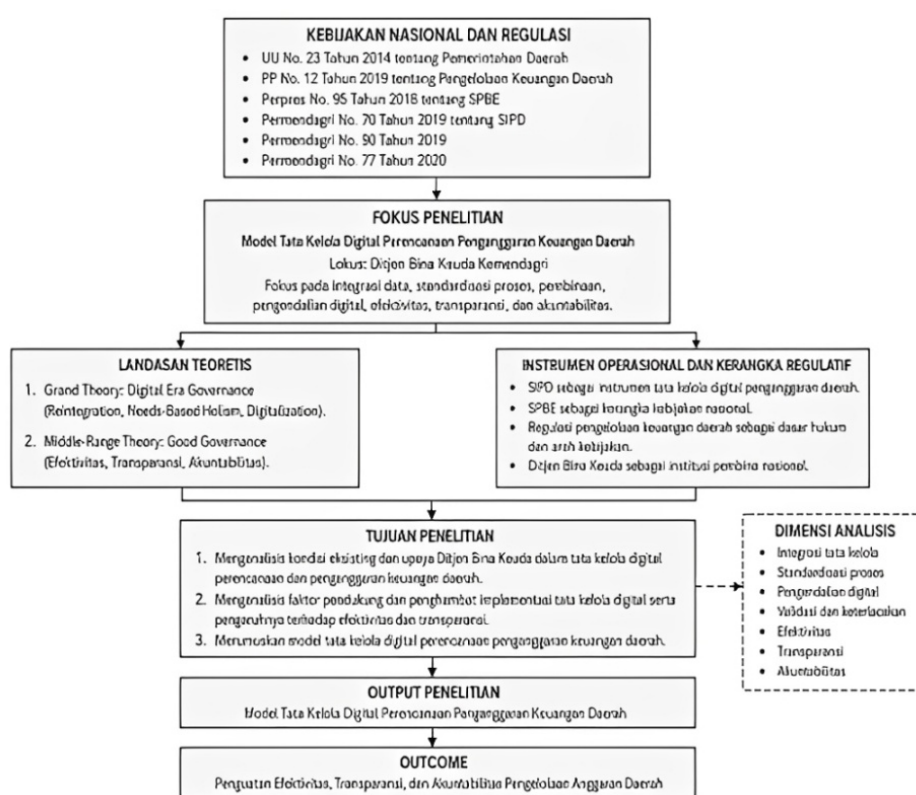


Figure 1. Research Framework

Source: Researcher's dissertation, developed based on the regulatory framework for regional financial management and the synthesis of Digital Era Governance and Good Governance (Bank, 1992; Bovens, 2007; Development, 2019; Dunleavy et al., 2006; Margetts & Dunleavy, 2013; Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 70 Tahun 2019 Tentang Sistem Informasi Pemerintahan Daerah, 2019; Peraturan Pemerintah Republik Indonesia Nomor 12 Tahun 2019 Tentang Pengelolaan Keuangan Daerah, 2019).

The framework connects the regulatory foundation, Digital Era Governance, Good Governance, SIPD, and the institutional role of the Directorate General of Regional Financial Management. It provides the basis for examining the existing condition of digital governance, identifying supporting and inhibiting factors, assessing their implications for effectiveness and transparency, and formulating a digital governance model for regional financial planning and budgeting.

Accordingly, this study aims to analyze the existing condition and efforts of the Directorate General of Regional Financial Development in digital governance of regional financial planning and budgeting, identify the supporting and inhibiting factors and their implications for effectiveness and transparency, and formulate a digital governance model for regional financial planning and budgeting to strengthen effectiveness and transparency under the guidance of the Directorate General of Regional Financial Development.

METHODS

Research Design

This study employed a qualitative approach with an integrated single-case study design to examine the processes, meanings, and stakeholder experiences underlying digital governance and the formulation of a digital governance model. The approach was used to explore stakeholders' perceptions, experiences, and understanding of the effectiveness and transparency of the digital system for regional financial planning and budgeting (Creswell, 2014).

The case focused on the Directorate General of Regional Financial Development, particularly the operationalization of the Regional Government Information System as an instrument of digital governance in regional budgeting. The case encompassed interconnected aspects of policy formulation, system management and development, regional budget evaluation, and system implementation, enabling the phenomenon to be examined within its organizational and policy context. The analysis was guided by Digital Era Governance, emphasizing reintegration, needs-based holism, and substantive digitalization (Dunleavy et al., 2006; Margetts & Dunleavy, 2013), and Good Governance to examine effectiveness, transparency, and accountability. SIPD was positioned as the operational context for examining data integration, process standardization, digital control, validation, traceability, and interoperability.

Table 1. Research Concept Matrix

Main Concept	Analytical Dimensions	Focus of Observation and Interview
Digital Governance Model (Digital Era Governance)	System reintegration, service holism, digital automation	Integration of planning and budgeting databases, ease of central-regional interaction, automated validation
Governance Outcomes (Good Governance)	Effectiveness, transparency, accountability	Speed and precision of regional budget evaluation, traceability of digital data changes, accessibility of evaluation status for regional governments
Operational Instrument (Regional Government Information System)	Data integration, process standardization, digital control, system validation, traceability, interoperability and central-regional relations	Connections among programs, activities, indicators, budget ceilings, account codes, funding sources, and budget documents, standardization of stages, input formats, nomenclature, coding, and evaluation procedures, locking and validation mechanisms, audit trails and evaluation tracking, system interoperability and central-regional communication

The matrix provided the analytical basis for examining the relationship between the theoretical perspective, governance outcomes, and the operational implementation of the Regional Government Information System. The Digital Era Governance dimensions were used to examine whether digital transformation generated reintegration, holistic interaction, and substantive digitalization, while the Good Governance dimensions were used to examine effectiveness, transparency, and accountability. The operational dimensions of the Regional Government Information System provided the empirical basis for examining how these principles were implemented through data integration, process standardization, digital control, validation, traceability, and interoperability.

Data Sources and Required Data

The study used primary and secondary data to provide a comprehensive understanding of Digital Era Governance in the Directorate General of Regional Financial Development. Primary data were obtained through interaction with relevant actors and observation, focusing on policy and strategic perspectives, digital-system operations, transparency implementation, and effectiveness impacts. The data covered the background, vision, and strategic constraints of integrating regional planning and budgeting systems, digital workflows and automated budget validation, management of digital traces and regional access to information, and changes in the duration and accuracy of budget-document evaluation following digitalization.

Secondary data served as supporting and triangulating evidence and included regulations and policy documents, decisions of the Directorate General, standard operating procedures, Electronic-Based Government Administration and Regional Government Information System architecture documents, system manuals, data-flow diagrams, and technical documents concerning the integration of regional planning and budgeting data.

Table 2. Data Requirements

Analytical Dimension	Primary Data	Secondary Data
Reintegration Digital Era Governance	Integration of planning data into the budgeting process	Regional Government Information System architecture and data-flow diagrams
Service Holism Digital Era Governance	Ease of interaction between central and regional governments through an integrated platform	Digital service procedures and system user manuals
Digital Change Digital Era Governance	Automated validation and security of system log data	Information-system audit reports
Effectiveness Good Governance	Speed of verification and accuracy of regional budget data	Service-duration statistics and performance reports
Transparency Good Governance	Ability of regional governments to track the budget-evaluation process in real time	System logs and regulations concerning information openness

The data requirements were aligned with the study's analytical framework, with data on reintegration, service holism, and digital change used to examine Digital Era Governance and data on effectiveness and transparency used to assess governance outcomes. The combination of primary and secondary data enabled comparison of stakeholders' experiences with documentary and system-based evidence to support triangulation. Accordingly, data collection focused not merely on the use of SIPD but on whether digitalization strengthened planning and budgeting data integration, process standardization, automated validation, digital traceability, central-regional interaction, and the effectiveness and transparency of regional budget evaluation. This orientation was consistent with the study's conceptual framework for assessing whether digital governance at the Directorate General of Regional Financial Development could support effective and transparent regional financial management.

Informants and Sampling

The study involved 16 informants selected purposively based on their relevance to the research focus and direct involvement in the governance and implementation of the Regional Government Information System and regional financial management. The informants represented five clusters: policy makers, system managers and developers, central budget evaluators or verifiers, regional users, and regional SIPD operators, covering perspectives across the digital governance chain from policy formulation and system management to budget evaluation, system use, and technical operation. Selection was based on three considerations: a minimum of two years of work experience to ensure familiarity with the transition to digital systems and direct involvement in SIPD or regional financial management, suitability,

requiring direct access to relevant system databases or information-system management policies, and adequacy, with data collection continuing until additional informants no longer provided substantially new information, indicating data saturation. For confidentiality and systematic analysis, each informant was assigned a code based on their cluster and sequence, which was used consistently throughout transcripts, analysis, quotations, and presentation of findings.

Table 3. Informant Composition and Data Contribution

No.	Informant Cluster	Number	Position in Digital Governance	Main Empirical Contribution
1.	Policy Makers	2	Strategic and regulatory level	Digital transformation vision, rationale for SIPD integration, pre-SIPD system fragmentation, institutional guidance, regulatory basis, and commitment to effectiveness, transparency, and accountability
2.	System Managers and Developers	2	Technical-systemic level	SIPD architecture, data flows, budget and detail locking, tagging, system validation, audit trails, data security, feature limitations, and interoperability requirements
3.	Central APBD Evaluators/Verifiers	3	Evaluative level	SIPD use in APBD evaluation, transition from manual to digital examination, time efficiency, data retrieval, thematic reports, system validation limitations, and professional judgment
4.	Regional Users	4	Implementation level	APBD evaluation transparency, central-regional interaction, implementation experience, and policy triangulation from the regional perspective
5.	Regional SIPD Operators	5	Operational level	System usability, work efficiency, operational constraints, and user experience

The informant composition represented five interconnected perspectives: strategic, technical, evaluative, implementation, and operational. Central actors provided evidence on policy direction, system management, standardization, guidance, and budget evaluation, while regional actors provided perspectives on implementation, system usability, operational constraints, user capacity, and practical experience. This composition prevented the analysis from relying solely on the normative perspective of the central institution or localized regional experiences and was particularly important for formulating the digital governance model. By integrating central and regional perspectives, the study incorporated regulatory, institutional, technical, evaluative, implementation, and operational requirements into the analysis of digital governance for regional financial planning and budgeting.

Data Collection

Data were collected through in-depth interviews, non-participant observation, and documentation study, which were integrated to obtain empirical evidence on digital governance in regional financial planning and budgeting and to compare stakeholder perspectives, system practices, and documentary evidence. In-depth interviews used a guide developed from Digital Era Governance, Good Governance, and the operational dimensions of SIPD, covering policy direction, system management, data integration, validation, digital control, regional budget evaluation, transparency, central-regional interaction, system usability, and operational constraints according to informants' roles. Non-participant observation examined SIPD as a digital working environment, focusing on its interface and menu structure, planning and budgeting stages, data flows, stage locking, validation and warning features, tagging and

thematic reports, evaluation status, document traceability, and user work practices. Observation was directed toward the research focus and did not constitute a comprehensive technical audit of the system.

Table 4. Observation Data

No.	Observation Object	Observation Focus
1.	Regional Government Information System interface and menu structure	Planning, budgeting, evaluation, reporting, stage status, and supporting features
2.	Planning and budgeting stages	Connections among development planning, budget formulation, budget execution, and related stages
3.	Data flow between stages	Reuse of data from previous stages and limitations when data are changed or adjusted
4.	Stage-locking mechanism	Stage locking, document status, data-change restrictions, and conditions after locking
5.	Validation and warning features	Budget-limit warnings, incomplete-data alerts, input restrictions, and technical warnings
6.	Tagging and thematic reports	Budget tagging and reports for education, health, infrastructure, stunting, extreme poverty, and mandatory spending
7.	Evaluation status and document traceability	Document position, evaluation progress, correction tracking, and status visibility
8.	User work practices	Use of spreadsheets, email, messaging applications, physical documents, backup procedures, and manual coordination

Observation data were used to support and verify interview findings concerning data integration, process standardization, digital control, effectiveness, transparency, and the coexistence of digital and manual practices. Documentation was used to verify the regulatory, technical, administrative, and operational aspects of SIPD through regulations, technical and architectural documents, system manuals, standard operating procedures, data-flow diagrams, evaluation reports, system logs, thematic reports, and coordination records. Relevant documents and previous manual procedures were compared with digital procedures to identify changes in regional financial planning and budgeting. The three techniques were integrated throughout the study: interviews provided stakeholder perspectives, observations captured actual practices, and documents provided regulatory, technical, and administrative evidence, establishing the empirical basis for source and technique triangulation.

Data Validity and Trustworthiness

The trustworthiness of the research data was ensured through source triangulation, technique triangulation, persistent observation, member checking, and peer debriefing. Source triangulation compared information from strategic and technical personnel, policy providers at the Directorate General of Regional Financial Development, and service users from regional governments and regional financial management agencies to identify similarities, differences, and information asymmetries. Technique triangulation cross-checked interview findings with direct observations of SIPD and documentary evidence, including system logs and relevant regulations, enabling informant statements to be examined against observable practices and documentary evidence.

Persistent observation involved continuous examination of the digitalization process to identify system barriers and information asymmetries that might not emerge from brief observations. Member checking confirmed key interview findings and technical or operational interpretations with the respective informants after transcription, while peer debriefing involved discussions with colleagues or academics knowledgeable in public administration and information technology to critically examine interpretations and identify overlooked aspects. These procedures were integrated to strengthen the credibility of the findings and ensure that

interpretations of digital governance were supported by consistent evidence across informants, data-collection techniques, observations, and documentary sources.

Data Analysis

Data analysis was conducted continuously from data collection through the completion of the study using an interactive model comprising data collection, data condensation, data display, and conclusion drawing and verification. Interview data were transcribed, observations were organized into field notes, and documentary evidence was classified according to the research questions and analytical dimensions. Data condensation involved selecting, focusing, simplifying, abstracting, and transforming the information through thematic coding focused on Digital Era Governance, Good Governance, and the operational dimensions of SIPD. Condensed data were presented through narrative descriptions, matrices, tables, and flow diagrams to identify relationships and patterns relevant to digital governance and its implications for effectiveness and transparency.

Thematic interpretation was guided by three Digital Era Governance themes: reintegration, concerning the integration of previously fragmented government functions, holism, concerning the integration of services and interactions for regional users and digital change, concerning the implications of digitalization and automation for budget verification effectiveness. Conclusions were developed by identifying patterns, explanations, configurations, relationships, and propositions and were continuously verified against field notes and, when necessary, through clarification with key informants. The iterative process allowed emerging findings to guide further data collection when evidence was incomplete and supported the formulation of the digital governance model presented in the findings.

Table 5. Data Analysis Process

Stage	Analytical Activity	Output
Data Collection	Transcription of interviews, organization of observation notes, and compilation of documentary evidence	Organized raw data
Data Condensation	Selection, focusing, coding, abstraction, transformation, and filtering of relevant information	Focused and coded data
Data Display	Organization of findings through narratives, matrices, tables, and flow diagrams	Patterns and relationships among findings
Conclusion Drawing and Verification	Identification of patterns, explanations, relationships, and propositions followed by continuous verification	Validated interpretations and research conclusions
Thematic Analysis	Interpretation through reintegration, holism, and digital change, supported by Good Governance and SIPD dimensions	Thematic findings and basis for the digital governance model

The analytical process therefore established a direct connection between empirical data, theoretical dimensions, and the formulation of the digital governance model. Data from interviews, observations, and documents were progressively condensed and interpreted through the established analytical themes, while verification was conducted throughout the process. The final synthesis was used to explain the existing condition of digital governance, identify supporting and inhibiting factors, assess implications for effectiveness and transparency, and formulate the Digital Governance Model for Regional Financial Planning and Budgeting.

RESULTS AND DISCUSSION

Existing Condition of Digital Governance through SIPD

The findings demonstrate that the implementation of the Regional Government Information System (SIPD) has shifted regional financial planning and budgeting from fragmented arrangements toward a more integrated and standardized digital ecosystem through integrated planning and budgeting data, standardized processes and nomenclature, digital control mechanisms, and more data-based central-regional relations. However, substantive maturity remains limited by data quality, substantive validation, interoperability, evaluation tracking, and differences in regional implementation capacity. SIPD connects data across planning and budgeting stages, enabling planning information to support subsequent budgeting and facilitating data retrieval for APBD evaluation. Nevertheless, this integration is not yet fully mature because its effectiveness depends on the quality of regional data input, reference-data updates, evaluator verification, and interoperability with external systems. The condition can be summarized as follows.

Table 6. Existing Condition of Digital Governance through SIPD

Aspect	Existing Achievement	Main Limitation	Implication
Data integration	Planning and budgeting data are increasingly connected within SIPD	Cross-system integration remains limited	Strengthening interoperability and data quality is required
Standardization	Nomenclature, coding, stages, and document formats are more uniform	Formal standardization does not always guarantee substantive accuracy	Stronger substantive validation is required
Digital control	Locking, document status, budget warnings, and audit trails have been implemented	Control remains predominantly administrative and technical	Real-time and substantive validation needs strengthening
Central-regional relations	Central and regional data are increasingly consolidated in the same system	Clarification and evaluation tracking still frequently require manual communication	Monitoring and follow-up functions need improvement
Regional implementation	SIPD helps organize regional budgeting processes	Implementation experiences vary according to infrastructure, human resources, operators, and system stability	User capacity and institutional support need strengthening

The findings show that SIPD has established a national framework for standardizing regional planning and budgeting through nomenclature, coding, input structures, work stages, tagging, and thematic reporting, supported by Minister of Home Affairs Regulations Number 90 of 2019 and Number 77 of 2020. However, the findings distinguish between formal and substantive standardization. Although structures, codes, formats, and stages have become more uniform, issues remain concerning account codes, funding sources, mandatory spending, tagging, and data consistency, requiring evaluator cross-checking. SIPD has also strengthened digital control through stage locking, data-change restrictions, budget-ceiling validation, document status, and audit trails. Nevertheless, these controls remain stronger at the administrative-technical level, while substantive validation continues to require professional judgment.

SIPD has also strengthened central-regional data consolidation and shifted interactions toward a more data-based environment, although clarification, consultation, and evaluation follow-up still partly rely on communication outside the system. Thus, SIPD functions not merely as a budgeting application but as an operational instrument connecting data, processes, actors, regulations, evaluation, and central-regional capacity building. From the perspective of Digital Era Governance, this represents progress toward reintegration, although data quality, manual verification, and limited interoperability indicate that reintegration remains incomplete.

Accordingly, SIPD currently strengthens procedural digitalization more than substantive digital governance. Further maturity requires transforming integration, standardization, and digital control into valid data, substantive validation, transparent processes, traceable evaluation, interoperability, and accountable budgetary decisions.

Effectiveness and Transparency of Digital Budget Governance

The findings indicate that SIPD has improved the effectiveness of regional financial planning and budgeting through greater process efficiency, reduced repetitive administrative work, improved access to budget information, and support for APBD evaluation, although these improvements remain stronger at the procedural and administrative level than at the substantive level. Transparency has also improved through greater access to data, document status, and digital records, but limitations remain in tracking, validation, and information completeness. The reduction of repetitive data entry allows information from one budgeting stage to be carried forward to subsequent stages without re-entering entire datasets. However, administrative burdens have not been fully eliminated, as regional operators still use Excel backups when system errors occur, while email, WhatsApp, and physical documents remain necessary when data cannot be retrieved or the system is unavailable. Certain adjustments, including changes in funding sources, may also require lengthy administrative procedures.

Table 7. Effectiveness of SIPD in Reducing Administrative Burden

Administrative Aspect	Improvement through SIPD	Remaining Limitation
Data input	Some data can be reused across stages	Re-entry remains necessary for particular requirements and external systems
Physical documents	Dependence on physical documents is reduced	Email and physical documents remain necessary during system problems
Report preparation	Reports and documents can be retrieved from the system	Validity and completeness still require verification
Technical coordination	Some processes are documented within the system	WhatsApp, email, and direct communication remain necessary when problems occur
Operator workload	Repetitive work is reduced in stable workflows	Excel backups and manual adjustments create additional work
Administrative Aspect	Improvement through SIPD	Remaining Limitation
Data input	Some data can be reused across stages	Re-entry remains necessary for particular requirements and external systems
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Technical coordination	Some processes are documented within the system	WhatsApp, email, and direct communication remain necessary when problems occur
Operator workload	Repetitive work is reduced in stable workflows	Excel backups and manual adjustments create additional work

SIPD improves the accessibility and usability of budget information for APBD evaluation by enabling evaluators to retrieve budget data, document status, program and activity information, and thematic reports. Tagging and thematic reporting facilitate the identification of allocations for education, health, infrastructure, stunting, extreme poverty, and mandatory spending, reducing the need for manual consolidation. However, improved accessibility does not necessarily ensure substantive accuracy because information remains dependent on regional data quality and evaluator verification. Thus, while digitalization accelerates data access, reduces repetitive input, facilitates reporting, and provides a more systematic workflow, substantive assessment of mandatory spending, funding sources, account

codes, budget ceilings, tagging, and expenditure consistency still requires professional judgment.

Transparency follows a similar pattern. SIPD strengthens central-regional information through shared planning and budget data, document status, system records, and audit trails, but evaluation tracking requires clearer information on corrections, follow-up actions, and evaluation progress, while audit trails need greater detail to trace expenditure changes. From the perspective of Good Governance, SIPD has therefore improved effectiveness and transparency, but its contribution remains partial and dependent on human verification, system stability, data quality, and institutional capacity. Digital transformation should consequently be assessed not merely by whether processes have moved online, but by whether digital systems improve governance quality, reliability, traceability, and accountability. These findings also show that procedural improvements coexist with substantive challenges in validation, evaluation tracking, audit-trail detail, manual backups, and external communication, providing the basis for examining the factors affecting digital governance maturity.

Supporting and Inhibiting Factors

The findings show that digital governance for regional financial planning and budgeting through SIPD is shaped by interacting regulatory, institutional, technological, data, and human dimensions. Supporting conditions include the regulatory framework, the role of the Directorate General of Regional Financial Development in guidance, evaluation, and control, standardized processes, integrated data, system features, and increasing user adaptation. SIPD provides an integrated digital workflow through document status, locking, tagging, thematic reporting, and data-recapitulation functions, while users who have passed the transition period generally experience more structured workflows and greater familiarity with the system. Conversely, governance maturity remains constrained by system and network instability, inconsistent data quality, variations in human-resource capacity, regulatory changes, incomplete interoperability, and coordination that partly relies on communication outside the system. These findings indicate that digital governance maturity cannot be explained solely by the availability of a digital platform but depends on the alignment of regulatory, institutional, technological, data, and human capacities.

Table 8. Supporting and Inhibiting Factors in SIPD-Based Digital Governance

Dimension	Supporting Factor	Inhibiting Factor	Governance Implication
Regulation	Legal basis, coding, nomenclature, and technical guidelines are available	Regulatory and reference changes require rapid adjustment	Regulatory changes need to be followed by timely system updates and dissemination
Institutional capacity	Directorate General of Regional Financial Development provides guidance, evaluation, and control	Regional capacity to understand and follow guidance varies	Central guidance needs to be adaptive to regional capacity differences
System	Digital workflow, document status, locking, tagging, thematic reports, and data consolidation	Slow server, login/upload failures, incomplete features, and system disruption	System reliability and functional completeness need strengthening
Data	Planning and budgeting data are increasingly connected	Data quality and synchronization are not yet fully consistent	Data-quality control and interoperability need strengthening
Human resources	Users increasingly understand SIPD workflows	Variations in user capacity and operator turnover	Continuous training, assistance, and helpdesk support are required
Coordination	Guidance, helpdesk, technical assistance, and central-	Telephone, WhatsApp, email, and manual	Coordination should increasingly be documented

regional communication are available	confirmation remain common	and institutionalized within the system
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The main constraints are system and network instability, unequal regional infrastructure, variations in human-resource capacity, inconsistent data quality, incomplete interoperability, and reliance on external communication channels. System disruptions may require Excel backups, email, or physical documents, while differences in infrastructure and operator capacity produce unequal implementation experiences. Data quality remains dependent on accurate regional input, and incomplete interoperability can cause repeated data entry and manual adjustments. Coordination also remains partly dependent on telephone, WhatsApp, email, and direct communication rather than being fully integrated into SIPD. These findings indicate that SIPD represents digital governance maturation rather than system failure, with remaining barriers spanning technical, administrative, and institutional dimensions. Accordingly, strengthening should focus on system stability, substantive validation and warning mechanisms, audit trails and evaluation tracking, interoperability, user capacity and helpdesk support, and central-regional digital collaboration.

Strengthening Needs for Digital Governance

The findings indicate that SIPD does not require fundamental replacement but governance maturation. Although it has established foundations through data integration, process standardization, digital locking, thematic reporting, and a shared central-regional data environment, substantive digital governance remains constrained by system stability, data validation, process traceability, interoperability, user capacity, and digital collaboration. Strengthening therefore requires improved infrastructure and system stability, particularly during peak budgeting periods stronger substantive validation and early-warning mechanisms for mandatory spending, funding sources, account codes, tagging, and expenditure details and enhanced audit trails and evaluation tracking to provide clearer information on corrections, evaluator comments, follow-up actions, and evaluation progress.

Further strengthening requires system interoperability to reduce repeated data entry and manual reconciliation user capacity and helpdesk support to address variations in regional capacity and operator turnover and central-regional digital collaboration to reduce reliance on telephone, WhatsApp, email, and manual confirmation for consultation, clarification, correction, and follow-up. Accordingly, SIPD development should move beyond application improvement toward an integrated governance arrangement in which infrastructure, substantive validation, traceability, interoperability, user support, and digitally documented collaboration operate coherently.

Table 9. Strategic Needs for Strengthening Digital Governance through SIPD

Strengthening Dimension	Empirical Problem	Required Strengthening
Infrastructure and system stability	Server slowdown and access disruption during peak periods	Increase capacity, improve load balancing, and strengthen system resilience
Substantive validation and warnings	Procedural controls do not fully detect substantive inconsistencies	Develop stronger validation and early-warning mechanisms
Audit trail and evaluation tracking	Evaluation status and follow-up are not always sufficiently informative	Provide more detailed and traceable evaluation records
Interoperability	Integration with external systems remains incomplete	Develop cross-system data integration and interoperability
User capacity and helpdesk	Unequal capacity and operator turnover affect implementation	Strengthen continuous training, assistance, and helpdesk services
Digital collaboration	Coordination remains partly dependent on informal external channels	Institutionalize central-regional collaboration within SIPD

The six strengthening dimensions demonstrate that SIPD development cannot be reduced to application improvement but requires transformation across technology, data, processes, people, institutional capacity, and central-regional relationships. From the perspectives of Digital Era Governance and Good Governance, these dimensions deepen reintegration, align digital functions with user needs and capacities, advance substantive digitalization through validation and traceability, and strengthen effectiveness, transparency, and accountability through reliable infrastructure, interoperability, user capacity, and documented collaboration.

Accordingly, the identified strengthening needs provide the bridge between the empirical problems and the proposed governance model. SIPD has established the structural foundation, but further development requires the six dimensions to operate as a coherent framework that is substantively integrated, accountable, interoperable, and collaborative. This provides the basis for formulating the Integrative-Substantive Digital Governance Model for Regional Financial Planning and Budgeting in the following section.

Integrative-Substantive Digital Governance Model

The synthesis of the empirical findings demonstrates that digital governance of regional financial planning and budgeting cannot be understood as the implementation of an information system alone. SIPD functions as an operational instrument connecting regulations, institutions, data, processes, actors, validation, traceability, interoperability, and central-regional guidance within a digital governance ecosystem, leading to the formulation of the Integrative-Substantive Digital Governance Model for Regional Financial Planning and Budgeting. The model distinguishes between administrative digitalization and substantive digital governance: although SIPD has improved data integration, process standardization, stage locking, reporting, and access to budgeting information, substantive effectiveness and transparency remain dependent on data quality, validation of mandatory spending and funding sources, account-code accuracy, tagging, detailed expenditure information, evaluation tracking, interoperability, and user capacity.

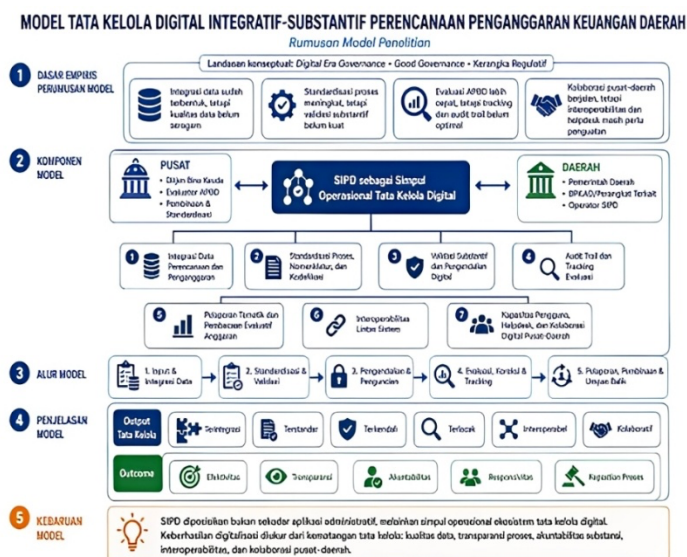


Figure 2. Integrative-Substantive Digital Governance Model for Regional Financial Planning and Budgeting

The model positions SIPD as the operational node of the digital governance ecosystem, with the Directorate General of Regional Financial Development serving as the central node for guidance, standardization, evaluation, and control, regional governments acting as principal implementers, and evaluators, administrators, operators, and system managers functioning as

operational connectors. The model comprises seven interconnected components, namely planning and budgeting data integration, process, nomenclature, and coding standardization, substantive validation and digital control, audit trails and evaluation tracking, thematic reporting and evaluative budget interpretation, cross-system interoperability, and user capacity, helpdesk support, and central-regional digital collaboration. These components are interdependent, as integration requires standardization, validation and control support reliable processes, and traceability depends on evaluation tracking, user capacity, stable infrastructure, and institutional collaboration.

The integrative character extends beyond database connectivity to the alignment of data, processes, regulations, actors, systems, evaluation, institutional responsibilities, and central-regional coordination. Its substantive character shifts digitalization from accelerating administrative procedures toward improving budget quality through validation of funding sources, mandatory spending, account codes, tagging, expenditure details, indicator output relationships, and development priorities. The resulting governance process is expected to be more integrated, standardized, controlled, traceable, interoperable, and collaborative, thereby strengthening effectiveness, transparency, accountability, responsiveness, and procedural certainty. Accordingly, digital-budgeting maturity should be assessed not merely by SIPD adoption but by its capacity to produce valid data, transparent processes, traceable evaluations, substantive accountability, interoperable information, and documented central-regional collaboration.

From the perspectives of Digital Era Governance and Good Governance, the model represents movement toward reintegration, holism, substantive digitalization, effectiveness, transparency, accountability, responsiveness, and procedural certainty. Its conceptual contribution is a socio-technical digital governance ecosystem in which SIPD connects data integration, process standardization, substantive validation, digital traceability, central-regional guidance, user capacity, and budget accountability. The model therefore shifts the analytical focus from system adoption to digital governance maturity, in which a digital budgeting system is considered mature when it produces reliable data, substantive control, transparent and traceable processes, interoperable information, and accountable decisions.

CONCLUSIONS

This study concludes that the implementation of digital governance for regional financial planning and budgeting through SIPD has shifted governance from fragmented arrangements toward a more integrated and standardized digital ecosystem. SIPD has improved procedural effectiveness through more structured processes, reduced administrative repetition, improved access to budget information, and stronger digital documentation, while transparency has improved through greater data availability, document status, audit trails, and thematic reporting. However, substantive effectiveness and transparency remain constrained by data quality, validation of funding sources and mandatory spending, account-code accuracy, tagging, expenditure details, evaluation tracking, interoperability, system stability, and variations in user capacity. The principal challenge is therefore no longer system availability or adoption but the maturity of the digital governance ecosystem, requiring improvements in substantive validation, digital control, traceability, interoperability, user capacity, helpdesk support, and documented central-regional collaboration.

The main contribution of the study is the Integrative-Substantive Digital Governance Model for Regional Financial Planning and Budgeting, which positions SIPD as an operational instrument within a socio-technical and institutional governance ecosystem rather than merely as an administrative budgeting application. The model integrates seven interconnected components, namely planning and budgeting data integration, process, nomenclature, and coding standardization, substantive validation and digital control, audit trails and evaluation

tracking, thematic reporting and evaluative budget interpretation, cross-system interoperability, and user capacity, helpdesk support, and central-regional digital collaboration. Its novelty lies in shifting the assessment of digitalization from system utilization toward digital governance maturity, in which successful digital governance is determined by the capacity to produce quality data, integrated processes, substantive validation, transparent and traceable evaluation, interoperable systems, responsive institutional support, and documented central-regional relations.

The study emphasizes that digital technology does not replace governance but functions as an instrument for strengthening it. The effectiveness of digital budgeting depends on the alignment of technology with regulation, institutional capacity, business processes, actors, data quality, and central-regional relationships. Accordingly, the future direction of SIPD should extend beyond application improvement toward the maturation of digital governance as part of broader public administration and public financial management transformation.

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