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Digital Governance in Border Areas: Challenges and Strategies for Transforming Public Services in Kapuas Hulu Regency

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ABSTRACT

This study pioneers the Border-Adaptive Digital Governance (BADG) model, which uniquely integrates national security dimensions with fiscal accountability in high-cost regions, distinguishing it from existing studies of urban digital governance. The objective of the study is to analyze the impact of digital-based program governance on increasing budget transparency and formulating adaptive public service transformation strategies for border regions. The research method used is descriptive qualitative with a library research approach, applying Creswell data analysis techniques (reduction, presentation, and conclusion drawing) to synthesize policy documents and performance reports. The study focuses on the digital transformation phenomenon in Kapuas Hulu Regency during the 2021–2026 strategic planning period. Empirical results show that although the realization of the BKPSDM budget reached 97.01% through the acceleration of the SI PLASMA and ASN Berpijar applications, the level of resource utilization efficiency is still very low at 2.99%. This is driven by extreme geographical challenges and the high Construction Cost Index (Indeks Kemahalan Konstruksi [IKK]) in border areas, which reached 123.34, as well as the limited digital competencies of local officials. The practical implications of this research emphasize the need for the establishment of a Joint Digital Command Center (JDCC) to synergize civil-military data in order to maintain information sovereignty and economic security at the forefront of the Republic of Indonesia.

Keywords: Digital Governance, Borders, Public Services, Kapuas Hulu, Accountability

INTRODUCTION

Digital transformation in the public sector has become a global phenomenon, fundamentally changing the way governments manage administration and interact with citizens, achieving the principles of good governance (Anggara et al., 2024; Ciancarini et al., 2024; Crusoe et al., 2024). In Indonesia, the paradigm shift from e-government, which primarily focuses on providing basic services, to a more integrative and collaborative digital governance, has become a strategic instrument for increasing government transparency and accountability (Murdhani, 2025; Rozikin et al., 2023; Siswanti et al., 2024). The implementation of digital technology is not merely viewed as the adoption of technical tools, but rather as a systematic effort to mitigate the risk of budget misappropriation through an electronically documented and traceable monitoring system (Inocencio et al., 2023; Khan et al., 2022; Pinnock et al., 2023). Digital-based government program governance is expected to close the gaps in corruption, collusion, and nepotism (KKN) by providing transparent data to the public, thus making oversight of resource allocation more effective and measurable.

The Indonesian government has formally established the legal basis for this transformation through Presidential Regulation Number 95 of 2018 concerning the Electronic-Based

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Government System (SPBE), which emphasizes the integration of business processes between agencies to produce user-oriented services. This policy is reinforced by the 2021–2024 National Digital Transformation Strategy, which aims to create an inclusive, efficient, and transparent governance ecosystem at all levels of government, including in underdeveloped and frontier regions. However, the reality on the ground shows that the governance of this program often faces challenges in terms of budget management accountability when the digital systems developed are not fully integrated nationally, thus the potential for irregularities in the execution of capital expenditures and procurement of goods/services remains. The weak harmonization of digital regulations with conventional administrative procedures often creates ambiguities in legal responsibilities that can be exploited by certain individuals to commit budget malpractice.

Kapuas Hulu Regency, as a land border region directly adjacent to the State of Sarawak, Malaysia, holds a strategic position and is highly vulnerable from a national security and economic stability perspective. The presence of the Nanga Badau Cross-Border Post (PLBN) in the region underscores the need for state presence through modern, responsive public services that can adapt to the dynamics of cross-border mobility of people and goods. In this context, digital governance is an urgent need to coordinate various agencies at the border, from immigration and customs to regional technical services, to ensure that every development program in peripheral areas is managed with the same stringent accountability standards as in urban areas. This lack of integrated governance in border areas risks triggering inefficient state spending and weak early detection of cross-border violations, which could harm the country's economic sovereignty.

The concept of digital governance has evolved from the mere use of information technology (informatization) to a profound digital transformation within government organizational structures (Inocencio et al., 2023; Khan et al., 2022; Pinnock et al., 2023). Theoretically, digital governance is understood as a new paradigm that emphasizes the use of digital technology to support more adaptive, collaborative, and data-driven decision-making (Almulhim & Yigitcanlar, 2025; Kassen, 2025; Korenhof et al., 2025). This shift requires governments to not only provide basic service portals but also create digital ecosystems that synergistically connect people, policies, and technology (Ibrohim, 2026). In this context, the success of the transformation depends heavily on the institution's ability to integrate internal business processes with the real needs of the community to generate sustainable public value.

One of the most relevant theoretical frameworks for evaluating digital transformation is the Technology-Governance-Public Value (TGPV) model, which integrates three key dimensions into a single analysis (Ibrohim, 2026). The technology dimension encompasses SPBE infrastructure readiness and data security; the governance dimension involves institutional coordination and digital leadership; and the public value dimension emphasizes efficiency, transparency, and citizen participation (Almulhim & Yigitcanlar, 2025; Kassen, 2025; Korenhof et al., 2025). This TGPV framework provides a basis for local governments, particularly in border areas, to ensure that technology adoption is not merely an administrative tool but a strategic instrument for strengthening legitimacy and public trust through accountable services.

In line with this, Smart City Governance theory emphasizes the importance of interoperability in improving public service standards and the efficiency of government processes (Hardi et al., 2025; Malik et al., 2023; Quek et al., 2023). Interoperability is viewed not only technically as the exchange of data between applications, but also organizationally through the alignment of procedures and strategies between agencies. In Indonesia, the implementation of the Electronic-Based Government System (SPBE) is a manifestation of efforts to create integrated governance by reducing system redundancy and strengthening cross-sector collaboration (Asianto et al., 2023; Kasiwi et al., 2025) Through interconnected

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systems, the government can respond more quickly to public issues while mitigating the risk of irregularities in resource management.

From a border region perspective, digital governance is inextricably linked to National Security Theory, which views peripheral regions as strategic spaces for protecting state sovereignty. Modern national security no longer focuses solely on conventional military threats but has expanded into the realm of human security, encompassing economic stability and citizen data protection (Agusman & Sundrijo, 2023; Tarai, 2024). Effective border region management requires integration of defense strategies through intelligence functions and digital civil services as an early warning system for cross-border violations (Rahardian et al., 2026). Thus, the digitalization of border services serves a dual function of providing public services and safeguarding the nation's information sovereignty.

Challenges in border regions are increasingly complex due to the paradox between state sovereignty and the sociocultural realities of local communities. Based on border typology, colonial borders often do not reflect settlement patterns or indigenous social ties within border communities, creating informal mobility networks that are difficult to control (Dajani, 2025; McGahern et al., 2024). In this situation, the theory of institutional coordination based on local partnerships becomes crucial, where the government must engage the community as a bulwark through the concept of community intelligence. Strengthening adaptive border governance requires a balance between strict security controls and the social legitimacy of inclusive public services.

Research by the findings, conducted through a Systematic Literature Review, found that the success of digital transformation in the public sector is significantly influenced by governance structure and institutional capacity rather than technological sophistication alone. This study proposes a Citizen-Centric Adaptive Model that emphasizes iterative development, data-driven decision-making, and participatory community engagement (Al-Inizi, 2025; Xu, 2025). Cross-country findings indicate that aligning national policies with regional operational realities is key to avoiding implementation failures, which often involve simply transferring manual forms to digital screens without reengineering business processes. The relevance of this research for Kapuas Hulu lies in the need to design digital services that prioritize the unique needs of border communities with limited infrastructure.

Research by Mozin and Hardiyanto (2026) highlights the strategic role of digital governance in strengthening government transparency through e-government portals and open data platforms. Their findings indicate that digital mechanisms enable citizens to monitor public spending in real time, significantly reducing the potential for corruption in public administration (Mozin & Hardiyanto, 2026). However, this study also identified that digital infrastructure gaps and low digital literacy remain major obstacles to achieving optimal transparency in various regions in Indonesia. This provides a basis for research in Kapuas Hulu to explore the extent to which regional digital systems can be used as effective budget oversight tools by local communities.

Research by Putra et al. (2026) analyzed the challenges of implementing digital transformation in bureaucratic reform in Indonesia (Putra et al., 2026). Their systematic literature review revealed that the main obstacles lie in bureaucratic resistance to change, limited digital human resource competencies, and a lack of adaptive regulatory support (Putra et al., 2026). The success of the transformation depends heavily on the quality of transformational leadership and the readiness of the organizational culture to move away from conventional administrative procedures (Putra et al., 2026). These findings are highly relevant to the situation in Kapuas Hulu, where increasing the capacity of civil servants in managing technology is an absolute prerequisite for effective public service delivery in border areas.

Research by Ibrohim (2026) presents a conceptual evaluation of the implementation of SPBE and the direction of transformation towards smart governance in Indonesia (Ibrohim,

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2026). This study found sharp disparities in SPBE scores between regions, with disadvantaged areas often scoring far below the national average (Ibrohim, 2026). Ibrohim emphasized that data governance integration through the One Data Indonesia approach is the primary foundation for realizing public value through evidence-based policies (Ibrohim, 2026). This study offers an integrative framework linking the technological dimension with government accountability values, which will serve as the foundation for formulating a digital transformation strategy in Kapuas Hulu Regency.

The Research critically examines the gap in legal norms regarding responsibility in the provision of digital-based public services. The results of this normative legal research indicate a gap between the Public Services Law and digital regulations, particularly regarding who is legally responsible for system failures or personal data leaks. The unclear division of responsibility between the government and third parties acting as technology vendors creates legal uncertainty for citizens. This research is crucial for the Kapuas Hulu context, as border regions are highly vulnerable to cyber data security, necessitating the reconstruction of norms protecting citizens' rights in the digital ecosystem.

The conceptual framework in this study is built on the integration of digital governance theory and the specific challenges of border regions to formulate a strategy for accountable public service transformation. The independent variable in this framework is the quality of digital governance implementation, which includes aspects of system interoperability, data integration through regional applications, and digital infrastructure readiness (Hardi et al., 2025; Ibrohim, 2026). This variable is expected to directly influence the dependent variables, namely budget management accountability and public service quality, where the use of technology is expected to increase transparency and mitigate potential administrative irregularities at the village and sub-district levels (Ardiputra et al., 2025; Girsang et al., 2025; Mursalin & Khaeriyah, 2025).

The relationship between digital implementation and accountability is moderated by three main inhibiting factors identified from the literature and preliminary data in Kapuas Hulu. The first factor is the limited geographic infrastructure in border areas, which hinders equitable internet accessibility. The second factor is the low competency of digital human resources within the bureaucracy, which leads to data input errors and system operational obstacles. The third factor is regulatory disharmony and the lack of legal norms regarding accountability for digital service failures, which can weaken the protection of citizens' rights (Sirrie, 2026).

Based on the 2024 Government Agency Performance Report (LKjIP) of the Kapuas Hulu Regency Civil Service and Human Resources Development Agency (BKPSDM), there is a strong commitment to implementing results-oriented organizational performance through the use of applications such as SI PLASMA (Public Satisfaction Survey Management Information System). The Rp 10,744,160,088 allocated for 2024 is directed to support five Key Performance Indicators (IKU), including the development of a merit system and increasing the capacity of civil servants based on the ASN Berpijar application. However, despite budget realization reaching 97.01%, challenges in program management accountability remain, stemming from the low educational qualifications of some civil servants, which hinders the optimal use of technology. The inability of officials to operate digital systems precisely not only reduces service quality but also opens up the possibility of financial data input errors, impacting the validity of regional budget accountability reports.

Specifically, data governance in Kapuas Hulu still faces fragmentation, with service systems across Regional Apparatus Organizations (OPDs) not yet fully interoperable, resulting in data duplication and budget wastage for developing similar applications. The lack of uniform data standards hampers evidence-based policymaking, resulting in policies often irrelevant to the real needs of border communities and resulting in low-effective capital expenditures. This lack of digitally integrated program management creates a dark space for

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discriminatory service practices and potential abuse of authority in the administration of social assistance or regional grants. The importance of this research is reinforced by the fact that the success of digital governance depends heavily on the readiness of an innovative organizational culture and digital leadership capable of mitigating bureaucratic resistance to transparent system change.

Regional fiscal data shows that Kapuas Hulu Regency has the highest IKK in West Kalimantan (123.34), meaning that each physical development program in this region requires significantly higher costs than other regions. These high costs demand higher accountability standards to ensure that budget management does not deviate from its original objectives, particularly for road and bridge infrastructure projects in border areas. Failure to integrate digital project monitoring systems can lead to suboptimal physical output and delays in administrative completion, which can be detrimental to regional finances. Therefore, the digital transformation of public services in Kapuas Hulu must be directed towards supporting fiscal efficiency and ensuring that every rupiah spent generates public value for the welfare of border residents.

The urgency of this research is also driven by the presence of non-conventional security threats, such as human trafficking, drug smuggling, and illegal logging along unofficial routes, locally referred to as "Jalan tikus," in Kapuas Hulu. These conditions require an early detection system supported by digital information technology. Effective border area management requires synergy between military strategy through Deninteldam XII/Tanjungpura and digital civil services to build public trust (community intelligence) as a bulwark of national defense. The unclear division of roles and lack of formal communication between agencies in border governance often create vulnerabilities that can be exploited by transnational crime, which indirectly impacts state revenue leakage from the cross-border excise and tax sectors. Therefore, this research is needed to formulate a digital-based institutional coordination model capable of strengthening state sovereignty while improving the quality of public services at the forefront of the Unitary State of the Republic of Indonesia (NKRI).

Previous studies have established several important dimensions of public-sector digital transformation. Wujarso et al. (2025) emphasize citizen-centered adaptation, Mozin and Hardiyanto (2026) highlight digital transparency, Putra et al. (2026) identify bureaucratic and human-resource constraints, Ibrohim (2026) connects SPBE implementation with technology, governance, and public value, while Sirrie (2026) identifies legal accountability gaps in digital public services. Despite these contributions, these dimensions have largely been examined separately and have not sufficiently addressed the distinctive conditions of land-border regions, where digital governance simultaneously operates within contexts of high service-delivery costs, limited infrastructure, cross-border mobility, fiscal accountability, digital inequality, and national security.

This gap is particularly relevant to Kapuas Hulu Regency. Digital transformation in this border region cannot be assessed solely through technological adoption or SPBE performance because public services operate within geographical and geopolitical conditions that differ substantially from urban settings. Accordingly, this study proposes the Border-Adaptive Digital Governance (BADG) model as a conceptual extension of the Technology-Governance-Public Value (TGPV) framework. The BADG model integrates four interrelated dimensions: technological accessibility and interoperability, institutional and fiscal governance, public value and digital inclusion, and border sovereignty and security. Its novelty therefore lies not in introducing digital governance as a new concept, but in reconstructing existing digital-governance dimensions into a border-specific analytical framework that connects service accessibility, budget accountability, public value, and national sovereignty.

Based on these conceptual and empirical gaps, this study addresses four research questions: (1) How is digital governance implemented in the distinctive geographical and institutional context of Kapuas Hulu Regency? (2) How does digital governance relate to

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budget accountability and public-service delivery in the border region? (3) What technological, institutional, human-resource, inclusion, regulatory, and security challenges constrain digital transformation in Kapuas Hulu? and (4) How can these findings be synthesized into a Border-Adaptive Digital Governance (BADG) framework appropriate to the characteristics of Indonesia's land-border regions?

The purpose of this study is to analyze the relationship between the quality of digital government program governance and the level of transparency and accountability in regional budget management. To evaluate the role of government information systems in Kapuas Hulu in preventing budget irregularities and strengthening public oversight. To identify inhibiting and enabling factors in the digital governance transformation process in the border region. To formulate recommended strategies and a digital transformation framework model appropriate to the unique characteristics of Kapuas Hulu Regency.

The benefits of this research encompass two main dimensions: theoretical and practical. Theoretically, this research contributes to the development of public administration literature on the application of the Technology-Governance-Public Value (TGPV) model in the context of regional governance in post-conflict and remote border regions. Practically, the results of this study are expected to serve as strategic guidance for the Kapuas Hulu Regency Government in developing a more effective, efficient, and budget-free SPBE action plan. Furthermore, this research is beneficial for PLBN (National Border Crossing) managers and border security agencies in building digital data synergy to strengthen economic defense and national security in West Kalimantan. Finally, this research is expected to have a positive impact on the people of Kapuas Hulu through improving accessibility and the quality of public services that are fairer and more accountable.

METHODS

This study employed qualitative document analysis supported by a structured literature review. The design was selected because the study did not collect primary field data but examined the phenomenon of digital governance in Kapuas Hulu through official government documents, regulations, performance reports, statistical publications, and relevant scholarly literature. The document analysis provided context-specific evidence concerning digital governance and public-sector performance in Kapuas Hulu, while the literature review was used to construct the theoretical framework, compare the case with previous studies, and develop the proposed BADG model.

The descriptive nature of this research aims to provide a systematic overview of the specific challenges faced by local governments in remote areas in adopting digital technology. Through this method, researchers can trace the evolution of digital policies from the central to the regional levels and qualitatively analyze the factors driving and inhibiting their implementation. The primary focus of this research is not on collecting primary data in the field, but rather on synthesizing the literature to identify gaps between national regulations and operational realities at the border. Thus, this approach is very appropriate for use in formulating an adaptive digital transformation strategy framework for regions with unique geographical characteristics such as Kapuas Hulu Regency.

This research is conducted entirely within the jurisdiction of the Republic of Indonesia, with the focus of analysis on governance in Kapuas Hulu Regency, West Kalimantan Province. This location is strategically selected because Kapuas Hulu is a land border region directly adjacent to Malaysia, which demands the integration of digital public service systems to strengthen national security and economic stability. Border regions often face greater infrastructure challenges and complex cross-agency regulations than urban areas in general. Therefore, this study positions Kapuas Hulu as the unit of analysis to evaluate the extent to

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which national policies, such as Presidential Regulation No. 95 of 2018 concerning the SPBE (Economic and Social Security System), can be effectively implemented at the nation's forefront.

In addition to geographic aspects, this research context also includes an analysis of the bureaucratic environment and the readiness of regional government officials to face digital disruption. The focus on Indonesian jurisdiction ensures that all legal instruments discussed, such as the Public Service Law and the Personal Data Protection Law, are relevant to national data sovereignty. Kapuas Hulu is used as a representative region with a high Construction Cost Index, requiring strict budget accountability through a digital monitoring system. By limiting the context to the Indonesian jurisdiction, the results of this study are expected to provide prescriptive and applicable policy recommendations for strengthening local governance in the border areas of the Republic of Indonesia.

The data sources in this study are entirely secondary data collected from various scientific literature and official documents of high academic validity. This secondary data includes government policy documents such as the Presidential Instruction on e-government development, SPBE regulations, and the National Strategy for Digital Transformation. Furthermore, the researchers utilized the Government Agency Performance Reports (LKjIP) of Kapuas Hulu Regency, the Regional Secretariat's Strategic Plan (Rencana Strategis/Renstra), and the results of the national SPBE Index evaluation to obtain objective data on achievements and challenges in the field. The use of these official documents is crucial for mapping the administrative realities and budget allocations that support the digitalization of public services in border areas.

The literature search was conducted through Scopus, ScienceDirect, Google Scholar, and the SINTA database using combinations of keywords related to "digital governance," "digital public services," "SPBE," "budget accountability," "public value," "border governance," "digital inclusion," and "border security." Academic literature was included when it: (1) addressed digital governance, public-sector digital transformation, accountability, public value, or border governance; (2) was relevant to the Indonesian or comparable public-sector context; (3) provided conceptual or empirical evidence relevant to the research questions; and (4) was published primarily within the most recent five-year period, except for seminal or context-specific studies considered necessary for the analysis. Publications without clear relevance to public governance, duplicate records, inaccessible full texts, and sources without identifiable authorship or institutional authority were excluded.

Other data sources include reputable national and international scientific journal articles, legal textbooks, and previous research on issues of personal data protection, digital governance, and public value. Researchers conducted a literature search through academic databases such as Scopus, Google Scholar, ScienceDirect, and the SINTA journal portal to ensure the study's relevance to current technological developments. Literature selection criteria included articles published within the last five years to ensure the data and arguments presented were up-to-date. All data sources were rigorously identified, inventoried, and classified to ensure the resulting analysis was comprehensive and academically sound.

The data analysis technique in this study follows a qualitative research design adapted from John W. Creswell's framework, which includes three main stages: data reduction, data presentation, and conclusion drawing. The data reduction stage involves filtering information from hundreds of collected literature and policy documents to extract the points most relevant to the research problem. This process involves categorizing the data into broad themes such as technology dimensions, data governance, and public value to simplify the complexity of the information without losing its original context. Data reduction also serves to remove overlapping information so that the research argument remains focused on the transformation strategy in Kapuas Hulu Regency.

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Data presentation, in which the researcher organizes the reduced information into analytical narratives, comparative tables, or mapping the relationships between categories. Data presentation aims to systematically describe how digital implementation at the border affects budget accountability and the quality of public services. Using thematic coding, the researcher connects various variables such as infrastructure readiness, human resource competency, and regulatory support to form a coherent narrative. This structured data presentation facilitates the identification of patterns of obstacles that frequently arise in the process of digitizing bureaucracy in remote areas.

Drawing conclusions and verification, where researchers formulate a theoretical synthesis and strategic recommendations based on the analysis results from the previous stage. The resulting conclusions are not merely a summary of data, but rather an argumentative construction that offers a model for an adaptive public service transformation strategy for Kapuas Hulu. Verification of conclusions is carried out through source triangulation techniques, namely by comparing findings from policy documents with public administration theories and empirical findings from other researchers. This ensures that the conclusions drawn are highly credible, free from subjective bias, and capable of making a real contribution to the development of legal science and public administration in Indonesia.

This research requires researchers to apply systematic procedures in processing library materials to produce an objective study. All documents are reviewed using Systematic Literature Review (SLR) principles and adapted from the PRISMA guidelines to ensure transparency in the literature selection process. Researchers critically read regulatory texts and academic literature to uncover the substantive meaning behind written norms. This focus allows the research to encompass a broad range of legal and governance dimensions, which might be difficult if only relying on physical observation in geographically inaccessible locations such as the Kapuas Hulu hinterland.

RESULT AND DISCUSSION

Dynamics of Digital Governance in Kapuas Regency

The digital transformation of governance in Kapuas Hulu Regency has demonstrated significant administrative progress, but still faces complex structural barriers in border areas. According to the 2024 Government Agency Performance Report (LKjIP) of the Kapuas Hulu Regency Human Resources Development Agency (BKPSDM), budget realization reached IDR 10,422,587,385, or 97.01% of the total spending ceiling. This achievement reflects the regional government's strong commitment to funding merit system development programs and technology-based civil service capacity building, such as the use of the ASN Berpijar application, which successfully achieved a competency standard compliance rate of 255.76%. Despite the high quantitative budget absorption, resource efficiency was only 2.99%, indicating that digital program management remains heavily reliant on substantial operational costs to address geographic constraints. The public service digitalization strategy in Kapuas Hulu focuses on strengthening transparency through the SI PLASMA (Public Satisfaction Survey Management Information System) application, which aims to transform manual survey mechanisms into digital ones to generate evidence-based policies. However, the data narrative reveals a sharp disparity between administrative achievements and the substantive quality of human resources within the border bureaucracy. The educational qualification aspect of the Civil Servant Professionalism Index (ASN) scores the lowest compared to other competency and performance aspects. This phenomenon aligns with findings by Budi (2016) evaluating e-government utilization in Kapuas Hulu, where the low skills of technology operators in each Regional Apparatus Organization (OPD) resulted in slow data input times

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and hampered the quality of internal services. Limited infrastructure, such as a lack of communication network towers and the vast distances between regions, worsened the accessibility of digital services for communities in remote sub-districts. This data confirms that although the regional government has established an internal SPBE coordination and assessment team to comply with the mandate of Presidential Regulation No. 95 of 2018, operational realities on the ground remain bogged down by issues of basic infrastructure and uneven digital literacy among civil servants.

Indicator	Value	Definition/Calculation	Documentary Source
BKPSDM budget ceiling	IDR 10,744,160,088	Approved expenditure ceiling	BKPSDM LKjIP 2024
Budget realization	IDR 10,422,587,385	Actual expenditure	BKPSDM LKjIP 2024
Budget realization rate	97.01%	Realization ÷ budget ceiling × 100	Calculated from BKPSDM LKjIP 2024
Resource efficiency	2.99%	State the exact formula used in the source	BKPSDM LKjIP 2024
Construction Cost Index	123.34	State the official definition/reference year	Insert official statistical source

In strategic land border areas, the integration of public service systems has not yet fully addressed national security aspects comprehensively. The role of the Military Intelligence Detachment of Kodam XII/Tanjungpura (Deninteldam XII/Tanjungpura) in the early detection of cross-border violations demonstrates that inter-agency coordination at the Kapuas Hulu border remains largely sectoral and has not yet been digitally integrated through a centralized data center. The presence of the Nanga Badau Cross-Border Post (PLBN) requires an interoperable information system to manage the mobility of people and goods, but overlapping regulations in determining immigration and customs authority areas often create administrative obstacles. This lack of cross-border data synchronization results in the potential for state revenue leakage and remains highly vulnerable to transnational crime. Data analysis shows that border governance in Kapuas Hulu remains heavily reliant on informal collaboration and institutional trust, without the support of digital infrastructure capable of providing real-time information to all security stakeholders.

The findings of this study, when interpreted through the Technology-Governance-Public Value (TGPV) model, indicate that Kapuas Hulu Regency is in the transition phase from e-government to inclusive digital governance. The use of the SI PLASMA and ASN Berpijar applications demonstrates efforts to create public value through administrative efficiency and performance transparency. However, in accordance with the theory of MacLean and Titah (2022), the success of digitalization is determined not only by technology adoption but also by the extent to which the technology can increase public trust (trustworthiness). In Kapuas Hulu, the gap between the national SPBE policy and the structural realities of border areas creates a risk of digitizing inefficient bureaucratic processes without first conducting comprehensive business process reengineering. The academic significance of this finding is that digital transformation in peripheral areas requires a more adaptive approach to infrastructure limitations, rather than simply replicating urban models.

The relationship between digital program governance and budget management accountability in Kapuas Hulu shows a positive correlation but is hampered by the high IKK. The cost of developing digital infrastructure on the West Kalimantan border is significantly higher than in other regions, so any deviations in financial data input due to low human resource competency can result in significant state losses. This discussion reinforces the Smart Governance theory, which emphasizes the importance of data interoperability to mitigate the

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risks of corruption and inefficiency. A comparison with research by Mozin and Hardiyanto (2026) shows that while open data portals do increase transparency, without the support of strong personal data protection (PDP Law), digitalization of border services actually increases citizens' cyber vulnerability. Therefore, the strategy in Kapuas Hulu must align budget efficiency with strengthening legal norms for data protection to ensure fairness of service.

Compared with previous research by Wujarso et al. (2025) on a citizen-centric adaptive model, Kapuas Hulu still lags behind in terms of active community participation in digital oversight. This study found that bureaucratic resistance and a hierarchical culture remain key barriers to organizational change toward innovative digital leadership. While the SIMPUN innovation at the Kapuas Population and Civil Registration Office (Central Kalimantan) can serve as a benchmark for successful outreach services, the geographical challenges of Kapuas Hulu (West Kalimantan) demand stronger integration between military and civilian strategies. Synergy between the XII/Tanjungpura Military Command and the local government through the concept of community intelligence is an urgent need to maintain information sovereignty at the border. Academically, this demonstrates that digital governance in border regions is not merely a public administration issue, but an integral part of a national defense and security strategy that is responsive to geopolitical dynamics.

The main innovation of this research, which fundamentally differentiates it from previous studies, lies in the formulation of a "Border-Adaptive Digital Governance" (BADG) model that integrates national security dimensions with fiscal accountability in high-cost regions. Most previous research, such as that conducted by Hardi et al. (2025), has focused on Smart Cities in urban areas like Yogyakarta and Makassar, which boast stable, established infrastructure. This research fills this gap by demonstrating that in border regions with high IKK scores, such as Kapuas Hulu, digital transformation should not solely pursue SPBE index scores but should also be directed at strengthening early detection systems for cross-border violations and digital image-based physical budget oversight. This addresses the question of the influence of governance on budget accountability by highlighting that digital transparency is an instrument of state sovereignty, not simply a tool for administrative convenience.

This research contribution also presents a strategic reconstruction that connects the concept of human security with cross-agency data interoperability (civilian-military) at the forefront of the Unitary State of the Republic of Indonesia. Unlike Sirrie's (2026) study, which only highlighted the legal gap, this study offers a practical solution in the form of developing a "Joint Digital Command Center" (JDCC) at the border that connects data from the National Border Post (PLBN), local governments, and territorial intelligence units. The novelty of this finding emphasizes that the transformation strategy in Kapuas Hulu must prioritize "Empowered Border Citizenship," whereby border communities are equipped with digital literacy to serve as sources of information for state security and monitor regional social assistance. Thus, this research theoretically expands the scope of the TGPV model by adding the variable "National Sovereignty" to Indonesia's public sector digital ecosystem.

Another novel aspect is the identification of "Digital Exclusion" risks specific to post-conflict and remote border regions. Previous research often generalizes human resource constraints as purely technical skills issues, but this research finds that in Kapuas Hulu, these barriers are rooted in a mismatch between the educational standards of civil servants and the technological workload in high-risk areas. These findings provide the basis for policy contributions, highlighting the need for "Digital Incentive Regulations" for civil servants serving in border areas to mitigate resistance to change and accelerate technology adoption. This research addresses implementation challenges by formulating that digital transformation at the border must be geographically inclusive, meaning that the construction of internet towers must align with the digitization of local education curricula to prevent discrimination in services for residents of underdeveloped villages.

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Overall, the novelty of this research lies in its multidisciplinary approach, synthesizing public administration theory, digital law, and military strategy into a single framework for border digital transformation. The analysis demonstrates that the success of digital governance in Kapuas Hulu depends heavily on the government's ability to harmonize overlapping sectoral regulations in the PLBN area. This research emphasizes that without legal certainty regarding responsibility for failures in the digital service system at the border, public trust will be difficult to build, and the goal of budget accountability will remain elusive. In conclusion, this research contribution offers a new path for the vision of "Kapuas Hulu EVEN GREATER" through digitalization that is not only technically modern but also resilient in safeguarding economic sovereignty and security at the nation's forefront.

CONCLUSION

The main findings of this study identify that the effectiveness of digital systems in mitigating budget irregularities is still hampered by the disparity between national policies and the structural realities in border areas. The most dominant challenges include limited and uneven telecommunications infrastructure, a IKK of 123.34 (the highest in West Kalimantan), and low digital literacy among civil servants, which frequently leads to errors in financial data input. Furthermore, the lack of legal norms regarding accountability for digital service system failures and overlapping sectoral regulations in the Nanga Badau Cross-Border Post (PLBN) area create legal uncertainty that has the potential to weaken public oversight. Therefore, the success of digital governance in Kapuas Hulu depends heavily on strengthening cross-agency data synchronization and aligning human resource competency standards with technological workloads.

The policy implications of this study emphasize that digital transformation in border areas must not be solely technocentric but must integrate national security and citizen rights protection. Administratively, local governments need to undertake in-depth business process reengineering to ensure that digitalization does not simply transfer conventional bureaucratic procedures to digital platforms, but instead generates public value through greater budget efficiency and more responsive services. Strengthening local regulations governing data interoperability and cybersecurity is an absolute prerequisite to ensure that every development program on the front porch of the Unitary State of the Republic of Indonesia can be monitored in real time by both the public and central supervisory agencies.

Strategically, this research implies the importance of civil-military collaboration in data management in border areas to mitigate unconventional threats. Integrating information systems between local governments and territorial intelligence units such as Deninteldam XII/Tanjungpura through the concept of community intelligence will strengthen information sovereignty and early detection of transnational crime. This approach demands a paradigm shift from closed governance to an open and inclusive digital ecosystem, where border communities are empowered as active subjects in maintaining economic stability and national security through accountable digital platforms.

Based on the theoretical perspective of Technology-Governance-Public Value (TGPV), the author analyzes that the main obstacle to digitalization in Kapuas Hulu is not simply a lack of hardware, but rather the risk of systematic "Digital Exclusion" for communities in remote border villages. The high IKK in this region indicates that each investment in information technology requires significantly higher costs than in urban areas. Therefore, without specific fiscal incentives for digital operations at the border, the gap in the quality of public services will widen. The author argues that digital transformation strategies must prioritize "Empowered Border Citizenship," where the construction of internet towers must be accompanied by a digital legal literacy program to empower citizens to protect their personal data and serve as a bulwark of digital sovereignty on the nation's front lines.

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