



SMART MONITORING IMPLEMENTATION IN PREVENTING CORRUPTION IN REGIONAL BUDGET MANAGEMENT: A LITERATURE REVIEW OF EAST KALIMANTAN

Aniza Dwi Amanda¹, Cilvy Putri Ihksani Alifia², Firre An Suprpto³

Department of Public Administration, Faculty of Social Sciences and Law,
Universitas Negeri Surabaya, Jawa Timur, Indonesia

Email: anizaamanda26@gmail.com

ABSTRACT

The increasingly complex management of regional budgets requires oversight systems that are adaptive, transparent, and capable of detecting irregularities at an early stage. This study analyzes budget governance problems in East Kalimantan and formulates a smart monitoring model as a strategy for preventing corruption and budget misuse in local public financial management. The research employs a descriptive qualitative approach based on literature review and secondary document analysis, including regulations, official reports, and public policy news related to the East Kalimantan APBD for the 2025–2026 period. The findings identify three main weaknesses in the budget oversight system: the absence of real-time budget tracking, limited public access to detailed expenditure information, and an ineffective early-detection mechanism for identifying patterns of irregular spending. In response, this study proposes a three-layer smart monitoring model consisting of a real-time digital ledger for early detection, an open public dashboard to strengthen transparency and social accountability, and an AI-based analytical system to identify budget anomalies. The model is expected to strengthen corruption prevention by integrating technology, institutional control, and public participation.

Keywords: *smart monitoring; regional budget; corruption prevention; transparency; accountability*

ABSTRAK

Pengelolaan Anggaran Pendapatan dan Belanja Daerah (APBD) yang semakin kompleks menuntut sistem pengawasan yang adaptif, transparan, dan mampu mendeteksi penyimpangan sejak dini. Penelitian ini bertujuan menganalisis problem pengawasan APBD di Kalimantan Timur serta merumuskan model *smart monitoring* sebagai strategi pencegahan korupsi dan penyalahgunaan anggaran dalam tata kelola keuangan daerah. Penelitian ini menggunakan pendekatan kualitatif deskriptif berbasis studi literatur dan analisis dokumen sekunder, termasuk regulasi, laporan resmi, dan pemberitaan kebijakan publik terkait APBD Kalimantan Timur periode 2025 - 2026. Hasil penelitian menunjukkan tiga kelemahan utama dalam sistem pengawasan anggaran, yaitu belum tersedianya pelacakan anggaran *real-time*, terbatasnya akses publik terhadap rincian belanja, dan belum optimalnya mekanisme deteksi dini terhadap pola anomali anggaran. Berdasarkan temuan tersebut, penelitian ini mengusulkan model *smart*

monitoring tiga lapis yang terdiri atas *real-time digital ledger* untuk deteksi awal, *open public dashboard* untuk memperkuat transparansi dan akuntabilitas sosial, serta sistem analisis cerdas berbasis kecerdasan buatan untuk mengidentifikasi pola penyimpangan anggaran. Model ini diharapkan memperkuat pencegahan korupsi melalui integrasi teknologi, kontrol kelembagaan, dan partisipasi publik.

Kata Kunci: Smart Monitoring; APBD; Pencegahan Korupsi; Transparansi; Akuntabilitas

INTRODUCTION

Transparency and accountability are two fundamental principles of good governance. In public financial management, these principles serve to ensure that regional budgets are utilized efficiently, appropriately, and in a manner that can be publicly accounted for. They not only constitute the ethical foundation of bureaucracy but also serve as key indicators for assessing the success of public administration reform (Nurlina, 2025). In the context of governance in Indonesia, the implementation of transparency and accountability has become increasingly important in response to growing public expectations for a government that is clean, open, and responsive to societal needs.

However, the management of Indonesia's Regional Revenue and Expenditure Budget or *Anggaran Pendapatan dan Belanja Daerah* (APBD) continues to face persistent challenges, including weak oversight, limited information disclosure, and broad discretionary authority in budgetary decision-making. One of the principal obstacles to the advancement of good governance in many countries, including Indonesia, is corruption. For governance to operate effectively and efficiently, it must embody key characteristics such as transparency, accountability, public participation, and responsiveness (Roziki et al., 2025).). *Komisi Pemberantasan Korupsi* (KPK) has emphasized that regional procurement of goods and services is among the sectors most vulnerable to irregularities. This vulnerability is influenced by the complexity of regional financial systems, the large number of parties involved, and the lack of transparency in budgetary decision-making processes (KPK RI, 2024). Research on APBD transparency and e-budgeting further demonstrates that budget disclosure mechanisms are directly associated with the quality of public accountability (Tanjung et al., 2024).

The case of East Kalimantan illustrates these concerns through public scrutiny of several regional expenditure items that were considered not fully aligned with public priorities. Despite generating substantial Regional Own-Source Revenue or *Pendapatan Asli Daerah* (PAD) from the oil, gas, and coal sectors, the province attracted criticism over budgetary policies perceived as

inappropriate during the 2025–2026 period. These included the procurement of Land Rover official vehicles valued at IDR 8.5 billion and the renovation of an official residence at a cost of IDR 25 billion (Dirgantara, 2026). The more pertinent issue is not merely whether such expenditures comply with formal legal requirements, but whether they reflect policy rationality, efficient resource utilization, and a genuine orientation toward the public interest. From a public administration perspective, this condition illustrates a gap between formal authority and policy rationality (Kardina et al., 2024).

The advancement of digital technology has created new opportunities to strengthen regional financial oversight. E-government, e-procurement, open data, big data analytics, and transparent reporting mechanisms can expand access to information, accelerate anomaly detection, and enhance public participation in monitoring processes. Technology serves as a catalyst for establishing more efficient, transparent, and accountable systems through innovations such as big data analytics, fraud detection systems, and real-time financial data integration (Balaji, 2025). Other studies indicate that digitalization can reduce opportunities for corruption; however, its effectiveness remains dependent on institutional capacity, supportive regulatory frameworks, and the integrity of those responsible for its implementation (Kapoor et al., 2026)

Previous studies generally indicate that transparency in APBD management, the implementation of e-budgeting, and public participation can strengthen accountability in regional financial management and reduce opportunities for budgetary irregularities. However, most existing studies have examined these three aspects separately. Research on e-budgeting has primarily emphasized administrative digitalization and governance efficiency, whereas studies on public participation have focused on information disclosure and community-based oversight. Meanwhile, research on APBD oversight has generally remained limited to procedural transparency and has yet to develop an operational mechanism capable of detecting potential irregularities from the budget-planning stage. Accordingly, a research gap remains, namely the absence of an oversight model that simultaneously integrates data-driven early detection, public transparency, and social accountability within a unified framework for preventing corruption in APBD management. This study seeks to address this gap by developing a three-tiered smart monitoring model that is preventive, participatory, and data-driven.

The novelty of this study lies in the integration of three oversight mechanisms: data-driven early detection, public transparency through an open-access dashboard, and artificial intelligence–

based intelligent analysis within a unified system for monitoring the APBD. Unlike previous studies, which have primarily emphasized transparency or digitalization in general, this study conceptualizes smart monitoring as a comprehensive oversight ecosystem that is not only transparent but also capable of identifying potential irregularities at an early stage and supporting corruption prevention at the regional level.

RESEARCH METHOD

This study employs a descriptive qualitative approach using a literature review and secondary document analysis. According to Sugiyono (2018), descriptive qualitative research is a method grounded in the philosophy of postpositivism and is used to examine objects under natural conditions, with the researcher serving as the key research instrument. This approach was selected because the study does not aim to statistically test causal relationships but rather to develop an in-depth understanding of the phenomenon of APBD oversight and to formulate a conceptual model relevant to corruption prevention.

A qualitative approach enables researchers to explore the meanings of social phenomena holistically. The data sources used in this study comprise scientific journal articles, books, regulations, official government reports, and public policy news reports relevant to APBD management, regional financial transparency, digital governance, and corruption prevention. Data were collected through documentation techniques, which involved identifying, reviewing, selecting, and recording information directly related to the research focus. According to Zed (2008), a literature review comprises a series of activities involving the collection of bibliographic data, as well as the reading, recording, and processing of research materials.

The data were analyzed using qualitative analysis based on the interactive model developed by Miles, Huberman, and Saldaña (2014), which consists of three stages. The first stage is data condensation, which involves selecting, simplifying, and focusing information relevant to APBD oversight. The second stage is data display, in which the selected information is organized into thematic matrices covering real-time tracking, transparency, and early detection. The third stage is conclusion drawing and verification, which involves interpreting patterns and relationships among the identified themes. This research design is appropriate for developing a conceptual framework grounded in mutually reinforcing evidence derived from the literature.

Data trustworthiness was maintained through source triangulation by comparing findings

from academic literature, policy documents, and news sources. This process ensures that the conclusions are not dependent on a single type of source. In literature-based research, source triangulation is essential for minimizing potential source bias and ensuring that the proposed model remains logical, relevant, and academically defensible.

RESULT AND DISCUSSION

The analysis indicates that the primary problem in the management of APBD in East Kalimantan lies not merely in formal legal compliance, but more fundamentally in the quality of budgetary decision-making. Several expenditure items that have attracted public scrutiny, including the procurement of Land Rover official vehicles valued at IDR 8.5 billion, the renovation of an official residence at a cost of IDR 25 billion, and the purchase of massage chairs worth IDR 125 million—indicate a tendency to allocate public funds to expenditures that are not fully aligned with public priorities (Ucu, 2026). Although these policies have not been legally established as acts of corruption, they reflect potential budgetary abuse in the form of wasteful spending and inappropriate prioritization. Such resources should instead have been directed toward strategic sectors, including healthcare, education, and infrastructure. This study identifies three major weaknesses in the existing APBD oversight system. First, there is no effective real-time budget-tracking mechanism. The current regional financial information system does not function as a control instrument capable of directly verifying the reasonableness of prices or the relevance of proposed expenditures (DJPK, 2025). Consequently, potential irregularities are often identified only after they have become audit findings or attracted public attention (KPK RI, 2024). Second, public access to detailed expenditure information remains limited. The publication of APBD information in an aggregated format restricts the public's ability to conduct substantive oversight. This finding is consistent with Nurjaman (2018), who argues that vertical transparency and accountability mechanisms remain ineffective when they are not supported by adequate transparency and accountability mechanisms at the local level. Third, early-detection mechanisms for identifying anomalous budgetary patterns have not been optimally developed. The absence of an effective whistle-blower protection system discourages internal bureaucratic officials from reporting indications of irregularities because of the considerable personal risks involved (BPK RI, 2014).

A. Smart Monitoring as a Framework for Regional Financial Oversight

Smart monitoring is an oversight concept that integrates digital technology, artificial

intelligence, and public participation to establish an adaptive, transparent, and accountable monitoring system. Kovtun and Shmahun (2021) argue that the digital transformation of anti-corruption policy requires innovative instruments, such as artificial intelligence, to detect patterns of irregularities at an earlier stage. In the context of APBD management, smart monitoring functions not merely as a transaction-recording tool but also as an early warning mechanism capable of identifying potential wasteful expenditure before budgetary decisions are finalized. Kapoor et al. (2026) emphasize that smart governance platforms can strengthen public-sector accountability through data integration, intelligent analysis, and information disclosure. Meanwhile, in their study on corruption detection using open data, Darusalam et al. (2018) found that common process patterns can be used to identify anomalies in government procurement of goods and services. These findings are relevant to the development of a smart monitoring model that prioritizes data-driven early detection.

Based on the identified weaknesses in the existing oversight system and the concept of smart monitoring, this study proposes a three-layer oversight model comprising the following components:

1. First Layer: A Real-Time Digital Ledger as an Early Detection Instrument

The first layer employs technology as the primary foundation of the oversight process. Unlike traditional financial information systems that primarily perform administrative functions, a real-time digital ledger serves as an active control instrument capable of automatically verifying transactions. Agustina et al (2025) and Zhang et al (2023) explain that digital governance and distributed ledger technology, particularly blockchain, can enhance transparency and accountability in government administration. Integration with a national market price database would enable the system to conduct comparative analyses automatically. When a significant price deviation is detected, the system would generate a warning signal or red flag, thereby triggering a further verification process. Furthermore, e-government and information and communication technology (ICT) can serve as effective corruption-prevention instruments by strengthening transparency in public services at the global level.

2. Second Layer: An Open Public Dashboard as an Instrument of Social Accountability

The second layer promotes transparency through the provision of an interactive and user-friendly open public dashboard. According to good governance theory, transparency is not limited to the disclosure of information but also encompasses the public's ability to access and

understand such information (Nurlina, 2025). Through this dashboard, the public would be able to view not only aggregate budget data but also detailed expenditure information at the item level, including product specifications, unit prices, and supplier identities. (Iriyani and Mutmainah (2024) found that the integration of e-planning and e-budgeting contributes to corruption prevention, with internal control systems serving as a moderating factor. In this manner, information that was previously technocratic and inaccessible becomes more inclusive and available for collective scrutiny. The integration of an anonymous reporting feature would also enable citizens to participate actively in identifying potential anomalies. From a social accountability perspective, Schatz (2013) emphasizes that social accountability mechanisms can reduce corruption in public administration when supported by access to information and horizontal pressure from civil society.

3. Third Layer: An Artificial Intelligence–Based Intelligent Analytical System for Detecting Patterns of Irregularities

The third layer utilizes artificial intelligence to detect patterns of irregularities that may not be immediately observable. (Kovtun and Shmahun (2021) explain that data-driven digital tools, risk-monitoring algorithms, and big data analytics can transform traditional anti-corruption controls into more proactive mechanisms. The system would operate by analyzing comprehensive budgetary data to identify anomalies, such as excessively high prices, project splitting intended to circumvent procurement regulations, or the procurement of goods that do not correspond to an institution's actual needs. Rifai et al (2024) further argue that artificial intelligence can optimize the detection of anomalous patterns within government systems. Unlike manual inspections, which are constrained by human capacity and limited data-processing capabilities, this system could operate continuously and process large volumes of data through big data analytics. Consequently, potential irregularities could be identified more rapidly and accurately. This approach transforms oversight from a predominantly administrative activity into a mechanism supported by more comprehensive and in-depth data analysis.

4. Integration of the Three Layers toward Continuous Oversight

The principal strength of this model lies in the interconnectedness of its three layers. Technology functions as an initial detection instrument, public transparency broadens oversight through citizen participation, and intelligent analysis strengthens the system's capacity to recognize patterns of irregularities. In their study of the capabilities of Government Internal

Supervisory Apparatuses or *Aparat Pengawasan Intern Pemerintah* (APIP) and the implementation of audit recommendations, Hidayatul et al. (2026) emphasize that strengthening internal oversight capacity has a positive effect on corruption prevention. This suggests that smart monitoring would be more effective when integrated with a well-established internal control system rather than positioned as a complete substitute for formal oversight institutions.

Theoretically, this model brings together three essential dimensions of public governance identified by Balaji (2025): technology through digital governance, institutions through institutional control, and citizen participation through social accountability. Technology without transparency would function merely as an administrative instrument; transparency without intelligent analysis would result only in passive disclosure; and public participation without the support of an adequate information system would be unlikely to produce effective oversight. Nusantara and Maksum (2021) similarly emphasize that the prevention of fraud in regional government requires integrated oversight beginning at the development-planning stage.

From a policy perspective, this three-layer model addresses persistent weaknesses in APBD management, including merely formalistic transparency, limited public participation, and an oversight system that remains excessively dependent on ex-post findings. By providing accessible data, connecting such data to automated verification mechanisms, and expanding opportunities for social participation, the proposed model has the potential to reduce opportunities for budgetary abuse from the planning stage onward. This argument is further supported research by Martin and Sripeni (2020), who state that public-sector bureaucratic performance accountability plays an important role in preventing corruption, collusion, and nepotism.

CONCLUSION

This study demonstrates that the issues surrounding the APBD in East Kalimantan are more appropriately understood as manifestations of budgetary abuse and weaknesses in the quality of budgetary decision-making, rather than merely as matters of criminal law. The findings identify four major weaknesses in the existing APBD oversight system: (1) the absence of a real-time budget-tracking mechanism; (2) limited transparency regarding detailed expenditure information, which restricts public access to budgetary data; (3) inadequate early-detection mechanisms for identifying patterns of budgetary irregularities, such as wasteful spending and inappropriate prioritization; and (4) insufficient protection mechanisms for whistle-blowers,

which may hinder the early disclosure of potential irregularities.

Based on these systemic weaknesses, this study proposes a three-layer smart monitoring model as a preventive strategy for strengthening APBD governance. The first layer, a real-time digital ledger, functions as an early-detection instrument that enables the automatic verification of transactions and real-time price comparisons against a national market-price database. The second layer, an open public dashboard, is designed to strengthen public transparency and social accountability by providing open access to detailed expenditure information at the item level, including product specifications, unit prices, and supplier identities. The third layer, an artificial intelligence-based intelligent analytical system, is capable of automatically detecting patterns of budgetary irregularities, such as price inflation or mark-ups, contract splitting intended to circumvent regulatory requirements, and the procurement of goods that do not correspond to the actual needs of government institutions.

These three layers operate in an integrated and mutually reinforcing manner, thereby establishing an oversight ecosystem that is not only reactive or ex-post in nature, but also preventive and continuous. The model strengthens corruption prevention by integrating three essential dimensions of public governance: technology through digital governance, institutional control, and public participation through social accountability. Accordingly, the proposed three-layer smart monitoring model may be positioned as a preventive strategy for strengthening APBD governance in a manner that is more transparent, accountable, and oriented toward the public interest.

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