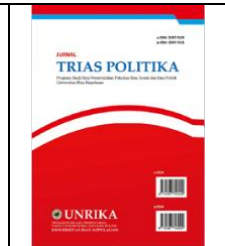


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Journal Homepage : <https://www.journal.unrika.ac.id/index.php/jurnaltriaspolitika>**DIGITAL BUREAUCRACY: CHALLENGES IN IMPLEMENTING THE ELECTRONIC-BASED GOVERNMENT SYSTEM (SPBE) IN THE 3T REGION OF SABU RAIJUA REGENCY****David Wilfrid Rihi^{1*}, Jacob Wadu², Delila A. Nahak Seran³, Rouwland Alberto Benyamin⁴**^{1, 2} Department of Public Administration, Faculty of Social and Political Sciences, Universitas Nusa Cendana, Indonesia

Abstract : This study examines the challenges of implementing the Electronic-Based Government System (SPBE) in Sabu Raijua Regency, one of Indonesia's frontier, outermost, and least developed (3T) regions located in East Nusa Tenggara Province. The selection of Sabu Raijua as the focus of analysis is grounded in its representative status as a 3T area, which faces structural and contextual constraints in advancing digital governance. Employing a qualitative approach, the research involved in-depth interviews, field observations, and document analysis with 33 informants, including heads of local agencies, staff, and citizens as service recipients. The findings reveal four significant challenges in implementing SPBE for realizing digital bureaucracy in Sabu Raijua: (1) policy-related barriers, (2) institutional limitations, (3) inadequate infrastructure, and (4) weaknesses in application systems. SPBE enhances bureaucratic innovation and digital governance, thereby improving efficiency, accountability, and public participation. However, the implementation of SPBE in this region encounters unique challenges that demand innovative and adaptive approaches to ensure effectiveness and inclusiveness. Accordingly, the study highlights the need for locally tailored policies, adaptive and collaborative digital architecture, bottom-up approaches, and strengthening local bureaucratic capacity.

Keywords : SPBE, digital governance, 3T regions, implementation challenges, public administration.

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**INTRODUCTION**

In the digital era, many countries have transformed almost every aspect of human life, from the way people work to how they communicate, driven by the advancement of information technology and the Internet of Things (IoT), which collectively push governments worldwide to reform modes of public service delivery (Ibragimova et al., 2025). Consequently, governments are required to respond swiftly and progressively to citizens' needs by implementing Electronic-Based Government Systems (E-Government) (Arief & Abbas, 2021; Koniyo et al., 2023). In 2022, Indonesia's national SPBE maturity level was recorded at 2.40, with the central government at 2.49 and provincial governments at 2.37. All three levels were categorized as "managed," while SPBE service maturity was classified at the "interaction" level, indicating that Indonesia's SPBE implementation remains far from optimal (Tingkes et al., 2024; Muzaqqi & Fitrianto, 2023).

In Indonesia, the digitalization of public services is formally mandated through Presidential Regulation No. 95 of 2018, which outlines the Electronic-Based Government

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System. SPBE aims to realize a clean, effective, transparent, and accountable governance system while ensuring high-quality and trustworthy public services (Iman et al., 2023; Fardia et al., 2024). Nationally, SPBE governance and management are crucial to strengthening the integration and efficiency of government systems (Sukarsa et al., 2020; Tingkes et al., 2024). The government recognizes the strategic role of SPBE in supporting all development sectors (Faridah et al., 2024). Various efforts have been made to accelerate SPBE implementation through sectoral regulations that mandate the establishment of information systems and digital governance frameworks (Maghfiroh et al., 2023).

To date, ministries, agencies, and local governments have implemented SPBE independently, in accordance with their institutional capacities, resulting in varying levels of progress nationwide (Israyudin et al., 2025). The use of information and communication technology (ICT) in Indonesia is not a new phenomenon, including within the bureaucracy (Gusman, 2024). However, implementation has often been siloed, leading to inefficiencies and duplication of systems (Arief & Abbas, 2021). In 2022, Indonesia ranked 77th globally in the E-Government Development Index (EGDI), with sub-index scores of 0.76 for Online Service, 0.64 for Telecommunication Infrastructure, and 0.74 for Human Capital (Nurhidayat et al., 2024; Mutiarin et al., 2024).

The optimal implementation of SPBE contributes to system integration, thereby improving the effectiveness and efficiency of public administration (Lisdiana et al., 2024). Leadership commitment across all levels of government, from the central to local agencies, is vital for accelerating SPBE adoption within three key domains: policy, governance, and service delivery (Rusli, 2023; Fardia et al., 2024). SPBE is not merely about digitizing manual administrative processes; instead, it requires interconnectivity and interoperability among organizational units and across institutions (Israyudin et al., 2025; Rusli, 2023).

One of the regions implementing SPBE is Sabu Raijua Regency in East Nusa Tenggara Province, classified as one of Indonesia's frontier, outermost, and least developed (3T) areas. In 2024, Sabu Raijua successfully improved its SPBE Index score to 2.14, achieving a "Fair" category, as shown in the following table.

Table 1. Results of the Electronic-Based Government System (SPBE) Monitoring for Regional Governments in East Nusa Tenggara, 2024

No	Government Institution	Index	Category
1	Provincial Government of East Nusa Tenggara	3.35	Good
2	Regency Government of Kupang	1.85	Fair
3	Regency Government of North Central Timor	1.21	Poor
4	Regency Government of South Central Timor	2.61	Good
5	Regency Government of Alor	1.81	Fair
6	Regency Government of Sikka	1.83	Fair
7	Regency Government of East Flores	1.52	Poor
8	Regency Government of Manggarai	1.76	Poor
9	Regency Government of East Sumba	2.31	Fair
10	Regency Government of West Sumba	2.25	Fair
11	Regency Government of Rote Ndao	2.48	Fair
12	Regency Government of West Manggarai	3.01	Good
13	Regency Government of East Manggarai	2.46	Fair
14	Regency Government of Southwest Sumba	1.35	Poor
15	Regency Government of Nagekeo	1.14	Poor
16	Regency Government of Central Sumba	1.25	Poor
17	Regency Government of Sabu Raijua	2.14	Fair
18	Regency Government of Malaka	1.99	Fair

Source: Monitoring and Evaluation Report on the Implementation of the Electronic-Based Government System (SPBE) in Central and Regional Government Institutions, 2024

Based on the performance shown above, the author assumes that the “Fair” (Cukup) rating of the SPBE Index in Sabu Raijua Regency reflects a moderate level of public service quality under the SPBE framework. However, in reality, various deficiencies and challenges remain evident in its implementation. These include the lack of optimal integration among digital applications, the underutilization or inadequacy of ICT infrastructure investments to meet service demands, difficulties among local government offices (OPD) in ensuring information security, and the limited use of available data for decision-making.

Research on SPBE implementation in frontier, outermost, and least-developed (3T) regions, such as Sabu Raijua, occupies a crucial and relatively underexplored position within Indonesia’s e-government literature. This study extends the scope of existing research, which has primarily focused on major cities or more advanced provinces, by highlighting the specific challenges faced in peripheral and marginalized areas.

Most Indonesian e-government studies focus on the implementation of SPBE at the provincial or urban level. Research explicitly examining 3T regions remains scarce, thus positioning this study in Sabu Raijua as an essential contribution to filling the empirical and conceptual gap in understanding the digitalization of bureaucracy in disadvantaged regions. The study contributes to Indonesia’s e-government scholarship by emphasizing the significance of internal policies, governance mechanisms, and institutional innovation in promoting the adoption of SPBE at the local level. Furthermore, it assesses the maturity level of SPBE implementation in a 3T context, such as Sabu Raijua, providing locally grounded recommendations for the development of digital applications, infrastructure improvement, and policy prioritization.

Sabu Raijua also faces other structural challenges that hinder public service delivery. Limited public service facilities constrain administrative performance, while geographical barriers, such as its dispersed island setting, pose transportation and logistical difficulties. Financially, between 2020 and 2024, the digitalization of public services in Sabu Raijua has relied heavily on the General Allocation Fund (DAU) and the Special Allocation Fund (DAK), as the region’s Own-Source Revenue (PAD) contributes only about 0.01%. This fiscal limitation further complicates efforts to strengthen and expand SPBE-based service delivery in the region.

METHODOLOGY

This study employed a descriptive qualitative method (Creswell & Clark, 2018). The qualitative approach is efficient for analyzing issues related to the implementation of the Electronic-Based Government System (SPBE) in Sabu Raijua Regency, as it enables a deeper understanding of the complexity, social dynamics, and local needs of 3T (frontier, outermost, and least-developed) regions that are often beyond the reach of quantitative methods. Qualitative inquiry enables rich descriptions of the processes, interactions, and perceptions of SPBE actors in areas with limited accessibility, such as Sabu Raijua, thereby helping to identify root causes and develop context-specific solutions. This approach is essential in regions characterized by distinct social, geographical, and administrative challenges compared to more developed areas.

Informants in this study were selected using a purposive sampling technique, involving individuals who possess substantial knowledge of or direct engagement with SPBE-related activities (Bungin, 2021). A total of 32 informants participated in the research, as presented in Table 2 below.

This study employed interviews, document analysis, and observation to ensure comprehensive data collection. Semi-structured interviews were conducted with 32 informants, including government officials, staff members, and citizens receiving public services. Each interview session lasted between 45 and 90 minutes. Informants were selected using a

purposive sampling technique based on specific criteria, namely, individuals directly involved in SPBE-related policymaking, program implementation, or those possessing specialized experience and knowledge about SPBE operations. This approach ensured that the data collected were both in-depth and contextually relevant. All interviews were recorded with informed consent and transcribed verbatim for analysis. The document study gathered secondary data, including government reports, policy documents, and media publications concerning the digitalization of public service delivery. Observations were carried out during the actual use of digital systems in the delivery of public services to capture the practical realities of SPBE implementation.

Table 2. *Research Informants*

No	Informant Category	Number of Participants
1	Regional Secretary of Sabu Raijua Regency	1
2	Head of the Department of Communication and Informatics, Sabu Raijua Regency	1
3	Head of the Regional Development Planning Agency (Bappeda), Sabu Raijua Regency	1
4	Staff Members from Various Local Government Offices (OPD)	10
5	Citizens Receiving Public Services in Sabu Raijua Regency	20
Total		32

Source: Researcher, 2025

Data analysis followed the interactive model of Miles and Huberman, which includes processes of transcription, data reduction, data display, and conclusion drawing. The transcribed data were coded into emerging themes related to SPBE implementation and the digitalization of public services in Sabu Raijua Regency. To enhance the validity and credibility of the findings, triangulation of data sources, methods, and theories was applied. This involved cross-checking information among different informants and data types to ensure consistency, minimize bias, and verify the robustness of the conclusions.

RESULTS AND DISCUSSION

Challenges in Implementing SPBE in the 3T Region of Sabu Raijua Regency

This study identifies several challenges in implementing the Electronic-Based Government System (SPBE) in the 3T (frontier, outermost, and least developed) region of Sabu Raijua Regency, including those related to policy, institutional capacity, infrastructure, and applications. The following section discusses the findings and analysis for each of these dimensions.

Policy

The policy dimension of the Electronic-Based Government System (SPBE) serves as the primary foundation that directs, regulates, and ensures the sustainability of digital transformation in the public sector. Strong and integrated policies are crucial for promoting efficiency, transparency, and enhancing the quality of public services across all levels of government. This dimension is also closely related to legal instruments and official documents that aim to guide and encourage the use of SPBE to enhance public service delivery (Tkachenko et al., 2025; Nga, 2025; Lu, 2024) within the scope of local government agencies in Sabu Raijua Regency.

Based on interviews, observations, and document analysis, it was found that the implementation of SPBE within the Sabu Raijua Regency Government began in 2024, following the issuance of Regent Regulation No. 19 of 2024 on the Electronic-Based Government System within the Sabu Raijua Regency Government. It indicates that since the establishment of this outermost regency in 2008, and despite having gone through two electoral periods, it took more than a decade for the SPBE policy to be formalized in a written regulation.

It also required three years for the elected Regent and Vice Regent to realize their vision and mission related to SPBE in Sabu Raijua. This policy document now serves as the primary reference for integration and harmonization among government units, preventing application overlaps and ensuring interoperability (Zhafrani et al., 2024).

Furthermore, the policy should be elaborated into three primary e-government planning documents:

1) Masterplan (Rencana Induk)

A long-term planning document that outlines the strategic direction of SPBE. However, based on interviews and observations, it was found that Sabu Raijua Regency does not yet have an SPBE Masterplan for improving public services within local government agencies.

2) Blueprint (Cetak Biru)

A detailed architectural framework that serves as the foundation for policy formulation, including goal setting, strategy formulation, program implementation, and operational steps that each government unit must execute. However, as revealed through observation and interviews, Sabu Raijua Regency has not yet developed an SPBE Blueprint, given that the policy was only enacted in 2024.

3) Technical Guidelines (Juklak) and Technical Instructions (Juknis)

These documents should contain both technical and procedural directions, providing step-by-step guidance and outlining interconnections among SPBE systems within different agencies. However, since the SPBE regulation was only enacted in 2024, no such technical documents were available at the time of this research.

The policy dimension, supported by legal products and formal documents, is crucial for providing direction, certainty, and promoting the optimal use of SPBE in government agencies, thereby directly enhancing public service quality (Crăciun et al., 2023; Nga, 2025).

In practice, the implementation of SPBE in Sabu Raijua faces various policy-related challenges. The main obstacles include a lack of policy integration, weak inter-agency coordination, regulatory delays, and limited understanding and dissemination of SPBE policies among implementers. In addition, human resource constraints, inadequate infrastructure, and limited budget further exacerbate these policy challenges at the local level.

This situation is aggravated by a hierarchical bureaucratic culture that has not yet fully adapted to digital innovation. Many administrative practices remain manual and paper-based, resulting in inefficiency. Moreover, public perception of electronic services remains low, as the region's limited internet access and low digital literacy hinder adoption. These conditions underscore the challenge of positioning SPBE as a tangible solution for enhancing public services.

The findings suggest the need for collaborative governance and inclusive policy formulation to ensure the effective implementation of SPBE (Viana, 2025). Strengthening policy narratives, facilitating cross-actor dialogues, and evaluating infrastructure readiness are key factors for successful implementation (Bonny & Cahlikova, 2024) in Sabu Raijua Regency.

These findings are consistent with global evaluations showing that SPBE or e-government maturity levels in many countries remain suboptimal, often at the “managed” or “interactive” stages. Developing countries such as Indonesia, Malaysia, Ethiopia, Ghana, and Brazil face policy-related challenges, and even developed countries like South Korea, China, and Germany encounter similar obstacles (Fogel, 2021; Gil-García et al., 2020; Zeng et al., 2024). Ultimately, SPBE performance depends on how effectively bureaucracies operationalize the policies that have been established (Israyudin, 2025).

Research by Chung et al. (2022) also found that SPBE implementation often faces obstacles related to policy readiness, which in turn hinders bureaucratic service delivery. In the context of Sabu Raijua, bureaucratic performance can function optimally only with transparent

and standardized regulations designed by policymakers (Puentes-Poloché, 2023). The success of SPBE in supporting digital bureaucracy in Sabu Raijua, therefore, depends on the presence of transparent, integrated, and adaptive policies that align with technological developments.

The transformation of Sabu Raijua's government system toward digitalization represents a critical step toward optimizing public services, enhancing efficiency, and building a more transparent and responsive government. Although this transformation is not an easy process, with a strong policy commitment, effective management, and the involvement of all stakeholders, digital governance can significantly improve public service delivery, even in regions facing infrastructural and geographical challenges, such as Sabu Raijua Regency.

The inability of the Sabu Raijua Government to adapt its policies to digital technological developments would hinder the effectiveness of public services, weaken accountability, and widen the information gap in this 3T region. It demonstrates that digital transformation is a necessary prerequisite for achieving development goals.

In the context of public service delivery, the implementation of SPBE policy in Sabu Raijua can act as a catalyst for bureaucratic reform, transforming administrative services, public complaints systems, and licensing processes into integrated online platforms. In other words, SPBE is not merely a technological tool but a strategic instrument for bureaucratic reform toward digital government.

However, despite the existence of national regulations, local implementation often remains inconsistent due to fiscal limitations, weak institutional capacity, and minimal political support, which often remains symbolic. The Ministry of Home Affairs (2023) noted that many regional heads have not yet prioritized SPBE as a key program in their Regional Medium-Term Development Plan (RPJMD) (Sofianto et al., 2023). Consequently, digital government transformation proceeds slowly and lacks clear direction. Only a few regions have explicitly included SPBE as a strategic program in their official development planning documents.

Institutional Dimension

The institutional dimension is closely related to the existence of organizations authorized and responsible for developing and utilizing the Electronic-Based Government System (EBGS) (Alshammari et al., 2025). A strong and well-defined institutional framework serves as the primary foundation for ensuring that SPBE implementation within government environments is effective, coordinated, and sustainable (Gong & Yang, 2025). Effective institutions enable cross-agency coordination, prevent application overlaps, and support the integration of digital public services (Scholta et al., 2025; Wouters et al., 2021). Moreover, institutional mechanisms play an essential role in harmonizing national and local policies (Nielsen & Jordanoski, 2020).

In practice, SPBE implementation in Sabu Raijua Regency is coordinated by the SPBE Coordination Team, which consists of a Steering Team and a Technical Team. The coordination is led by the Regional Secretary (Sekda), who is accountable to the Regent. The Department of Communication and Informatics (Dinas Kominfo) serves as the leading agency responsible for managing SPBE at the regional level.

Table 3. *ICT Management Units and SPBE Service Provider Units in Sabu Raijua Regency*

ICT Management Unit	SPBE Service Provider Unit
Department of Communication and Informatics of Sabu Raijua Regency	Regional Government Agencies (Perangkat Daerah)
Service Coordinator	Service Coordinator
Recovery Coordinator	Recovery Coordinator
Technical Administrator	Technical Administrator

Source: Researcher, 2025.

The management of SPBE services is a shared responsibility between the ICT Management Unit and the Service Provider Units within the Sabu Raijua Regency Government, as illustrated in the following table.

Based on the table above, the structure of the SPBE management unit can be described as follows:

- a. Service Coordinator. The service coordinator is responsible for managing all existing SPBE-based services.
- b. Recovery Coordinator. The recovery coordinator is responsible for restoring malfunctioning or disrupted services.
- c. Technical Administrator. The technical administrator is a team that performs operational management activities, both in service delivery and in recovery processes within service management.

All members involved in the SPBE service provider unit are part of, and accountable to, the Head of the Regional Apparatus Organization (OPD) that delivers the service. The ICT Management Unit holds considerable authority in implementing SPBE in Sabu Raijua Regency. Such authority is essential because the unit's tasks are interconnected with other work units, including infrastructure development and maintenance, information and data sharing, and other related functions.

However, the specific duties and functions (Tupoksi) of the SPBE management unit have not yet been clearly stipulated in a legal instrument governing the institution's establishment. Furthermore, to ensure that SPBE development mechanisms can be implemented appropriately, Standard Operating Procedures (SOPs) need to be developed. In practice, however, these SOPs have not been adequately documented and therefore are not yet formalized in any legal product, such as a regent's regulation or circular letter.

Findings related to institutional capacity also indicate the absence of uniform institutional structures responsible for SPBE implementation. In almost every government agency (OPD), individual units or work sections can develop electronic systems using public funds. As a result, within a single agency, there can be more than one electronic system performing the same function. Consequently, information systems are developed sectorally and lack interoperability.

According to an evaluation by the Ministry of Administrative and Bureaucratic Reform (KemenPAN-RB, 2025), out of 514 regencies and cities in Indonesia, only about 40% have integrated SPBE systems across service units (Israyudin, 2025), and Sabu Raijua Regency is not among them. It indicates persistent issues in the implementation of the national SPBE architecture at the regional level, particularly in areas like Sabu Raijua. Although the Department of Communication and Informatics (Dinas Kominfo) has been appointed as the ICT Management Unit, there is no clear policy framework defining its operational authority. Ideally, to ensure efficiency, the division of labor between units responsible for designing, building, and maintaining electronic systems and those responsible for using and operating them should be explicitly delineated.

Another problem arises because each unit in Sabu Raijua Regency manages its human resources independently and sporadically, resulting in a shortage of qualified personnel within government institutions capable of handling various SPBE operational stages. Even among existing qualified personnel, frequent rotations often result in staff being reassigned to roles that are unrelated to their expertise. Additionally, cryptography and information security management remain weak due to a lack of competent specialists.

Many civil servants (ASN) still lack adequate digital competencies and, in some cases, express distrust toward electronic systems for managing service-related information. They are not yet technically or mentally prepared to adopt electronic-based work systems. Moreover,

human resource capacity-building initiatives, such as SPBE-related training, are sporadic and not part of a sustainable HR management strategy. It has resulted in low operational efficiency in the existing SPBE systems.

This situation has led to minimal utilization of cryptographic communication between Sabu Raijua's local government agencies and other regional or national authorities. However, according to Law No. 23 of 2014 on Regional Government, cryptography is a mandatory governmental function (non-basic public service) aimed at securing information. From a personnel standpoint, Sabu Raijua Regency currently lacks qualified cryptography specialists. Ideally, each government agency should have at least one competent officer in this field to ensure proper data security management. Currently, the level of digital data security within the Sabu Raijua Regency Government remains uncertain.

Observations also reveal that, institutionally, the percentage of public information services remains low, with limited transparency and declining connectivity among OPDs to the internet network provided by Dinas Kominfo. In 2024, only 80% of OPDs were connected to the Kominfo network, down from 98.47% in 2021 and 97.43% in 2022. Similarly, the percentage of online and integrated public services declined from 40.90% in 2021 to 33.33% in 2022. Meanwhile, three indicators improved: (1) the percentage of citizens aware of regional government policies and priority programs increased to 79.10%, (2) the SPBE Index reached 2.14, and (3) the number of official government subdomains increased from 39 in 2021 to 40 in 2022.

These findings present an irony: although SPBE is frequently declared a regional development priority in Sabu Raijua, institutional management has not evolved in alignment with digital transformation goals. Effective SPBE implementation necessitates fundamental changes to back-office structures and organizational culture, with a focus on public service innovation and institutional transformation (Maghfiroh et al., 2023; Fardiah et al., 2024).

Consistent with these findings, Agustriani et al. (2025), Erizal et al. (2022), and Rusli (2023) argue that SPBE implementation in Indonesia remains partial and sectoral, characterized by institutional ego and siloed operations that hinder integration. Given the extensive authority and resources of the bureaucracy, it should be able to reform its institutional management to achieve better coordination and efficiency.

Issues such as application and digital infrastructure fragmentation, without proper coordination, have led to redundancy, resource inefficiency, and a poor user experience. In contrast, strong institutions supported by cross-agency collaboration strategies have been shown to reduce overlap and enhance SPBE interoperability (Saputra et al., 2025).

Bureaucratic reform through SPBE entails not only transforming manual systems into digital formats but also restructuring institutional (back-office) systems themselves (Moser-Plautz & Schmidhuber, 2023). The main objective is to deliver the best possible public services (Matheus et al., 2020) while ensuring integration, efficiency, and sustainable quality in digital public service delivery (Kuhlmann & Heuberger, 2021).

The reform process required in Sabu Raijua's bureaucracy is by no means simple, as it demands a critical reconfiguration of bureaucratic structures, from feudal and hierarchical patterns toward a rational model of authority that fosters a public service-oriented culture focused on serving citizens rather than being served.

However, the primary challenges of this bureaucratic restructuring include institutional readiness, data integration, organizational culture, business process transformation, and internal resistance. Hence, business process reengineering, the establishment of a one-stop integrated SPBE unit, and the transformation of mindset and work culture toward collaborative and adaptive digital governance are essential. In short, public service digitalization is more than the development of information technology; it is fundamentally about reforming government institutions.

Infrastructure

The Regulation of the Minister for Administrative and Bureaucratic Reform (Menpan RB) No. 59 of 2020 stipulates the monitoring and evaluation of the Electronic-Based Government System (SPBE), which serves as an assessment mechanism for SPBE implementation across government institutions. This regulation was later updated through Menpan RB Regulation No. 23 of 2023 on the Bureaucratic Reform Roadmap in Indonesia, which provides a more detailed framework for accelerating e-government implementation through SPBE.

The roadmap outlines strategic directions and concrete actions to integrate information and communication technology (ICT) into governmental processes with the aim of enhancing operational efficiency and improving the quality of public service delivery. It also emphasizes the importance of continuous monitoring and evaluation of SPBE implementation to ensure that each government institution strengthens its capacity to effectively utilize digital technology (Shintia et al., 2024).

The importance of SPBE in bureaucratic reform cannot be overstated. The implementation of SPBE is expected to make administrative processes more streamlined, transparent, and accountable (Qotrunnisa, 2021). Such transformations help reduce bureaucratic redundancy and foster greater public trust in government institutions. The 2023 Bureaucratic Reform Roadmap also underscores the need to strengthen ICT infrastructure to ensure that all government institutions have adequate access to the technology necessary for successful SPBE implementation.

In the context of this study, the infrastructure dimension of SPBE encompasses all hardware, software, and facilities that serve as the essential backbone for operating systems, applications, data communication, data processing and storage, integration devices, and other electronic tools (Wang et al., 2023; Baheer et al., 2020). The use of infrastructure within SPBE aims to improve efficiency, security, and system integration (Qader, 2025). However, in the case of Sabu Raijua Regency, the SPBE infrastructure remains suboptimal.

In Sabu Raijua, the availability of SPBE infrastructure across regional government agencies (OPDs), both in terms of specification and quantity, remains inadequate. Adequate ICT infrastructure represents nearly 50% of the key success factors in implementing the e-government concept effectively. Based on the author's field observations and interviews, it was found that the hardware and software used for SPBE management in Sabu Raijua are often privately owned by employees, rather than procured by the regional government. Moreover, the communication networks (LAN, WAN, and Internet) are unstable; service delivery channels (such as websites, telephone, and SMS systems) are underdeveloped; and supporting facilities (including air conditioners, UPS, generators, and access control systems) are not yet functioning optimally.

Table 5. Performance of Government Administration in Sabu Raijua Regency, 2024

No	Indicator	Unit	Achievement
1	Percentage of Regional Apparatus Organizations (OPD) connected to the internet network provided by Dinas Kominfo	%	95.47
2	Percentage of public services conducted online and integrated	%	33.33
3	Percentage of the target population aware of public information dissemination, government policies, and priority programs	%	97.45
4	Electronic-Based Government System (SPBE) Index	Score	1.78
5	Number of local government agency (SKPD) websites with official subdomains	Subdomain	39

Source: RKPD of Sabu Raijua Regency, 2024

SPBE infrastructure within the Sabu Raijua Regency Government is also unevenly distributed. Several regional government agencies (OPDs) and technical implementation units

(UPTs) remain unconnected to the internet, resulting in the absence of SPBE services such as digital applications or institutional websites. Furthermore, the limited availability of electricity and network signal coverage continues to hinder the effective utilization of SPBE infrastructure in the region. Based on the data presented in Table 5, the performance of the Department of Communication and Informatics (Dinas Kominfo) in supporting SPBE implementation in Sabu Raijua Regency remains suboptimal.

The evaluation of SPBE indicators in Sabu Raijua Regency reveals several key patterns in the region's digital governance implementation. Although internet connectivity coverage among regional agencies (OPDs) is relatively high at 95.47%, the percentage of integrated online public services remains significantly low at 33.33%. This disparity suggests that while access to digital infrastructure is available mainly, its utilization for service delivery and integration across government units remains limited.

Furthermore, the SPBE Index score of 1.78 indicates that the maturity level of digital governance in Sabu Raijua is still at the *initial or developing stage*, considerably below the national average for optimal SPBE implementation. In contrast, the high level of public awareness (97.45%) regarding regional government programs shows that communication and public information dissemination are functioning effectively. However, this has not translated into proportional progress in digital service transformation.

Additionally, the existence of 39 official subdomains for SKPD websites demonstrates a formal commitment to digital presence; nonetheless, the quality, interoperability, and security of these digital platforms remain questionable. This imbalance between digital access and digital capability underscores that infrastructure availability alone does not guarantee effective integration, reliability, or sustainability in digital governance systems.

According to the RKPD of Sabu Raijua Regency (2024), the server infrastructure managed by the Department of Communication and Informatics (Diskominfo), which serves as the data custodian for the local government, remains insufficient to meet the diverse operational needs of all OPDs. In response, Diskominfo has initiated the use of the National Data Center Cloud Service provided by the Ministry of Communication and Informatics (Kemenkominfo). Moreover, an intra-government communication network, in the form of MetroLink or a Virtual Private Network (VPN), has been developed. Nevertheless, this network infrastructure does not yet encompass all OPDs, thereby limiting internal data integration and coordination.

The limited SPBE infrastructure represents one of the most critical barriers to realizing effective, efficient, and inclusive digital governance in Sabu Raijua. These constraints directly affect the quality of public services, data management, and government transparency. Similar conditions prevail in many other regions of Indonesia, where blank spots, insufficient bandwidth, and unequal ICT infrastructure distribution, especially in rural and remote areas, impede the progress of digital transformation (Liwaul et al., 2023). Even in developed countries, rural regions continue to face disparities in access to digital services due to uneven distribution of infrastructure (Jia, 2024).

A comparative study by Doran et al. (2023) in Europe illustrates that Nordic and Western European countries, which possess highly developed telecommunication networks, stand in sharp contrast to Eastern and Southern European nations such as Romania and Bulgaria, where limited infrastructure and internet accessibility persist. Likewise, suboptimal use of SPBE infrastructure in Sabu Raijua exposes the region to data security vulnerabilities and service interruptions (Botrić & Božić, 2021).

Inadequate infrastructure leads to slow, fragmented, and unresponsive digital services, hindering data interoperability and eroding public trust in digital governance (Marino & Pariso, 2021). Such deficiencies underscore the need for comprehensive infrastructure development,

encompassing stable network connectivity, reliable data centers, robust cybersecurity measures, and standardized interoperability systems.

To address these challenges, the SPBE Roadmap must serve as the principal guide for infrastructure strengthening and policy alignment. The Government of Sabu Raijua Regency should ensure that digital transformation unfolds in a practical, systematic, and sustainable manner. Robust infrastructure facilitates innovation, efficiency, and citizen engagement, while weak infrastructure risks deepening fragmentation and inefficiency.

Finally, as a 3T region (*tertinggal, terdepan, terluar*, underdeveloped, frontier, and outermost), Sabu Raijua faces an even greater risk of lagging due to its limited ICT capacity and uneven internet coverage. These challenges exacerbate the digital divide between urban and rural areas. Thus, the implementation of SPBE holds a dual potential: it can either bridge or widen the digital divide, depending on the region's infrastructure readiness, digital literacy, and citizen accessibility. Ensuring equitable digital transformation, therefore, requires a strategic balance between technological advancement and institutional capacity building to achieve truly inclusive e-governance in Indonesia's peripheral regions.

Applications

The application dimension relates to the availability and utilization of software systems that meet specific criteria for supporting the implementation of electronic-based government (e-Government). These criteria include the application's ability to operate effectively under existing conditions (such as available infrastructure and human resources), to address administrative and service needs, to enhance workflow efficiency through optimal use of information technology, to positively impact the quality and efficiency of public services, and to adapt flexibly to technological and organizational changes over time (Scholl, 2020; Howard et al., 2020).

In the context of SPBE implementation for improving public services within the Regional Government of Sabu Raijua Regency, the application dimension is measured through several key parameters, including Official Website/Homepage:

- a. The existence of an official government website as a digital platform for information dissemination and public communication.
- b. The presence of interactive features on the website that enable the public to engage directly with the government through online forms, feedback systems, or communication portals.

Based on these parameters and the findings from field observations, it was identified that the Government of Sabu Raijua Regency has already established an official website/homepage, as illustrated in the figure below. The website serves as a central access point for public information and online services, marking the initial manifestation of the SPBE application in the region. However, further evaluation is necessary to determine the extent of its interactivity, content relevance, system integration, and user accessibility, which are critical indicators of application maturity within the SPBE framework.

The official website of the Sabu Raijua Regency Government serves as a vital medium for disseminating information and communicating with the public. It functions as a digital platform, providing access to various types of information related to governance, regional development, and public services. The design and use of this website reflect the broader transformation in information and communication technology (ICT), marking a shift from traditional printed publications to electronic and web-based media as part of modern digital governance.

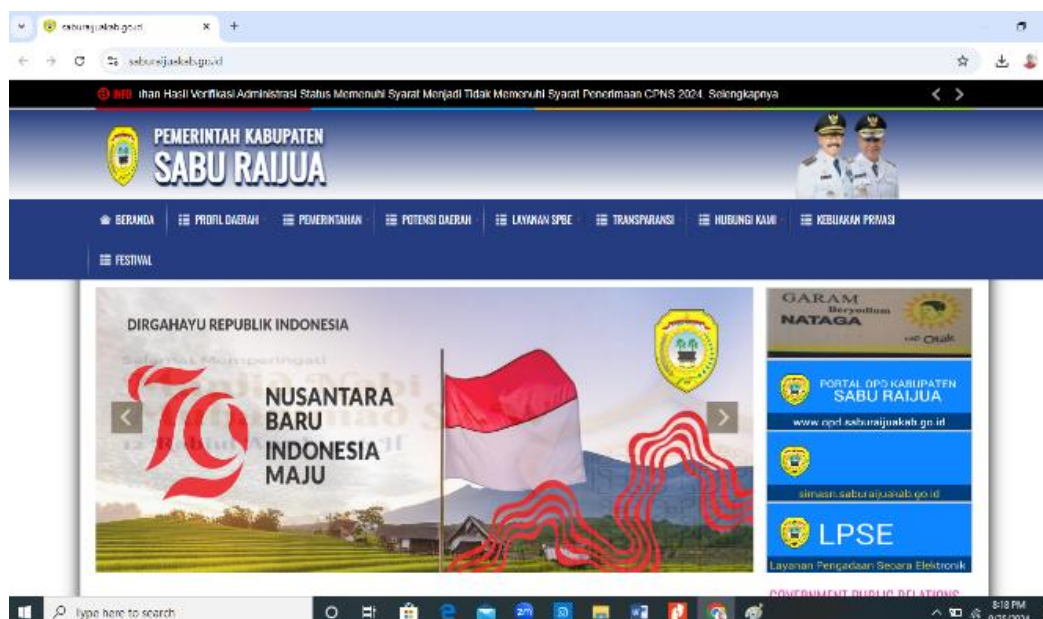


Figure 1. Official Website/Homepage of the Sabu Raijua Regency Government

Source: Author's Field Observation, 2024

The establishment of a regional government website aims to ensure that citizens can easily access official information and public services, while also encouraging civic participation in democratic processes through the use of internet-based and emerging technologies. In general, the objectives of developing the Sabu Raijua Government's website align with the government's mission to enhance public service delivery, particularly by ensuring:

- 1) Accessible, accurate, equitable, and wide-ranging information dissemination;
- 2) Electronic distribution of information through online media platforms;
- 3) Availability of all published materials or public-domain documents that the public can legally access;
- 4) Access to official information and documents produced or collected in accordance with national laws, while considering commercial sensitivity and privacy protection; and
- 5) Publication of public-interest documents to support community needs and transparency.

However, field findings indicate that the official website of Sabu Raijua Regency is not regularly updated, and several key online services are either inactive or unavailable. It has resulted in limited transparency of public information and minimal opportunities for public interaction. For example, certain SPBE-related service features remain inaccessible or non-functional, as illustrated in the figure below.

This condition highlights a significant gap between the existence of digital infrastructure and its operational effectiveness in promoting open government and interactive public engagement. Strengthening the maintenance, content management, and interactivity of the regional government's website is thus crucial to improving the implementation of SPBE and realizing a more transparent, participatory, and citizen-oriented digital governance system in Sabu Raijua Regency.

An effective government website constitutes one of the key strategies for any organization engaged in online information and service delivery. Proper website management requires seamless integration between electronic publishing units and local government departments, ensuring that all relevant materials are accurately and consistently presented through the official website. In developing such a platform, it is essential to clearly define management tasks, allocate responsibilities, and ensure that all parties involved understand their respective roles to guarantee effective and sustainable operation of the site.

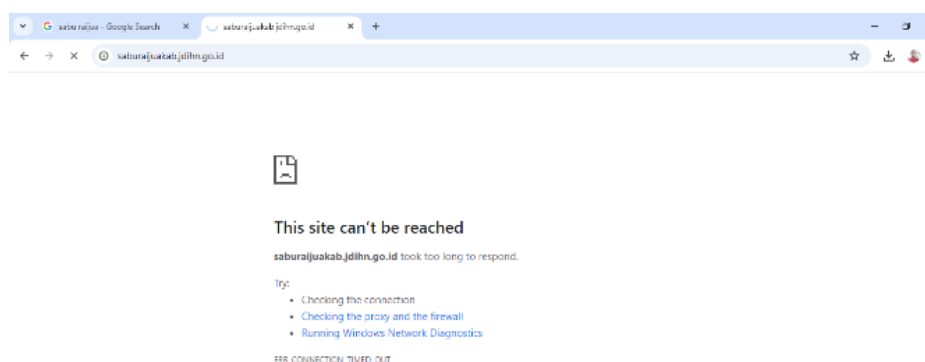


Figure 2. *Official Website/Homepage of the Sabu Raijua Regency Government Showing SPBE Services Inaccessible to the Public*
Source: Author's Field Observation, 2024

Within the SPBE application dimension, two categories of functional applications have been identified as indicators of maturity in digital governance for the Sabu Raijua Regency Government:

- 1) Functional Applications for Public Services
- 2) a. Availability of applications that facilitate direct public service delivery.
- 3) b. Existence of applications designed to enhance accessibility and service efficiency for the public.
- 4) c. Utilization of these functional service applications in accordance with established Standard Operating Procedures (SOPs) to ensure reliability, consistency, and accountability in digital public service delivery.
- 5) Functional Applications for Administration and General Management
- 6) a. Availability of applications that support internal administrative and managerial functions within the government.
- 7) b. Existence of systems designed to streamline interdepartmental coordination and internal workflows.
- 8) c. Effective use of these administrative and management applications following established SOPs, promoting efficiency, data accuracy, and transparency in government operations.

Despite the establishment of such frameworks, field observations revealed that several SPBE service applications remain inaccessible or underutilized. It not only limits public participation and access to services but also undermines the broader goals of transparency and digital efficiency. Consequently, enhancing application functionality, interoperability, and user accessibility is vital for advancing SPBE implementation and realizing an integrated, service-oriented digital governance system in Sabu Raijua Regency.

Based on field observations, the implementation of SPBE in Sabu Raijua Regency includes two main types of functional applications: those serving public service functions and those supporting administrative and general management functions. However, several applications were found to be offline or under maintenance, limiting their operational effectiveness and accessibility to the public.

This finding aligns with Bhatt (2025), who notes that rural areas and low-income communities often lack access to adequate internet or digital devices. Although digital government applications are designed to improve information quality and public services, their suboptimal implementation can, in practice, impede both objectives.

In Sabu Raijua, many government digital applications remain poorly known or inadequately publicized, resulting in low public utilization. The limited outreach and lack of user awareness mean that citizens are often unfamiliar with available digital services.

Furthermore, the features and systems of existing applications are not fully optimized; many require additional functionalities, system upgrades, and content updates to ensure that information remains relevant and accessible.

Table 6. *List of SPBE Services in Sabu Raijua Regency (Condition as of June 21, 2024)*

NO	Domain Layanan SPBE	Alamat Akses
I	Layanan Administrasi Pemerintahan Berbasis Elektronik	
1	Layanan Perencanaan	https://sipd-ri.kemendagri.go.id/
2	Layanan Penganggaran	https://sipd-ri.kemendagri.go.id/
3	Layanan Keuangan	https://sipd-ri.kemendagri.go.id/
4	Layanan Pengadaan Barang dan Jasa	http://lpse.saburajaukab.go.id/eproc4/
5	Layanan Kepegawaian	https://mysapk.bkn.go.id/
6	Layanan Kearsipan Dinamis	https://srikandi.arsip.go.id
7	Layanan Pengelolaan Barang Milik Negara / Daerah	SIMDA BMD *
8	Layanan Pengawasan Internal Pemerintah	https://eauditee.bpk.go.id/
9	Layanan Akuntabilitas Kinerja Organisasi	https://esr.menpan.go.id/
10	Layanan Kinerja Pegawai	https://kinerja.bkn.go.id/
II	Layanan Publik Berbasis Elektronik	
1	Layanan Pengaduan Pelayanan Publik	https://www.lapor.go.id/
2	Layanan Data Terbuka	https://www.sipd.go.id/run2/
3	Layanan Jaringan Dokumentasi dan Informasi Hukum (JDIH)	https://saburajaukab.jdih.go.id/ **
4	Layanan Kependudukan	https://web.dukcapil.kemendagri.go.id/
5	Layanan Informasi Publik	http://ppid.saburajaukab.go.id/
6	Layanan Perijinan	https://oss.go.id/

Note: Desktop applications are not yet online; Applications currently under maintenance.

Source: Department of Communication and Informatics, Sabu Raijua Regency, 2024

Several key structural factors contribute to this issue. Budget constraints, limited human resources in technology, and inadequate server infrastructure have resulted in frequent service interruptions and unresponsive systems. Compounding this, unstable electricity supply poses an additional challenge. As of July 2024, Sabu Raijua's electrification rate stood at 73.65% of 26,695 households, which remains below the national average of 90%. Even this figure reflects quantitative availability only, qualitatively, the power supply is often unstable or entirely unavailable in certain areas.

As a 3T region (underdeveloped, frontier, and outermost), Sabu Raijua's population is also less familiar with digital technologies, often preferring manual service channels. Consequently, the adoption of digital applications has had a limited impact on improving service quality.

This problem stems from a combination of factors, including weak governance, limited capacity building, persistent digital divides, and rigid policy implementation. The quality of digital information and services largely depends on effective digital governance. Weak governance, such as the absence of accessibility standards, lack of transparency, and poor inter-agency coordination, often results in inefficient digital systems, inaccurate information, and unresponsive services (Puentes-Poloche et al., 2023).

Moreover, non-adaptive policies, unclear regulations, and minimal monitoring and evaluation mechanisms (Adni et al., 2024) have further exacerbated these challenges. The lack of systematic training and professional development among government employees has limited their ability to manage, maintain, and develop digital applications effectively (Septory & Andarwati, 2023). It leads to data entry errors, delayed responses to technical issues, and low-quality digital content.

Strengthening human resource capacity and promoting cross-sectoral collaboration are, therefore, crucial for achieving sustainable digital transformation. Without robust governance, comprehensive capacity building, adaptive policy frameworks, and targeted digital inclusion

efforts, digital applications in 3T regions risk exacerbating information quality issues, reducing service efficiency, and widening regional disparities.

Ultimately, poor user experiences and digital exclusion can erode public trust and participation in digital government initiatives (Kim & Lee, 2024; Dolganova & Vasilevskaya, 2022). Hence, optimizing governance structures, capacity development, and policy adaptability, alongside strategic efforts to bridge the digital divide, is vital to ensure that digital government applications truly enhance, rather than hinder, the quality and inclusivity of public services.

Recommendations for Improving SPBE Implementation in the 3T Region of Sabu Raijua Regency

The research findings reveal that the main challenges in implementing the Electronic-Based Government System (SPBE) in Sabu Raijua Regency, a region classified as 3T (underdeveloped, frontier, and outermost), are concentrated in four key areas: policy and regulation, institutional structure and governance, infrastructure, and application systems. Based on these findings, the following table summarizes the current conditions and proposed improvements to strengthen digital governance and accelerate bureaucratic transformation in the region.

Table 7. Findings and Recommendations for Improving SPBE Implementation in Sabu Raijua Regency

Indicator	Current Condition	Proposed Improvement
Policy and Regulation	a. Fragmented and sectoral implementation according to national laws. b. Existing policy references include: <i>Piagam Kartika</i>, ICT Evaluation Guidelines, National ICT Governance Guidelines, and Interoperability Framework. c. Local regulation: <i>Regent Regulation No. 19/2024 on SPBE Implementation in Sabu Raijua Regency</i>.	a. Consolidate planning and clarify accountability mechanisms; ensure vertical, horizontal, and longitudinal integration. b. Strengthen authentication, interoperability, privacy, and security standards. c. Develop a comprehensive Masterplan (Strategic Plan). d. Formulate a detailed Blueprint (Architecture Plan). d. Prepare Technical Guidelines (Juklak and Juknis). e. Design adaptive policies tailored for 3T regions to reduce the digital divide.
Institutional Structure and Governance	a. Dispersed and inconsistent institutional setup. b. Suboptimal coordination despite having strategic authority. c. Limited human resource capacity.	a. Strengthen institutional coordination and governance compliance. b. Establish a centralized coordination hub (e.g., PPID or GCIO). c. Implement systematic organizational and individual capacity building programs.
Applications	a. Operate independently, with some intellectual property owned by private developers. b. Overlapping use of state budgets across departments for similar applications. c. Lack of sustainability. d. Outdated information and poor content management.	a. Gradual optimization and integration of existing systems. b. Apply multi-year budgeting for development and maintenance. c. Ensure application sustainability. d. Establish regular information and content updates.

Indicator	Current Condition	Proposed Improvement
Infrastructure and Suprastructure	a. Inefficient budget utilization. b. Infrastructure underused. c. Bureaucratic culture remains paper-based. d. Limited electricity and network availability.	a. Promote cost-efficient budgeting. b. Maximize infrastructure utilization. c. Encourage a paperless bureaucratic culture. d. Improve the supply and stability of electricity and network signals.
Human Resources (HR)	a. IT staff often misplaced in non-technical roles. b. Inadequate IT competence. c. Limited number of IT personnel. d. Absence of cybersecurity (cryptography) officers, affecting data protection.	a. Assign IT personnel appropriately according to expertise. b. Enhance digital skills through technical training and certification. c. Recruit additional IT professionals. d. Hire and train cybersecurity specialists to safeguard government data.
Information Security	a. Vulnerable due to open security gaps. b. No guarantee of data authenticity or public information integrity. c. Absence of responsive incident-handling protocols. d. Dependence on external systems and actors.	a. Strengthen integrated security systems (physical and logical). b. Ensure data authenticity and identity verification. c. Establish a rapid incident response mechanism. d. Prioritize internal institutional control before engaging in external technical engineering.
Major Barriers to SPBE in Sabu Raijua	a. Fragmented planning, budgeting, and collective legal responsibility. b. Lack of bureaucratic transformation and digital work culture. c. Functional integration without structural authority alignment. d. Low adaptability to local 3T conditions.	a. Formulate adaptive SPBE policies for 3T regions. b. Develop a collaborative and adaptive digital architecture model. c. Promote bottom-up approaches in policy and system design. d. Strengthen local bureaucratic capacity to sustain digital operations. e. Consolidate planning and budgeting to clarify administrative and collective accountability. f. Transform bureaucratic culture from manual to digital practices. g. Allow distributed system management while ensuring integration and interoperability. h. Establish a fully integrated SPBE ecosystem.

Source: Author's Analysis Based on Research Findings, 2024

These recommendations emphasize that effective SPBE implementation in 3T regions such as Sabu Raijua requires not only technological intervention but also policy coherence, institutional restructuring, capacity building, and cultural change within the bureaucracy. The success of digital governance hinges on collaborative leadership, adaptive policy frameworks, and continuous investment in human capital and infrastructure, ensuring that the transition toward a digital bureaucracy is inclusive, efficient, and sustainable.

CONCLUSION

The implementation of the Electronic-Based Government System (SPBE) in 3T regions (underdeveloped, frontier, and outermost areas), such as Sabu Raijua Regency, faces significant challenges across four key dimensions: policy, institutional capacity, infrastructure, and applications. These challenges have a direct impact on the effectiveness of digital bureaucracy and the quality of public services. From the policy perspective, SPBE implementation requires clear and coherent regional regulations that are harmonized with national policies to ensure effective digital governance. However, in Sabu Raijua Regency, the absence of a strong legal framework and insufficient political will has hindered progress in this dimension. In terms of institutional structure, the lack of a solid organizational framework, limited human resource competence in both quality and quantity, and weak inter-agency coordination have constrained the effectiveness of the regional SPBE coordination team, resulting in fragmented management and poor governance of SPBE. Regarding infrastructure, limited internet connectivity, inadequate ICT equipment, and insufficient budgets for procuring and maintaining SPBE infrastructure remain major obstacles in 3T regions, such as Sabu Raijua. These limitations significantly restrict access to and utilization of SPBE systems. On the application dimension, non-integrated and partially developed applications that do not align with local needs, combined with low digital literacy among civil servants and the general public, have resulted in suboptimal and underutilized digital services. To address these issues, it is essential to enhance governance frameworks, strengthen human resource capacity, develop adaptable policies tailored to local contexts, and actively reduce the digital divide to ensure an inclusive and sustainable digital transformation in public administration.

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