




Transforming Governance: Indonesia's Digital Leap from Bureaucracy to Big Data in the Era of Society 5.0

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Abstract. This paper explores Indonesia's digital transformation of public services through the lens of Society 5.0, a human-centered approach integrating advanced technologies like Big Data and Artificial Intelligence (AI) to enhance quality of life. The Sistem Pemerintahan Berbasis Elektronik (SPBE) and Kebijakan Satu Data (One Data Policy) are central to this transformation. The SPBE aims to create an interoperable electronic government system that improves communication, service delivery, and efficiency, tackling challenges such as bureaucratic inefficiency and limited access to remote areas. Aligned with Society 5.0's goals, these policies foster innovation and integrate technology into daily life, enhancing governance, decision-making, and operational efficiency. This paper applied a qualitative approach. As a result, this paper addresses significant challenges, including high implementation costs, system integration issues, and cybersecurity risks. It recommends enhancing system integration, investing in human capital, improving cybersecurity measures, and optimizing the technology budget to overcome these hurdles. These steps are crucial for Indonesia's digital advancement and provide valuable insights for other countries. The paper emphasizes the need for a unified digital strategy to improve public service quality, transparency, and accountability..

Keywords: Digital Transformation, Society 5.0, SPBE, and Kebijakan Satu Data.

1 Introduction

Society 5.0 is a concept developed by the Japanese government in response to the rapid advancement of digital technology and the global challenges of the 21st century. Unlike previous revolutions, Society 5.0 focuses on integrating smart technologies such as artificial intelligence (AI), the Internet of Things (IoT), and big data to create a human-centered society. This is because the vision of Society 5.0 requires us to reframe two kinds of relationships: the relationship between technology and society and the technology-mediated relationship between individuals and society [1] Unlike Society 4.0, which focuses on the creation of smart factories, Society 5.0 aims to develop a super-smart society. Therefore, while the scope of Cyber-Physical Systems (CPS) implementation in Society 4.0 is concentrated in the manufacturing sector to create new value and reduce production costs, Society 5.0 applies CPS across all

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aspects of society to build a highly intelligent community, with much more complex success metrics [2].

Digital transformation has become an inevitable trend, with Information and Communication Technology (ICT) now embedded in various aspects of service delivery business and operational processes [1]. Across the globe, both public and private sector organizations are leveraging digital tools to improve efficiency and adaptability in response to rapidly changing societal demands. In Indonesia, this shift is exemplified by adopting the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik or SPBE), which aims to enhance public services through ICT integration across different government levels.

The SPBE framework operates in multiple contexts, including G2G (Government-to-Government) for services between central and regional governments; G2E (Government-to-Employee) for services targeting government employees; G2C (Government-to-Citizen) for public services; and G2B (Government-to-Business) for services provided to the business sector[3], [4]. The COVID-19 pandemic has underscored the importance of SPBE by necessitating a shift to digital public services in areas such as taxation, civil administration, healthcare, immigration, licensing, and education [5].

SPBE not only aims to maintain the effectiveness and efficiency of service delivery but is also assessed through the E-Government Development Index (EGDI), which measures the digital performance of governments globally. Over the past three years, Indonesia has made significant strides in the EGDI, reflected in improvements in the Human Capital Index (HCI), Online Service Index (OSI), and Telecommunication Infrastructure Index (TII) [6].

According to the UN DESA survey, published every two years, Indonesia improved its E-Government Development Index (EGDI) ranking from 88th in 2020 to 77th in 2022. This rise reflects Indonesia's progress in enhancing its digital government capabilities, including better online services, improved telecommunications infrastructure, and stronger human capital development.

While this advancement demonstrates Indonesia's commitment to digital transformation, further efforts are needed to expand digital access, strengthen cybersecurity, and reduce the digital divide. Overall, the improved ranking underscores Indonesia's strides towards creating a more efficient, inclusive, and digitally empowered government. This progress also highlights the critical role of digital transformation in fostering a more dynamic and adaptive public administration capable of meeting contemporary societal needs.

Nevertheless, this effort is necessary given the achievements of neighboring countries in the 2022 EGDI rankings, with Singapore at 12th, Malaysia at 53rd, and Thailand at 55th. [6]

2 Method

This research applied qualitative methods, which align with the scope of this research in public policy and public administration studies. Since this research generates data from existing literature, including policies and how those policies are implemented, the data analysis uses a qualitative approach, specifically by describing and explaining[7]. The techniques employed include a literature review and a documentary analysis of policies[8]. These two techniques complement each other in qualitative research. A literature review provides a theoretical framework for understanding the topic, while a documentary analysis offers empirical evidence about how policies or practices are implemented.

3 Result and Discussion

3.1 Digital Transformation on Policy Framework: Smart Society, Big Data and Online Services

Digital transformation has become a primary policy focus in Indonesia's National Medium-Term Development Plan (RPJMN) 2020-2024, particularly in strengthening ICT infrastructure. To this end, the Indonesian government and the private sector have developed regulations such as Law Number 25 of 2009 on Public Services and Presidential Regulation Number 95 of 2018 on Electronic-Based Government Systems (SPBE)[9]. Furthermore, the architecture of SPBE is regulated in Presidential Regulation Number 132 of 2022, which is reinforced by Presidential Regulation (Perpres) Number 39 of 2019 on One Indonesia Data[10].

Referring to Presidential Regulation Number 132 of 2022, it is stated that digital transformation in government is now necessary for efficiently managing governmental affairs. Implementing New Ways of Working (NWow) is essential for fostering a digital work culture that supports administrative functions in the Capital City of Nusantara. This initiative is part of the effort to achieve a Smart City, focusing on six key aspects: Smart Government, Smart Mobility, Smart People, Smart Living, Smart Environment, and Smart Economy.

Additionally, it is explained that the Electronic-Based Government System (SPBE) catalyzes national development. Therefore, the SPBE architecture is developed as a critical tool for executing government business processes in five key areas: policy directions and strategies; the National SPBE Architecture Framework; National SPBE Architecture References; National SPBE Architecture Domains; and strategic initiatives for the National SPBE Architecture.

The SPBE is developed to support basic services, which include education, health, public works, spatial planning, public housing, public order and safety, and social services. Thus, it is envisioned as "Government as a Platform" (GaaP). Consequently, the SPBE will be synchronized with the one data policy, moving towards implementing Big Data and artificial intelligence for government purposes.

As a concept developed to respond to the rapid evolution of digital technology, Society 5.0 has significant potential to drive substantial social change. "Smart society" is defined as: "A society that is capable of leveraging the potential of digital technology and connected devices, as well as utilizing digital networks to enhance the quality of life for its people" [11]. The super-smart society concept within Society 5.0 envisions a community where intelligent technologies are seamlessly integrated into daily life, creating more intelligent, interconnected, and responsive systems. With deep technology integration, society can benefit from more efficient solutions, improved accessibility, and personalized services [12].

The trend of smart society across various countries reflects how smart technology is integrated into different aspects of life to enhance quality and efficiency. Many European cities, such as Amsterdam and Barcelona, are developing smart cities focusing on sustainability and quality of life [13]. Japan is implementing smart cities emphasizing smart mobility, digital health, and smart security systems [14]. Singapore is known for its Smart Nation initiative, which focuses on applying technology to improve urban living. This initiative includes the development of digital infrastructure such as smart grids, smart transportation systems, and digital health services. Singapore also utilizes big data for city planning and traffic management and implementing smart technology in security and public services [15].

As Indonesia moves towards becoming a smart society, it is essential to reflect on the country's Human Development Index (HDI). According to the 2024 UNDP data, Indonesia falls into the "High Development" category, ranking 112th globally. This position places Indonesia just above the Philippines but significantly behind Singapore (ranked 9th), Brunei Darussalam (55th), Malaysia (63rd), and Thailand (66th).[16]

The HDI is determined by three key dimensions: a long and healthy life, access to knowledge, and a decent standard of living. It is calculated as the geometric mean of normalized indices for these dimensions.

The health dimension is measured by life expectancy at birth. The education dimension is assessed by the average years of schooling for adults aged 25 and older, along with the expected years of education for children starting school. The standard of living dimension is evaluated using gross national income (GNI) per capita. To reflect the diminishing marginal returns of income, the HDI incorporates a logarithmic scale for GNI. A geometric mean combines These three indices into a single composite index. [16], [17]

Understanding Indonesia's current position on the HDI is crucial for guiding its efforts to become a more advanced and equitable smart society supported by digital transformation.

Reflecting on the HDI, it is also important to consider the state of human resources, institutions, and public service infrastructure within the E-Government Development Index (EDGI) framework. The EDGI utilizes three main dimensions: the Human Capital Index (HCI), which assesses human resource capabilities; the Online Service Index (OSI), which evaluates the quality and availability of public online services; and the Telecommunication Infrastructure Index (TII), which measures the development and accessibility of telecommunication infrastructure.

The table below shows Indonesia's EDGI performance over the past four years, providing insights into the progress and challenges in enhancing digital governance and public services.



Fig. 1. EDGI Indonesia 2018-2022

3.2 SPBE as Key for Digital Transformation

Digital transformation in the Indonesian government sector has become a crucial part of improving public service efficiency, transparency, and accountability. This endeavor involves the implementation of various service models, including G2G (Government to Government), G2E (Government to Employee), G2C (Government to Citizen), and G2B (Government to Business). However, despite the promising benefits of this transformation, several challenges have emerged alongside the introduction of approximately 27.400 platforms or service applications spread across various government agencies [18], [19].

The implementation of SPBE also indicates bureaucratic reform, especially through the declaration of Integrity Zones (ZI), promoting the transformation of services from manual to electronic or digital-based across central and regional governments. Implementing Electronic-Based Government Systems (SPBE) also serves as an indicator in the Governance Area of Integrity Zones, encouraging central and regional government agencies to transform services from manual to electronic or digital-based[4].

The presence of several SPBEs has several benefits and challenges. The benefits include work efficiency and accuracy: Digitalization has enabled tasks to be performed more quickly and accurately. Processes that previously took a long time and were prone to manual errors can now be completed in seconds with minimal human intervention. For example, implementing e-government for public services such as licensing and civil administration has reduced service times from several days

to just a few hours or even minutes. This improves operational efficiency and public satisfaction.

Transparency and Accountability: Service processes have become more transparent and measurable through digitalization. Digital data that is automatically recorded facilitates monitoring and auditing, minimizing potential corruption and administrative errors. For instance, the e-procurement system implemented by the National Public Procurement Agency (LKPP) has increased the transparency of government goods and services procurement processes.

Cost Savings in the Long Term: Although initially requiring significant investment, digitalization can reduce long-term operational costs. For example, reducing the costs of printing physical documents, decreasing the need for archive space, and improving workforce efficiency.

Otherwise, the presence of SPBE also brings emerging challenges, namely **High Costs:** Developing, maintaining, and operating around 27.000 platforms or service applications certainly requires substantial costs of around IDR 6,2 trillion [19]. The government budget for information technology covers investments in hardware, software, training, and operational costs such as cybersecurity and system maintenance. These costs are sometimes higher than the short-term benefits gained, especially if the platforms are not well-integrated.

Suboptimal System Integration/Interoperability. The numerous platforms and applications spread across various agencies often lack proper integration, resulting in data duplication and inefficiencies in information management. This also causes difficulties in data sharing across agencies, making public services less responsive to the community's needs[20], [21].

Human Resources (HR) Quality Gap. There remains a significant gap in human resources involved in the digitalization process both at the policymaker level and the operational level. According to the Ministry of Communication and Information Technology data, most government employees still require additional training to operate digital applications effectively. Moreover, there is a gap between employees' technical skills and evolving technological needs.[18], [19]

Data Security and Privacy. The increase in digitalization brings new risks related to data security and privacy. According to data from Astra Security, there are expected to be around 2,600 cyber-attacks per day in 2024, leading to global losses of up to 9.5 trillion USD. These losses are projected to rise to 10.5 trillion USD by 2025, as reported by Cyber Security Francers. In addition, data from AwanPintar.id., part of Prosperita Group, a group of companies that are concerned with digital security through a series of methodologies for collecting and analyzing data on accumulated cyber-attacks in the first semester of 2024, namely 158 attacks per second, 9.537 per minute, 572.226 per hour and 13.733.440 per day.[22][23]. If extrapolated, there were 2.499.486.085 attacks during the first semester of 2024. Compared to the same semester last year, at 347.172.666. these attacks increased by 619.95%, or more than 6 times over.[22], [23].

3.3 Needs for Improvement Efforts and Future Strategies

To address these challenges, the Indonesian government must take several strategic steps: 1) Strengthening System Integration by developing standards for interoperability and system integration between different applications to facilitate data sharing and improve efficiency. 2) Investing in Human Resource Development by conducting intensive and continuous training to enhance the technical skills of government employees in managing digital applications. 3) Enhancing Cybersecurity by adopting more advanced technologies and policies to protect public data from cyber threats. 4) Optimizing the Technology Budget by re-evaluating budget allocations to ensure that digital investments generate optimal value for society and the government.

With this approach, it is hoped that the digitalization of public services can indeed provide maximum benefits to all levels of society in Indonesia.

4 Conclusion

Indonesia's digital transformation, driven by policies like the Electronic-Based Government System (SPBE) and One Indonesia Data, aims to improve public services through greater efficiency, transparency, and accountability. These initiatives enhance critical sectors like education, health, and infrastructure by streamlining processes with digital platforms.

The benefits include faster, more accurate services, reduced costs, and improved transparency. For instance, digital systems for licensing and procurement have significantly shortened processing times, increased accountability, and provided real-time tracking of applications, thereby enhancing transparency.

However, challenges remain. High costs are a key issue, with over 27,000 government platforms requiring significant investment. Many of these systems lack integration, leading to data duplication and inefficient information sharing across agencies, which limits service effectiveness.

There is also a skills gap among government employees, who need training to manage digital systems effectively. This gap slows the realization of digital transformation's full potential. Cybersecurity risks are another concern, as increased digitalization exposes public data to potential threats. The government must focus on system integration, invest in employee training, strengthen cybersecurity, and optimize technology budgets to overcome these challenges. By doing so, Indonesia can fully leverage digital transformation to create a more efficient, transparent, and secure public service system for its citizens.

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