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## Smart Village Concept And Improvement Of Public Services In Indonesia

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**Abstract:** The *Smart Village* concept in Indonesia seeks to integrate information and communication technology (ICT) into rural development to enhance public service efficiency, community empowerment, and overall quality of life. This study adopts a qualitative descriptive approach through document analysis to explore the implementation of *Smart Village* initiatives as a strategy to reduce disparities between urban and rural areas. Key challenges identified include infrastructure gaps, limited digital literacy, budget constraints, resistance to change, and data security concerns. Successful case studies such as Banyuwangi's *Smart Kampung*, public-private partnerships in Pangandaran, and the adoption of telemedicine and *e-learning* platforms illustrate significant improvements in administrative efficiency, transparency, healthcare access, education, and local economic empowerment. The findings emphasize the importance of multi-stakeholder collaboration involving government, private sector, academia, and communities to overcome these barriers. Furthermore, the study outlines the phased process of digital transformation in public services: digitization, digitalization, integration, and intelligent governance, exemplified by initiatives such as e-KTP, the Village Information System (SID), and the One Data Indonesia portal. Policy frameworks including the National Electronic-Based Government System Architecture (SPBE) and the Digital Village Movement are identified as critical enablers. Ultimately, equitable infrastructure, comprehensive digital literacy, secure data governance, and sustainable funding models are essential to scale *Smart Village* initiatives nationwide, fostering inclusive and sustainable rural development.

**Keyword:** Smart Village; Public Services; Rural Development; Digital Literacy; Infrastructure Gap

### INTRODUCTION

Digital transformation has brought fundamental changes to various aspects of life, including rural development through the Smart Village concept. This concept aims to integrate information and communication technology (ICT) into village development to enhance the efficiency and effectiveness of public services, as well as improve the quality of life in rural

communities. In Indonesia, developing Smart Village models has become one of the government's priorities in efforts to reduce the development gap between urban and rural areas.

According to (Ella, S., & Andari, 2018), the implementation of Smart Villages seeks to strengthen rural community empowerment by providing broader access to technology and information. This enables communities to participate more actively in decision-making processes, while village governments can enhance transparency and accountability in public services. A case study in Banyuwangi conducted by (Aziiza, A. A., & Susanto, 2020) demonstrated that applying the Smart Village concept has had positive impacts across various sectors, including education, health, and the local economy.

Furthermore, in the context of improving public services, technology-based innovation has become one of the key factors in bureaucratic reform. (Cahyati, 2023) emphasizes the importance of developing digital public services to improve the quality and efficiency of government administration. Research by (Sulistya, A. Q. W., Sulistiyo, B. B., Aditya, F., Aritonang, I. D., Simangunsong, S. A., Shihab, M. R., & Ranti, 2019) also shows that implementing e-government can enhance public service efficiency and accelerate responses to community needs.

With more than 83,000 villages spread across the archipelago, Indonesia faces unique challenges in implementing the Smart Village concept. The diversity of socio-economic conditions, infrastructure, and technology access in each village requires tailored approaches to ensure the success of digital transformation at the rural level.

According to data from (Indonesia, 2019), Indonesia has 74,953 rural villages and 8,488 urban villages, totaling 83,441 administrative areas at the village level. The Ministry of Villages, Development of Disadvantaged Regions, and Transmigration recorded a significant increase in the number of independent villages from 174 in 2014 to 17,207 in 2024. However, according to goodstats.id, there are still 3,920 villages categorized as very underdeveloped, indicating disparities that must be addressed in rural development.

One of the main challenges in implementing Smart Villages in Indonesia is the technological infrastructure gap. While some villages have adequate internet access, many others still face basic infrastructure limitations such as electricity and stable telecommunications networks. These constraints hinder the effective implementation of digital technologies and limit opportunities for villages to adopt digital-based services that could improve the quality of public services and the local economy.

In addition, low digital literacy also becomes a barrier to transforming villages into smart villages. The lack of knowledge and skills in using technology among rural communities has made many digitalization programs less effective in their execution. Therefore, intensive education and training programs are needed to improve the digital literacy of rural communities so that they can fully utilize technology in their daily lives.

Another challenge to be addressed is the limited budget for Smart Village development. Implementing this concept requires significant investment, particularly for infrastructure procurement and technology development. However, many villages face budget constraints, making it difficult to realize the Smart Village concept optimally. Therefore, financial support from the central government and private sector through sustainable funding schemes is essential.

Indonesia, as a country with a large number of villages and diverse socio-economic conditions, has its own challenges and opportunities in implementing the Smart Village concept. Therefore, more in-depth research is needed to examine current conditions, the challenges faced, and the most suitable strategies to accelerate the development of technology-based villages to improve public services comprehensively.

## METHOD

This study employs a documentation review method, with data collected through a literature review of various secondary sources, including books, scientific journals, government policy documents, and research reports relevant to the implementation of Smart Villages and the digitalization of public services. The data sources include official government documents, such as the 2022 Electronic-Based Government System (SPBE) Roadmap, as well as academic references from previous studies on e-government, technological infrastructure, and digital-based village governance. (Krippendorff, 2018).

The collected data were analyzed using content analysis to identify key themes, patterns, and relationships among variables related to the challenges and strategies in implementing the Smart Village concept in Indonesia. Correlation testing was not applied in this study due to its qualitative and descriptive nature. Instead, the research adopts a systematic approach to interpreting information from diverse documents in order to gain a comprehensive understanding of the phenomenon under investigation. (Creswell, 2023)

## RESULTS AND DISCUSSION

### RESULTS

Similar to the development of Smart Cities, the implementation of Smart Villages faces a range of complex challenges. According to (Niewiadomska, 2023), the main challenges in developing smart villages include legal, social, and economic aspects. In the Indonesian context, these challenges are more specifically related to:

#### Technological Infrastructure Gap

One of the main challenges in implementing Smart Villages in Indonesia is the technological infrastructure gap. While some villages already have adequate internet access, many others still face limitations due to unstable electricity and telecommunication networks. Data from (Indonesia, 2019) shows that around 12,000 villages remain without electricity and internet services, or about 16% of the total 74,961 villages. The 2020 BPS report also recorded 13,577 villages without internet access, which hampers communication, information flow, as well as economic and educational development in those areas. This condition clearly obstructs the optimal use of digital technology and limits opportunities for villages to develop digital-based services.

To address this gap, the government has allocated budget subsidies (DPJB from the Ministry of Finance) to strengthen digital infrastructure in remote areas. The Digital Village Program initiated by the Ministry of Communication and Information Technology (Kominfo) also aims to bring technology to more than 12,000 villages across the archipelago (Kementerian Komunikasi dan Informatika Republik Indonesia, 2020). (Angelakis, V., Tragos, E., Pappas, N., Papadakis, S., & Siris, 2017) emphasize that strong digital infrastructure is the foundation of successful digital transformation, making investment in broadband networks and internet expansion a priority. However, geographical factors and limited human resources in remote areas often increase costs and complexity. Therefore, collaboration between government, the private sector, and local communities is essential to accelerate equitable and sustainable digital infrastructure development in Indonesia.

#### Low Digital Literacy

Beyond infrastructure issues, low digital literacy is a major obstacle in transforming villages into Smart Villages. The lack of knowledge and skills among rural communities has made many digitalization programs ineffective. A 2021 survey showed that only 49.8% of rural

residents had high digital literacy, lower than 52.5% in urban areas. The Indonesian Digital Literacy Index (2022) also recorded a score of 3.54 out of 5.00 (medium category).

To overcome this, intensive education and training are needed for both village officials and communities. Successful examples include training in Cimanggu Village, which improved residents' understanding of social media and hoaxes, and the program by Muhammadiyah University of Surakarta (UMS) in Regunung Village, which supported MSMEs and enhanced community digital skills. Collaboration among government, academia, and communities is key to enabling rural populations to fully utilize technology.

### **Budget Constraints**

In addition to infrastructure and literacy challenges, budget limitations are a significant barrier to Smart Village development. The concept requires large investments in infrastructure and technology, while many villages have limited funds. The government allocated Rp25 trillion in 2022 and Rp71 trillion in the 2025 state budget, but these amounts remain insufficient.

An effective solution is government–private sector partnerships through Public-Private Partnership (PPP) schemes. A concrete example can be seen in Pangandaran, where collaboration with PT Telkom Indonesia resulted in Smart Government, Smart Economy, and Smart Society programs. Literature also highlights the importance of cross-stakeholder collaboration among government, private sector, and academia to overcome budget constraints and achieve sustainable Smart Villages in Indonesia.

### **Resistance to Change**

Beyond technical and financial challenges, cultural and traditional resistance is a major obstacle in Smart Village implementation. Communities accustomed to traditional systems are often slow to accept digitalization. (Kumar, 2015) notes that cultural factors and lack of trust in technology can trigger rejection.

Solutions include demonstrating the tangible benefits of technology (such as telemedicine and digital education), involving community leaders and local figures in outreach, and providing comprehensive digital literacy training. With a combination of education, empowerment, and community involvement, resistance can be minimized. Collaboration between government, private sector, and local communities is crucial to ensure smooth and widely accepted Smart Village transformation.

### **Data Security and Privacy**

Beyond technical and financial challenges, protecting citizens' personal data is a critical aspect of village digitalization. Managing resident data requires policies that prevent misuse of information. Angelakis et al. (2017) stress that information system security is key to successful digital services, while the SPBE Roadmap (2022) and Presidential Regulation No. 132 of 2022 mandate the implementation of data security standards across all institutions, including villages.

Measures include implementing a Secure Village Information System (SID) with encryption and authentication, providing digital security training for village officials, and establishing local data protection policies. With these strategies, villages can build a safe and trustworthy digital ecosystem, supporting the sustainability of Smart Village implementation.

### **Collaboration between the Public and Private Sectors**

Smart Village development in Indonesia requires close collaboration between the public sector, private sector, and communities to ensure program sustainability and improve the

quality of public services in rural areas. Such partnerships enable the pooling of resources, expertise, and innovation from various stakeholders to achieve common goals.

- a. Private Sector: Plays a role in providing technological infrastructure, developing innovative services, and offering technology-based solutions. The involvement of technology companies can accelerate digital transformation in villages through hardware, software, and training.
- b. Government: Functions as a policy facilitator and regulator supporting the digital village ecosystem. The government can issue policies to encourage technology investment in rural areas, provide incentives for participating companies, and ensure regulations protect the interests of rural communities.

## DISCUSSION

### Digitalization (Service Automation)

This stage involves the use of technology to improve the efficiency of public services through automation systems. Services that were previously carried out manually are now processed using more efficient digital systems.

Implementation in Indonesia:

The implementation of the *Electronic-Based Government System (SPBE)* in Indonesia aims to enhance the efficiency and quality of public services through the use of information and communication technology. SPBE encourages the integration of government business processes between central and regional agencies, making bureaucracy more connected and responsive. Since the issuance of Presidential Regulation No. 95 of 2018 on SPBE, various efforts have been made to strengthen synergy among agencies in providing integrated digital services.

The 2022 evaluation showed that the National SPBE Index increased to 2.34 out of 5 (fair category), surpassing the annual target of 2.30. In addition, the government has adopted digital services such as E-Samsat for online motor vehicle tax payments, reducing queues and illegal levies, and E-Tilang (E-TLE), which uses surveillance cameras to automatically detect traffic violations, thereby improving transparency and public compliance. At the district level, the Integrated District Administration Service (PATEN) program accelerates bureaucratic processes by providing administrative services in one location, making it easier for citizens to manage ID cards, family cards, and permits. Overall, these initiatives reflect the Indonesian government's commitment to utilizing technology to improve the quality of public services and the efficiency of government administration.

### Digital Transformation (Digital Integration)

Digital service integration has been strengthened through the One Data Indonesia (SDI) Portal, which serves as the official platform for synchronizing and sharing data among government agencies. The portal provides accurate, up-to-date, integrated, and accountable data to support evidence-based policymaking and enhance government transparency.

In addition, the Digital Village Program has been developed to connect rural communities with technology-based services, such as access to e-commerce for local products, online education, and telemedicine.

The use of Artificial Intelligence (AI) and Big Data has also been applied in population data analysis and evidence-based policy planning. Data analytics enables the identification of community needs in real time, ensuring that development programs are more targeted. These efforts also support the growth of the digital economy and the provision of public services that are more responsive to community needs. Overall, integration through SDI, the Digital Village Program, and the application of AI and Big Data reflects the government's strategy to achieve efficient, transparent, and adaptive governance.

## **Intelligent Governance**

The highest stage of digital transformation is intelligent governance, where AI (Artificial Intelligence), IoT (Internet of Things), and Blockchain-based systems are used to create an efficient and responsive public service ecosystem.

Implementation in Indonesia (still in the development stage): The application of advanced technologies is still in progress. One example of AI utilization is the GISA Chatbot, launched by the Ministry of Home Affairs to provide interactive civil administration information through the AKUI application.

In the agricultural sector, the concept of smart farming with IoT has been applied through the Field Monitoring System (FMS), which monitors crop and climate conditions in real time, as well as the use of drones for land mapping and the distribution of fertilizers and pesticides.

Meanwhile, Blockchain is being explored to improve transparency in village financial management. With its decentralized and immutable nature, blockchain has the potential to strengthen public trust in village budget management, although it still requires feasibility studies and adequate infrastructure readiness.

Overall, the integration of AI, IoT, and Blockchain reflects Indonesia's commitment to leveraging digital innovation to improve the quality of public services and the agricultural sector, even though many initiatives remain at an early stage.

## **Implementation of Digital Transformation in Improving Public Services in Indonesia The Role of the Government in Driving Digital Transformation**

The Indonesian government has introduced various policies and programs to accelerate digital transformation in public services. Key initiatives include:

### **1. Presidential Regulation No. 132 of 2022 on the National SPBE Architecture**

This regulation serves as a strategic foundation for the digitalization of bureaucracy and public services. Its objective is to integrate business processes, data, infrastructure, applications, and SPBE security to ensure government services are more efficient, transparent, and accountable. It also emphasizes the importance of cross-agency collaboration, standardized electronic systems, and budget efficiency.

### **2. Digital Village Movement (Ministry of Communication and Information Technology – Kominfo)**

Kominfo promotes digital transformation in rural areas through the Palapa Ring Project (2016–2019), which built a 12,148 km fiber-optic cable network connecting 90 districts/municipalities, including underdeveloped, frontier, and outermost regions (3T). Beyond infrastructure, Kominfo provides technological assistance for village officials, such as the Sideka-NG application for managing financial data, citizen services, and village websites. Collaboration with partners like Puspindes in Pematang Liris has enabled nearly all villages in the region to establish websites as information hubs and digital service platforms.

### **3. Equitable Development of Technological Infrastructure**

The government continues to expand internet access through investments in 4G and 5G networks, particularly in rural areas. Additionally, the establishment of National Data Centers (PDN) in Cikarang (2022), Batam, and the new capital Nusantara aims to consolidate government data, improving efficiency, security, and integration of digital services.

## **Impact of Digital Transformation on Village Public Services**

### **1. Efficiency and Transparency**

Digitalization of village-level public services has enhanced efficiency and accountability. The Smart Kampung application in Banyuwangi allows residents to access

administrative services online, reducing time, costs, and the workload of village officials. Furthermore, the e-budgeting system strengthens transparency in village fund management through real-time reporting, minimizing risks of misuse and encouraging greater community participation in oversight.

## 2. Easier Access to Public Services

Digital technology has expanded access to healthcare and education in rural areas. Telemedicine programs connect local health centers (puskesmas) with referral hospitals, accelerating diagnosis and treatment. The Tele Sehat application enables direct consultations with doctors. In education, platforms such as Rumah Belajar and applications like ICANDO provide online learning resources, although challenges remain due to limited internet access, devices, and digital literacy.

## 3. Digital Economy Empowerment

Marketplaces such as Tokopedia and Shopee create opportunities for rural MSMEs to reach national and global markets. The Proudly Made in Indonesia (BBI) program has encouraged millions of MSMEs to join the digital ecosystem. In agriculture, AI-based agribusiness applications such as TaniHub and RiTx Bertani help farmers manage their businesses using data-driven approaches, increasing productivity and profitability. Nevertheless, challenges such as infrastructure limitations and low digital literacy must be addressed through the Digital Village program and continuous training.

## CONCLUSION

The implementation of the Smart Village concept in Indonesia demonstrates significant potential to enhance bureaucratic efficiency, transparency, and the overall quality of life in rural communities through digital technology. Government policies such as the National SPBE Architecture, the Digital Village Movement, and the establishment of National Data Centers provide a strong foundation for this transformation. However, challenges remain, including infrastructure gaps, low digital literacy, budget limitations, cultural resistance, and data security concerns. Case studies such as Banyuwangi's Smart Kampung, public-private partnerships in Pangandaran, and the adoption of telemedicine, e-learning, and digital marketplaces highlight the tangible benefits of multi-stakeholder collaboration. Ultimately, the success of Smart Village initiatives depends on equitable infrastructure development, improved digital literacy, sustainable funding models, robust data protection policies, and synergy among government, private sector, academia, and local communities to achieve inclusive, adaptive, and sustainable rural development.

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