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Evaluating Village Information System Implementation for Smart Village Development: A Case Study of Pekon Waluyojati, Lampung

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Abstrak

Perkembangan pesat Teknologi Informasi dan Komunikasi (TIK) telah mengubah berbagai sektor, seperti administrasi pemerintahan dan pembangunan daerah. Salah satu inovasi utama adalah konsep Desa Cerdas, yang menggunakan teknologi untuk meningkatkan kualitas hidup, pengelolaan sumber daya, dan partisipasi warga. Salah satu alat penting untuk transformasi ini adalah Sistem Informasi Desa (SID), yang membantu pemerintah desa dalam mengelola data administrasi dan layanan publik, serta mendorong transparansi dan akuntabilitas. Penelitian ini mengkaji implementasi SID di Pekon Waluyojati, Pringsewu, dengan fokus pada tantangan dan potensi manfaat untuk pengembangan Desa Cerdas. Menggunakan desain fenomenologi deskriptif kualitatif, penelitian ini menerapkan Teori Implementasi Van Meter dan Van Horn, yang mengevaluasi standar kebijakan, alokasi sumber daya, komunikasi, dan kondisi sosial-politik. Penelitian menemukan bahwa SID telah meningkatkan pelayanan publik tetapi menghadapi tantangan seperti kekurangan sumber daya manusia, kebijakan yang sudah usang, dan ketidakefisienan komunikasi. Meskipun menghadapi hambatan ini, SID memiliki potensi besar untuk mendorong pembangunan berkelanjutan di daerah pedesaan.

Kata kunci: Sistem Informasi Desa, Desa Cerdas, Pemerintahan, Komunikasi, Kecerdasan Buatan.

Abstract

The rapid advancement of Information and Communication Technology (ICT) has transformed sectors such as government administration and regional development. One key innovation is the Smart Village concept, which uses technology to improve quality of life, resource management, and citizen participation. A critical tool for this transformation is the Village Information System (SID), which helps village governments manage administrative data and public services, promoting transparency and accountability. This study examines the implementation of SID in Pekon Waluyojati, Pringsewu, focusing on the challenges and potential benefits for Smart Village development. Using a qualitative, descriptive phenomenological design, the research applies Van Meter and Van Horn's Implementation Theory, evaluating policy standards, resource allocation, communication, and socio-political conditions. The study finds that SID has improved public service delivery but faces challenges such as insufficient human resources, outdated policies, and communication inefficiencies. Despite these obstacles, SID holds significant potential for driving sustainable development in rural areas.

Keywords: *Village Information System, Smart Village, Government, Communication, Artificial Intelligence*

1. INTRODUCTION

The rapid advancement of Information and Communication Technology (ICT) has significantly transformed various sectors of life, particularly in government administration and regional development. This transformation is reshaping public governance, enhancing efficiency, transparency, and public service delivery [1]. The integration of digital technologies in governance processes is not just about adopting new tools but also about rethinking institutional structures to fully utilize ICT's potential, fostering more agile and responsive governance models [2], [3]. The COVID-19 pandemic has further accelerated the digital shift in governance, making ICT solutions more critical in managing public services and engaging citizens [4], [5].

A significant innovation emerging from ICT advancements is the Smart Village concept, which adapts the principles of Smart Cities to rural areas. Smart Villages utilize technology to enhance quality of life, optimize resource management, and foster active citizen participation in governance [6], [7]. This model leverages ICT to improve governance, community engagement, and local economic

development, offering a sustainable alternative to urban migration by empowering rural communities [8]. The Smart Village framework focuses on key dimensions like resources, institutions, technology, service chains, and sustainability, aiming to improve the overall living standards in rural areas [9].

At the core of this transformation is the Village Information System (SID), a technology-driven platform designed to assist village governments in managing administrative data and public services [10]. SID plays a pivotal role in improving transparency and accountability, two critical elements for building trust between local governments and their communities. By utilizing SID, villages can optimize the management of data related to population, finances, assets, and public services, thus empowering local governance and community participation through data-driven development.

Despite its potential, the implementation of SID faces several challenges in rural areas, including the reliance on outdated, manual systems that hinder efficiency and accuracy [11]. Many villages still struggle with poor integration of digital tools, which exacerbates the digital divide between rural and urban areas. Therefore, the successful implementation of SID is crucial for advancing the Smart Village concept and improving governance and service delivery in rural Indonesia [12], [13]. By overcoming these barriers, SID can play a key role in fostering sustainable and inclusive development, which will ultimately enhance the quality of life for village residents.

Pekon Waluyojati, located in Pringsewu, Lampung, is a fitting case study for exploring the development of Smart Villages through the SID program. Pekon Waluyojati's commitment to transparency and community participation makes it a valuable example for understanding the potential and challenges of SID in a rural setting. Comparatively, other regions in Indonesia, such as Seworan Village in Magelang and the efforts in West Sumba Regency, have similarly implemented VIS with varying degrees of success, demonstrating both the potential and challenges faced by rural areas in adopting digital solutions [14], [15]. Research on VIS implementation in Panggungharjo Village, Bantul, demonstrated improvements in community participation and infrastructure management [16], while efforts in Mangunjaya Village highlighted both successes and challenges in digital governance adoption [6]. Studies from other countries, such as India and Malawi, have shown how localized ICT solutions can support agricultural and rural development, though challenges like digital literacy and infrastructure remain [17], [18].

Despite progress in the implementation of Village Information Systems (SID) in Indonesia, a significant research gap exists in understanding how specific socio-economic and policy contexts shape the effectiveness of SID at the village level. While previous studies have explored SID adoption broadly, they often lack in-depth qualitative insights into the lived experiences of village stakeholders, particularly regarding the complex interaction between human resources, policy frameworks, and inter-organizational coordination. This gap limits a comprehensive understanding of the practical challenges and enablers unique to rural Indonesian settings. The novelty of this research lies in its focus on Pekon Waluyojati, Lampung, a village with proactive SID implementation that presents both significant potential and notable barriers. By examining this unique socio-political and economic context, this study provides fresh empirical evidence on the realities of SID adoption that has been underexplored in the literature. The contribution of this study is it enriches the existing body of knowledge on Smart Village development by offering a detailed, context-specific analysis of SID implementation challenges and successes. Also, it generates practical, evidence-based strategies to overcome obstacles related to human resource capacity, policy clarity, and stakeholder coordination. These insights are valuable for policymakers, local governments, and practitioners aiming to optimize digital governance frameworks and promote sustainable, inclusive rural development in Indonesia and similar contexts.

2. RESEARCH METHOD

2.1. Research Design

This study adopts a qualitative approach with a descriptive phenomenological design to explore the implementation of the Village Information System (SID) in Pekon Waluyojati, Pringsewu. The phenomenological approach is explicitly chosen because it enables an in-depth understanding of the lived experiences, perceptions, and meanings that key stakeholders attribute to the SID implementation. This method is particularly valuable for capturing the subjective and complex realities of those directly involved, including village officials, community leaders, and program implementers, allowing for rich insights into the nuances, challenges, and successes of SID beyond what quantitative methods could

reveal. Moreover, the phenomenological approach facilitates the exploration of contextual factors influencing stakeholders' perspectives and behaviors. For example, [19] demonstrate through qualitative interviews and observations how village officials and community leaders in Kepek Village provide rich narratives that reflect both the obstacles encountered and the achievements in SID implementation. Similarly, [20] emphasize user engagement and service quality as critical to SID's success, highlighting the importance of socialization, training, and active stakeholder involvement to foster ownership and optimize community benefits. This alignment underlines the phenomenological approach's strength in appreciating stakeholder motivations and contextual dynamics vital for sustainable implementation of SID in rural communities.

To ensure methodological transparency, this research involved 7 key informants selected through purposive sampling. These informants include village government officials from Pekon Waluyojati, representatives from the Dinas Pemberdayaan Masyarakat dan Desa (PMD) of Pringsewu, and technical staff from the third-party organization CV. Swakarya Mandiri. The selection aimed to encompass diverse perspectives from those responsible for policy, implementation, and day-to-day operation of SID, thus providing a comprehensive understanding of the program's dynamics. Data collection comprised in-depth interviews, focus group discussions, and participant observation. Interviews and focus groups were semi-structured, facilitating open dialogue while allowing the exploration of predefined themes related to policy standards, resources, communication, and socio-political factors. Observations conducted during the SID's operational activities provided contextual data on system usage and interaction among stakeholders.

2.2. Theoretical Framework

The theoretical foundation of this study is based on the Implementation Theory by Donald Van Meter and Carl E. Van Horn [21], which identifies six critical factors that influence the success of program implementation. These factors provide a structured approach to evaluating the process and outcome of SID implementation in Pekon Waluyojati. The six key indicators for evaluating the SID program include a) Policy Standards and Objectives, which assess whether the program aligns with the village and local government's policy objectives; b) Resources evaluate the availability and adequacy of human, material, and financial resources allocated to the program; c) Inter-organizational Communication examines the flow of communication and coordination among stakeholders like the village government, Dinas PMD, and third-party organizations; d) Characteristics of Implementing Agencies evaluate the capacity, readiness, and structure of the agencies involved in the program's implementation; e) Implementing Agents focus on the competence, training, and roles of individuals directly responsible for executing the program at the village level. Lastly, f) Socio-political and Economic Conditions investigate how the socio-political environment and economic conditions influence the program's success or failure. This framework will guide the data collection and analysis process, helping to understand the relationship between these factors and the successful implementation of SID.

2.3. Study Location

The research will be conducted in Pekon Waluyojati, a village in Kecamatan Pringsewu, Kabupaten Pringsewu, Lampung, which has actively implemented the SID program. Pekon Waluyojati was selected because it provides a valuable case study of both the successes and challenges encountered during the implementation of SID. Additionally, the Dinas Pemberdayaan Masyarakat dan Desa (PMD) of Pringsewu, which plays a key role in developing and supporting the SID program, will also be included as a research site.

Comparative studies from other regions further highlight the significance of this research. In Indonesia, similar initiatives have been undertaken in Seworan Village, Magelang, where VIS has been applied to address public infrastructure gaps, and Segorotambak Village in Sidoarjo, where capacity-building through SID has fostered local empowerment [14], [22]. These cases demonstrate the transformative potential of VIS, particularly when local communities are actively engaged in the process. Comparatively, in India and Kenya, VIS initiatives such as those in Krishi Vigyan Kendras for farmers and Malawi's agricultural systems have enhanced rural governance and economic development by facilitating real-time communication and decision-making based on data-driven platforms [17], [18].

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The successful integration of mobile technology in these regions to enhance agricultural output and food security further emphasizes the potential of digital systems in rural governance.

This study, by exploring the implementation of SID in Pekon Waluyojati alongside these international case studies, will provide critical insights into overcoming common barriers in rural governance, such as resource constraints and technological gaps. Additionally, it will contribute to understanding the necessary policy frameworks and training programs that can support the sustainable development of Smart Villages. It is hoped that the findings will provide actionable recommendations for policymakers, local governments, and private stakeholders in Indonesia and other developing countries to optimize SID implementation, foster active community participation, and enhance public service delivery, thus contributing to sustainable rural development.

2.4. Sampling Strategy

This study utilizes purposive sampling to identify key informants who possess direct experience and comprehensive knowledge of the SID implementation. The primary informants to be selected include the Head of Dinas PMD Pringsewu, who will offer insights into the development, oversight, and support of the SID program at the district level. Additionally, Village Government Officials from Pekon Waluyojati will provide perspectives on the local government's role in the implementation of SID and the challenges it faces. Furthermore, third-party organizations such as CV. Swakarya Mandiri will contribute insights into the technical and operational support provided for the SID program.

2.5. Data Collection Methods

The study utilized both primary and secondary data sources. The data collection methods included in-depth interviews, direct observation, and documentary analysis. In-depth interviews were conducted with key informants over a period of three days, from March 15 to March 17, 2022, to gain a comprehensive understanding of their experiences, challenges, and perspectives regarding the SID implementation. These interviews were semi-structured, allowing flexibility in exploring key themes and issues. Direct observation took place between February 22 and March 10, 2022, in Pekon Waluyojati, where the researcher witnessed the real-time implementation of SID. The researcher observed interactions between local officials, Dinas PMD staff, and third-party partners, noting how SID was utilized and the effectiveness of its operation. Additionally, documentary analysis involved the analysis of relevant documents such as official reports, village profiles, annual reports, and online data from Pekon Waluyojati's website. These documents supported the primary data by providing historical context, records of SID usage, and administrative insights.

2.6. Data Analysis Process

Data analysis will be conducted using interactive data analysis, which comprises three essential steps. The first step, Data Reduction, involves filtering and organizing the collected data to pinpoint key themes and concepts related to the implementation of SID. This process helps in focusing on the most pertinent data that address the research questions. The second step, Data Presentation, entails presenting the organized data in a coherent format, such as tables, figures, and narratives, to provide a clear depiction of the SID implementation process. This phase aids in visualizing the impact of SID on village governance. The final step, Conclusion Drawing, involves drawing conclusions based on the presented data. Patterns, themes, and factors that either facilitate or hinder SID implementation will be identified. These findings will be discussed in relation to the six indicators from the Van Meter and Van Horn Implementation Theory, enabling a comprehensive evaluation of the SID program. The findings will be presented in a narrative form, integrating the theoretical framework, data collected from interviews, observations, and document analysis, as well as the contextual insights gathered throughout the research.

2.7. Framework of Van Meter and Van Horn's Theory

To visualize how the six key indicators of the Van Meter and Van Horn implementation theory will be applied, the following framework (Figure 1) will guide the data collection and analysis.

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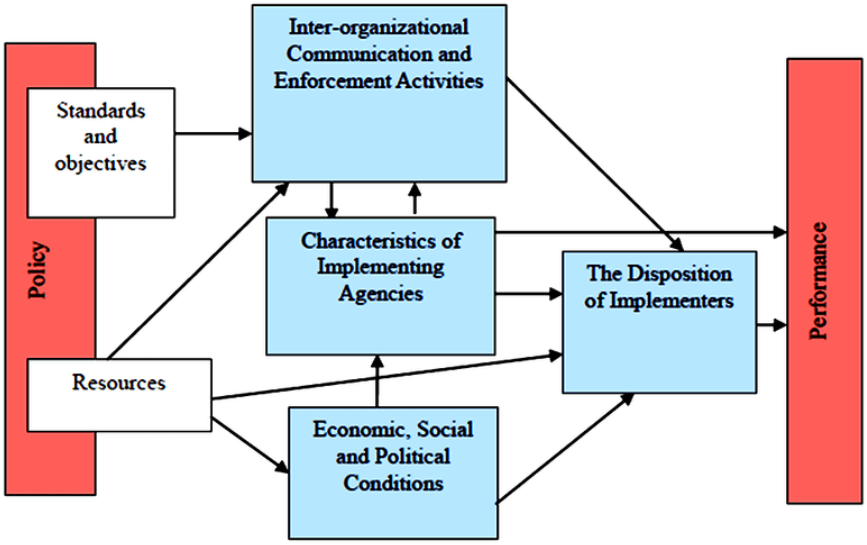

Figure 1. Van Meter and Van Horn Framework

Policy standards and objectives should be thoroughly assessed to ensure they align with the goals set by local government institutions. This alignment guarantees that the initiatives taken are in harmony with the broader governmental agenda and contribute effectively to the community's development. Meanwhile, evaluating resource availability and adequacy involves a meticulous check on human, financial, and material resources to ensure they are sufficient and appropriately allocated. Proper resources enable efficient policy implementation and mitigate risks of setbacks due to shortages.

Effective inter-organizational communication is crucial and involves examining the communication and coordination efforts between government agencies and third parties. These interactions facilitate a seamless execution of strategies and foster a collaborative environment for policy implementation. Additionally, the characteristics of implementing agencies should be analyzed to understand their readiness and capacity to handle the tasks involved in sustainable infrastructure development. Such an analysis ensures that agencies possess the necessary expertise and infrastructure to meet their mandates.

The competence and roles of implementing agents are equally important and require assessment to verify that individuals executing SID are well-equipped, skilled, and clear about their responsibilities. This involves assessing their qualifications, experience, and understanding of the project goals. Moreover, local socio-political and economic conditions play a significant role in the success of SID initiatives. Investigating these factors involves understanding the impact of political stability, economic health, and social dynamics on the implementation process, as these can significantly influence policy outcomes and the overall effectiveness of development projects.

This systematic approach, underpinned by Van Meter and Van Horn's Implementation Theory, provides a structured method for evaluating the effectiveness and challenges of the SID program in Pekon Waluyojati. By combining qualitative methods, a detailed theoretical framework, and rigorous data analysis techniques, this research aims to offer valuable insights into the practicalities of implementing smart village programs and contributing to the body of knowledge on ICT-based governance in rural Indonesia.

3. RESULTS AND DISCUSSION

3.1 Profile of Pekon Waluyojati

Pekon Waluyojati, located in Kecamatan Pringsewu, Kabupaten Pringsewu, covers an area of approximately 362 hectares and was formed through the division of Pekon Margakaya (shown in Figure 2). The name "Waluyo," meaning healthy, and "Jati," meaning prosperous, reflects the aspirations of the community for a healthy and prosperous village. The village was established in 1926 by transmigrants from Java.

In terms of education, the village government has prioritized support for underprivileged residents based on identified needs. The main goal of this initiative is to improve the quality of education, particularly by raising awareness of the importance of completing education up to the 12th grade. This

initiative is expected to contribute to the empowerment of the community by using education as a tool for improving their quality of life.

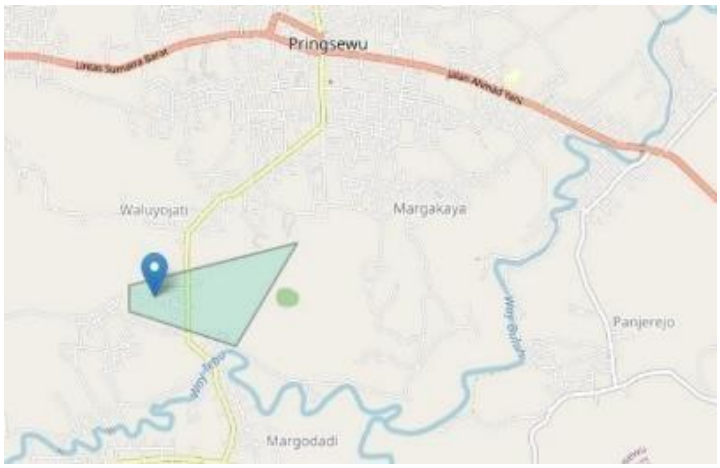

Figure 2. Map of Waliyojati Area

3.2 Village Information System (SID) Program in Pekon Waluyojati

The SID implementation in Pekon Waluyojati was initiated independently by the village government in 2019, with the system becoming fully operational in 2021 (Figure 3). This initiative was accompanied by the creation of a special institution responsible for managing the SID, ensuring that it aligns with the community's information needs. The SID program aims to improve public service delivery, foster transparency, and facilitate community participation in village development.

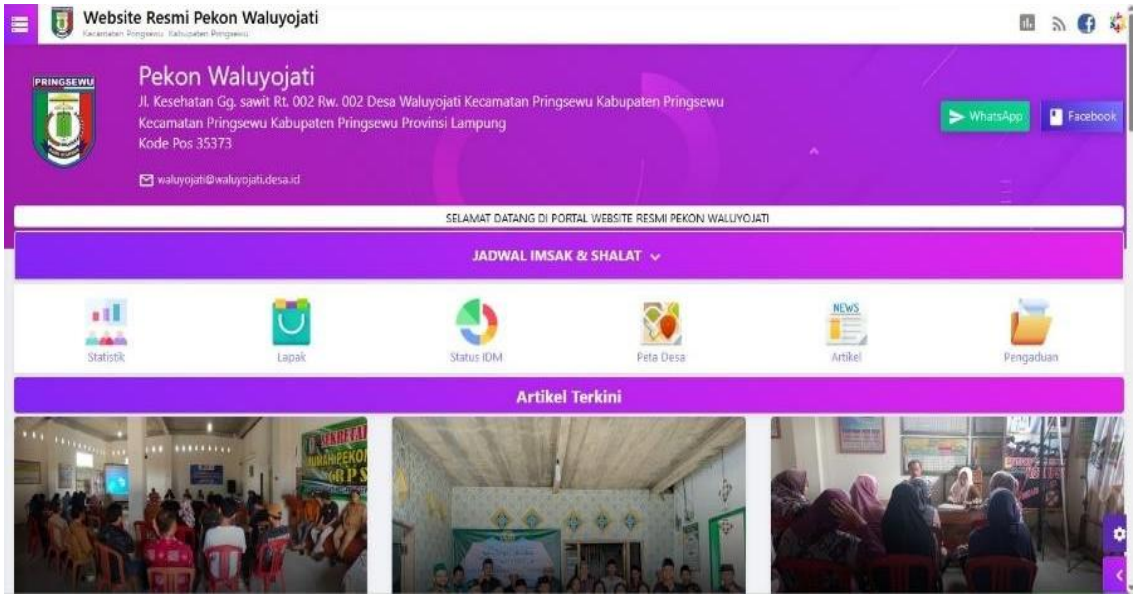

Figure 3. Waluyojati SID Application

The SID system in Waluyojati covers various data categories, including population, social, economic, and biophysical information. As part of the theoretical framework based on Van Meter and Van Horn's Implementation Theory, we assessed the program's alignment with the Policy Standards and Objectives by comparing its goals to the local government's strategic objectives. The SID system helps to meet these standards by improving transparency and accountability in village administration.

3.3 Implementation of SID in Pekon Waluyojati

To provide a clearer and more structured picture of the results of the evaluation of the implementation of the Village Information System (SID) in Pekon Waluyojati, the Table 1 summarizes the main findings based on the six main indicators of the Van Meter and Van Horn theoretical framework. This table displays important points related to policy standards, resources, inter-organizational communication,

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characteristics of implementers, socio-economic-political conditions, and obstacles faced in the implementation of SID.

Table 1. Main Finding Summary

Indicator	Findings
Policy Standards & Objectives	SID complies with Lampung Provincial regulations but is not fully implemented across all villages. The program's clear objectives face execution gaps.
Resources	Human resources are insufficient, with one administrator handling all SID tasks. Infrastructure limitations, such as fiber-optic access, persist.
Inter-organizational Communication	Regular meetings exist, but communication inefficiencies occur at the grassroots level, limiting full SID utilization and stakeholder alignment.
Characteristics of Implementing Agents	PMD shows commitment with a support team, yet agents lack specialized ICT and data management skills, requiring further training.
Socio-economic & Political Conditions	Low social awareness of SID, financial constraints due to COVID-19, and political support with coordination challenges at the provincial level.
Barriers to Implementation	Key barriers include limited skilled personnel, outdated SOPs, and weak communication structures, all impeding effective program scaling.

3.3.1 Policy Standards and Objectives

The Smart Village Initiative (SID) in Lampung Province adheres to the policy standards established by Peraturan Gubernur Lampung No. 36 of 2020, which provides guidelines for Smart Village initiatives, and Governor's Decision No. G/71/V.12./HK/2021, which specifies the target locations for these programs. However, the evaluation of these policy standards and objectives reveals that while the SID program in Waluyojati is in compliance with these regulations, it has not been fully implemented across all villages in the province. This incomplete implementation hinders the program's effectiveness in achieving broader regional goals. Additionally, although the program's policy objectives are well-defined, the resources available to execute these objectives are insufficient, particularly concerning human resources. In Waluyojati, SID is overseen by a single administrator, which substantially limits the system's potential. The shortage of adequate human resources is a significant obstacle to the program's success and aligns with the findings in the Van Meter and Van Horn framework under Resources and Implementing Agents.

3.3.2 Resources

A major finding from the research is that the human resources available to support SID in Waluyojati are insufficient. Currently, only one administrator is responsible for both the technical management of the SID system and administrative duties, which reduces the efficiency of SID implementation. Expanding and training personnel is necessary for the effective execution of the program. Additionally, the material resources available to SID implementation are also limited, particularly in terms of infrastructure such as fiber-optic networks. The PMD Office faces difficulties in providing adequate technical resources, leading to a reliance on third-party organizations like CV. Swakarya Mandiri for technical support and equipment provision. The lack of comprehensive material resources directly impacts SID's ability to function at its full capacity, aligning with Van Meter and Van Horn's second indicator, Resources. On the other hand, the policy resources have generally been supportive, with Dinas PMD creating a Smart Village Advisory Team to assist in program development. However, there is still a need for clearer Standard Operating Procedures (SOPs) to ensure a standardized approach to SID implementation. The creation of an advisory team is a positive step toward achieving effective coordination, but further refinement in policy is needed to address the challenges outlined in the Van Meter and Van Horn framework.

3.3.3 Inter-organizational Communication and Activity Strengthening

Effective communication and coordination between the village government, the PMD Office, and third-party organizations were found to be critical in the successful implementation of SID. Regular monthly meetings have been held to ensure that all stakeholders are aligned and working towards the

same goals. However, the evaluation of Inter-organizational Communication identified occasional inefficiencies in communication, particularly at the grassroots level where SID's full potential is not yet understood by all community members.

The communication challenges underscore the need for stronger coordination and clearer protocols among implementing agencies, which is highlighted in the Van Meter and Van Horn framework under Inter-organizational Communication. The recommendation is to streamline communication channels to avoid miscommunication and overlap, thereby improving overall program performance.

3.3.4 Characteristics of Implementing Agents

The characteristics of implementing agents are crucial to SID's success. The PMD Office has shown commitment through the establishment of a dedicated team to support the Smart Village initiative, but more efforts are needed in terms of training and enhancing the skills of those involved in the system's execution. Currently, the capacity of the implementing agents is limited by their lack of specialized skills in ICT and data management.

The evaluation of the Implementing Agents under the Van Meter and Van Horn framework shows that while the agents are committed, they lack the necessary expertise to fully utilize the potential of SID. This highlights the need for specialized training programs to increase their competence, ensuring the sustainability of the program.

3.3.5 Social, Economic, and Political Conditions

Social awareness of SID in Waluyojati remains low, with many residents unaware of its existence or benefits. The evaluation of social conditions suggests that outreach efforts are insufficient, necessitating more targeted awareness campaigns to educate the community about SID's potential benefits for local development. Economically, the conditions have been pivotal in SID's implementation, with funding availability from village budgets being crucial. However, the COVID-19 pandemic disrupted economic planning, causing delays in the program's expansion. Economic constraints are a key consideration in the Van Meter and Van Horn framework, which emphasizes the need for clear financial planning and resource allocation to ensure the program's continuity. Politically, SID has received strong support from both the local government and the PMD Office. Nevertheless, the program faces political challenges, such as the need for more provincial-level coordination and addressing regional disparities in the implementation of Smart Villages across Lampung. While political commitment is strong, logistical challenges persist, directly impacting the socio-political and economic conditions in Van Meter and Van Horn's theory.

3.3.6 Factors Hindering SID Implementation

The primary barriers to the full implementation of SID are rooted in human resources, policy resources, and communication and coordination. The absence of sufficient skilled personnel remains a significant challenge, as the single administrator model creates an inefficient system that cannot scale effectively. This aligns with Van Meter and Van Horn's Resources and Implementing Agents indicators, highlighting the need for adequate resources and skilled agents to drive implementation. Additionally, the lack of clear and updated standard operating procedures (SOPs) is hindering progress, underscoring the necessity for comprehensive and standardized procedures to ensure consistency across the program. Furthermore, inefficiencies have arisen due to the absence of structured communication, which is crucial for enhancing the program's impact. Strengthening these communication and coordination channels, as emphasized in Van Meter and Van Horn's Inter-organizational Communication, will be vital in overcoming these barriers and achieving successful implementation.

3.4 Comparison with Other Methods

When compared to similar Smart Village programs both within Indonesia and internationally, the implementation of SID in Pekon Waluyojati demonstrates meaningful progress in enhancing transparency and public service delivery. However, regions with more advanced infrastructure and greater human resource capacity, such as Seworan Village in Magelang and certain rural areas in India, have achieved higher levels of efficiency and sustainability. This comparison highlights the critical role of adequate resources, capacity building, and institutional support in maximizing the impact of Village Information Systems. From a theoretical perspective, this study contributes to the ongoing development

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of Van Meter and Van Horn's Implementation Theory by providing empirical evidence on how human resources, communication, and policy alignment function in the unique socio-political context of rural Indonesia. It underscores that successful SID implementation requires not only resource availability but also active stakeholder coordination and adaptive policy frameworks responsive to local conditions. These findings enrich the literature on Smart Village governance by illustrating the dynamic interplay between technical, organizational, and social factors in policy implementation at the village level.

Furthermore, the research expands the understanding of Smart Village literature in Indonesia by identifying specific bottlenecks—such as limited human capacity, infrastructural gaps, and coordination challenges—that are common yet variably addressed across different regions. By contextualizing these issues within the Van Meter and Van Horn framework, the study provides a nuanced analytical lens to inform both scholars and practitioners about the mechanisms underlying effective digital governance in rural settings. While SID in Pekon Waluyojati shows promising results, this study reveals critical areas for improvement including human resource development, communication streamlining, infrastructure enhancement, and policy updating. Addressing these areas is essential not only for the success of SID locally but also for the broader replication and scaling of Smart Village initiatives across Indonesia, thereby contributing both practically and theoretically to rural digital governance.

4. CONCLUSION

The implementation of the Village Information System (SID) in Pekon Waluyojati has not yet reached its full potential. Several stages of the Smart Village program remain only partially implemented. Key obstacles hindering SID's success include limited human resources, outdated policy frameworks, and suboptimal communication and coordination among stakeholders. Additionally, funding for SID is constrained, with some village budgets diverted to COVID-19 response efforts. Although political support exists, better coordination between the local government, Dinas PMD, and third-party partners such as CV. Swakarya Mandiri is necessary to enhance program effectiveness. Addressing these challenges is essential for SID to significantly contribute to the development of Smart Villages.

To optimize SID implementation, several policy recommendations are proposed. First, enhancing human resource capacity through targeted training and recruitment of skilled personnel is crucial for improving SID operations. Second, policies related to SID should be updated and aligned with regional and national development goals, accompanied by clear guidelines and dedicated budget allocations. Third, improving communication and coordination through regular meetings and stronger collaboration among the village government, Dinas PMD, and third-party organizations will foster better information flow and problem-solving. Fourth, increasing financial support by allocating specific funds in local budgets and exploring partnerships with the private sector can secure necessary resources. Lastly, leveraging emerging technologies such as cloud computing, the Internet of Things (IoT), and artificial intelligence (AI) can enhance SID's data management and service delivery capabilities, supporting sustainable Smart Village development.

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