



Development Strategy of E-Government in Village Governance in Banda Sub-District

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Abstract

Background: E-government is intended to improve transparency, accountability, efficiency, and public participation using information technology. However, its implementation in village governance in Banda Sub-district, Central Maluku Regency, remains uneven because of limitations in institutional readiness, human resources, infrastructure, and policy support.

Objective: This study aims to examine the importance of e-government in Banda Sub-district and identify its benefits, barriers, implementation conditions, and development strategies in village governance.

Methods: This study employed a qualitative descriptive approach with a Most Different Systems (MDS) design. The research covered 18 villages in Banda Sub-district, with informants selected purposively from village governments and relevant agencies. Data were collected through observation, interviews, and documentation and then analyzed using data reduction, data presentation, and conclusion drawing, with triangulation used to ensure data validity.

Results: The findings show that only 6 of the 18 villages had active village websites, 5 had inactive websites, and 7 had no village websites. The main barriers were policy and regulatory limitations, planning and budget constraints, inadequate human resources, and information and communication technology (ICT) infrastructure problems. The study formulated four development stages: preparation, maturation, consolidation, and utilization.

Conclusion: E-government implementation in Banda Sub-district remains limited and requires stronger regulation, sustainable budgeting, ICT capacity building, infrastructure development, and coordinated long-term implementation.

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INTRODUCTION

Information and Communication Technology (ICT) is rapidly evolving and has revolutionized the way people live, including how they communicate, learn, work, conduct business, and manage government (Aryani et al., 2024; De la Hoz-Rosales et al., 2019; Shava & Vyas-Doorgapersad, 2021). The information age provides enormous opportunities for organizing activities through new, innovative, instantaneous, transparent, accurate, and timely approaches, thereby facilitating management and improving its outcomes. With information and communication technology, all work processes and content can be transformed from physical and static forms into digital, mobile, virtual, and personalized forms (Gershon, 2024; Turban et al., 2021; Wang et al., 2020).

The process of government management, from the central government to local governments, is currently undergoing changes toward a future government model characterized by transparency, service effectiveness, management efficiency, and public accountability (Benito et al., 2021; Birdayanthi et al., 2025; El Kezazy & Hilmi, 2023). Therefore, a fundamental transformation is needed to establish more effective local government management practices, one of which involves utilizing technology, particularly information technology (Harshavarthan & Ayyanathan, 2025; Helmi et al., 2025).

This research is a follow-up study. The results of previous research indicate that the implementation of e-government-based village governance in Central Maluku Regency, particularly in Banda Sub-district, remains inadequate and lags behind in terms of the use of information technology at the village level; some villages do not even have a website. Of the 186 villages, only 18 have active village websites, meaning that only approximately 10% of villages have begun developing websites as one of the facilities for village services. Based on previous research in Banda Sub-district, of the 18 villages with websites, 6 have active village websites that are used for various purposes, such as village administrative matters and information about village potential. Four villages have village websites, but they are inactive because the websites are still undergoing development and maintenance, there is a lack of operator skills for managing the websites, and there are limited budgets for website development and network infrastructure. Meanwhile, 8 villages do not have village websites. In the implementation of e-government in Banda Sub-district, several obstacles have been identified related to policies and procedures, software and applications, data and information, hardware and networks, and human resources. These obstacles are presented in Table 1.

Table 1

Constraints of e-Government Implementation in Banda Sub-district, Central Maluku Regency

Component		Obstacles/Weaknesses
Policies and procedures	and	a. Leadership commitment is still low; b. Incomplete regulations/regulatory tools and standard operating procedures; c. Does not yet have a Master Plan (Blue Print) for the development of E-Government; d. There is no special organization that exclusively handles ICT management; e. There is no electronic reporting mechanism; f. There is no implementation guidance for ICT program funding
Software/application		a. Application development is still partial, so less attention is paid to system integration; b. Maturity of applications that have been developed is still low; c. There is no priority in application development; d. There are still proprietary applications that are not licensed (pirated); e. There is no standard procedure for handling data.
Hardware & network		a. Limited computer facilities, infrastructure, and networks at the sub-district and village offices in Banda Sub-district; b. Existing infrastructure has not been optimally utilized; c. There are no technical guidelines for developing alternative computer networks.
Human resources		a. Resistance of existing human resources to changes in work culture from manual to electronic; b. Limited number and quality of human resources who have adequate ICT mastery competencies; c. Limited ability and readiness of human resources in Village Government ICT governance.

Source: Previous Research Results, 2022

Based on Table 1, it can be seen that the constraints associated with the implementation of e-government in Banda Sub-district require the development of a strategy to improve the quality of public services through the utilization of information and communication technology within an electronic government framework, thereby reducing or eliminating the need for direct contact between service providers and service users. In Indonesia, an opportunity for this transformation already exists through the issuance of Presidential Instruction Number 3 of 2003 concerning the National Policy and Strategy for the Development of e-Government, one of whose objectives is to provide quality public services that adhere to the principles of good governance. With the development of the public service sector through the adoption of e-government, it is expected that service delivery can be improved in the same direction by making public services faster, more affordable, more transparent, and more accountable. Based on the problems described above, the researchers sought to conduct a study entitled "E-Government Development Strategy in Village Government Organizations in Banda Sub-district."

METHOD

This research employed a qualitative descriptive approach. The object of the research was directly related to the application of e-government in village governance. Data sources (research participants) were selected through purposive sampling. The research area comprised 18 villages in Banda Sub-district. The research participants consisted of 19 village heads, 10 village secretaries, 5 heads of government departments, 5 heads of BPD (Village Consultative Bodies), and 7 village operators representing the villages, the Infocomm Office of Central Maluku Regency, and the Village Community Government Office. Data were collected using three techniques: observation, interviews, and documentation. The data analysis technique employed was interactive analysis, which consisted of three stages: data reduction, data presentation, and conclusion drawing. Data validity was assessed through triangulation. Triangulation involved reaching conclusions by reexamining the data from multiple perspectives.

RESULTS AND DISCUSSION

Results

Utilization of E-Government in the Implementation of Village Government

Village governance following the enactment of Law No. 6 of 2014 has implications for the readiness of village officials to provide services and implement development programs at the village level, encompassing both physical development and community development through electronic government (e-government) and information technology. As the frontline of public service delivery, village governments are required to strengthen the capacity of village officials in community-based service delivery and development planning to create independent villages through the utilization of information technology. An independent village, in the context of digital governance and e-government implementation, reflects a village community with a strong determination to progress, produce products with distinctive village or local characteristics that contribute to the village's identity and pride, and develop the capacity to meet its own needs.

The implementation of village governance in Banda Sub-district through the utilization of information technology (e-government) remains limited and faces several challenges, including limited human resources, inadequate facilities and infrastructure, limited community digital literacy, and regulatory obstacles in implementing the village information system. The digital divide between urban and rural communities is one of the problems faced by developing countries. This gap can be caused by various factors, including disparities in infrastructure between cities and villages, differences in community needs for ICT facilities and devices such as mobile phones and computers, internet access, and the availability of ICT-skilled human resources, all of which affect ICT utilization at the village level ([Sugiharti et al., 2021](#)).

There are 18 villages in Banda Sub-district, namely Nusantara Village, Dwiwarna Village, Merdeka Village, Rajawali Village, Kampung Baru Village, Tanah Rata Village, Walling Spanciby Village, Boiyauw Village, Lonthoir Village, Combir Kasestoren Village, Selamon Village, Dender Village, Lautang Village, Waer Village, Uring Tutra Village, Ay Village (Ay Island), Hatta Village (Hatta Island), and Rhun Village (Rhun Island). Of all the villages in Banda Sub-district, only a small

number have village websites, including Nusantara Village, Dwiwarna Village, Merdeka Village, Tanah Rata Village, Boiyauw Village, Lonthoir Village, and Lautang Village. The implementation of e-government-based village governance in Banda Sub-district remains limited; of the 18 villages in Banda Sub-district, only 6 have active e-government-based village governance, as shown in the table below.

Table 2

Village Website Status in Banda Sub-district, Central Maluku Regency

No	Village Name	Available	Since Year	Status
1	Boiyauw	Available	2020	Active
2	Cumbir Kasestoren	Not Available	-	Inactive
3	Dender	Not Available	-	Inactive
4	Dwiwarna	Available	-	Active
5	Kampung Baru	Available	-	Inactive
6	Lautang	Available	-	Active
7	Lonthoir	Available	2020	Inactive
8	Merdeka	Available	2018	Active
9	Nusantara	Available	2019	Active
10	Pulau Ay	Not Available	-	Inactive
11	Pulau Hatta	Not Available	-	Inactive
12	Pulau Rhun	Not Available	-	Inactive
13	Rajawali	Available	2020	Inactive
14	Selamon	Available	2020	Inactive
15	Tanah Rata	Available	2019	Active
16	Uring Tutra	Not Available	-	Inactive
17	Waer	Not Available	-	Inactive
18	Walling Spanciby	Available	2020	Inactive

Source: Research Results, 2023

From the table above, of the 18 villages in Banda Sub-district, 6 villages have active village websites that are used for various purposes, such as village administration and dissemination of village news and information on village potential; 5 villages have village websites that are currently inactive because the websites are undergoing extension or upgrading, there is a lack of operator capacity to manage the websites, budget constraints for website maintenance and extension, and network limitations; and 7 villages do not have village websites.

a. Boiyauw Village

The Boiyauw Village website (<https://boiyauw.desa.id>) has been established and active since 2020 and is used to publish village news, reports, proposals, and correspondence. The Boiyauw Village website contains various menus designed to facilitate public services for the community, including village news, village data, village profiles, community institutions, and village administrative information. The average number of visitors to the Boiyauw Village website is 100–120 visits per day, but this figure remains relatively low compared with the village's population. Another shortcoming identified on the Boiyauw Village website is that several menus still do not have accessible pages when selected.

b. Dwiwarna Village

The Dwiwarna Village website (<https://dwiwarna.desa.id>) has been established and is used to publish village news, reports, proposals, and correspondence. The website contains various menus designed to facilitate public services for the community, including village data, village potential, village profiles, community institutions, and village administrative information. Other shortcomings identified on the Dwiwarna Village website include several menus that do not have accessible pages and the absence of an operator specifically responsible for managing the website. Website management in this village is still combined with the responsibilities of village officials who perform other duties.

c. Lautang Village

The Lautang Village website (<https://lautang.desa.id>) has been established and is used to publish village news, reports, proposals, and correspondence. The Lautang Village website contains various menus designed to facilitate public services for the community, including development information, village profiles, village potential, and village administrative information. One shortcoming of the Lautang Village website is the lack of regular updates to population statistics; data from 2020 had only been updated as of February 2023.

d. Merdeka Village

The Merdeka Village website (<https://merdeka.desa.id>) has been established since 2018 and is used to publish village news, reports, proposals, village funds, and correspondence. The Merdeka Village website contains various menus designed to facilitate public services for the community, including public information, village profiles, village potential, and village administrative information. However, one shortcoming identified on the Merdeka Village website is that some pages are unavailable when accessed.

e. Nusantara Village

The Nusantara Village website (<https://nusantara.desa.id>) has been established since 2019 and is used to publish village news, reports, proposals, village funds, and correspondence. The Nusantara Village website contains various menus designed to facilitate public services for the community, including community institutions, village profiles, village data, village potential, and village administrative information. In terms of community utilization, residents are more likely to deal directly with the village office because of limited knowledge of how to use IT to access the village website and because the village office is located relatively close to residents' homes.

f. Tanah Rata Village

The Tanah Rata Village website (<https://tanahrata.desa.id>) has been established since 2019 and is used to publish village news, reports, proposals, village funds, and correspondence. The Tanah Rata Village website contains various menus designed to facilitate public services for the community, including community institutions, village profiles, village data, village potential, and village administrative information. Regarding community utilization, residents are more likely to deal directly with the village office because of limited knowledge of how to use IT to access the village website and because the village office is located relatively close to residents' homes.

The utilization of information technology for e-government in village administration in Banda Sub-district includes activities such as promoting local businesses through websites, although such promotion remains largely limited to reporting on activities and promoting agricultural products, tourist sites, cultural and arts festivals, and handicraft products produced by small and medium-sized enterprises (SMEs), as well as population administration and other activities. In terms of information provision, the available information is relatively complete and informative; however, facilities that support communication and collaboration between the government and the business sector (Government-to-Business or G2B) need to be further developed. According to informants, the information technology used by the Banda Sub-district government was initially intended primarily to support village officials in promoting superior local products and tourism products. However, implementation has not been optimal because of the limited capacity of village officials to operate the system, incomplete internet and electricity coverage in several locations, and other constraints.

Challenges and Obstacles to E-Government Development in Village Administration

E-government became a popular topic after being linked to regional autonomy. Almost every region has attempted to implement it according to its own circumstances. In principle, e-government involves the utilization of information technology to improve relationships between the government and other stakeholders, including the community, the business sector, and other government institutions. The utilization of digital technology in governance processes is currently a priority that continues to be developed by local governments, including the Central Maluku Regency Government, particularly in villages within the Banda Sub-district area. To realize governance that is transparent, accountable, efficient, and effective, the local government is attempting to implement innovative policies based on electronic government systems to facilitate

community access to optimal public services.

The fundamental reasons why e-government is necessary and important to implement are as follows. Traditionally, interactions between citizens or social institutions and government agencies have taken place primarily in government offices. However, with the emergence of information and communication technology (ICT), it has become increasingly possible to bring government service centers closer to communities. E-government provides new opportunities to improve the quality of government through increased efficiency, new services, increased citizen participation, and improved access to the global information infrastructure. Thus, e-government can improve the quality of public information services as a means of realizing good governance. Through e-government, government services can be delivered more transparently, and processes can be tracked, thereby strengthening accountability. Opportunities for irregularities can be reduced, and services can be delivered more effectively and efficiently.

However, in practice, the implementation of electronic-based services in local governments usually faces numerous obstacles that can lead to implementation failure. This is also evident in several villages in Banda Sub-district. The data in this study were obtained through interviews and observations involving a number of village heads across Banda Sub-district. An evaluation of the electronic government system was conducted based on Ministerial Regulation (Permenpan RB) No. 59 of 2020 at the Central Maluku Regency Government, followed by the identification and categorization of data concerning obstacles to the implementation of electronic government system services. The results showed that the obstacles faced by several village governments, namely Lonthoir Village, Boiyauw Village, Combir Kasestoren Village, and Dender Village, in implementing electronic government system services can be categorized into four aspects: policy/regulation, planning and budgeting, human resources, and IT infrastructure.

The results show that the obstacles faced by several village governments in Banda Sub-district are challenges that can potentially be addressed jointly by all parties, including the sub-district government and the village governments. Although infrastructural barriers remain in the form of limited network connectivity and electricity coverage in certain villages, the data demonstrate that these barriers do not stem solely from inadequate infrastructure. Rather, they are also related to the capacity of qualified human resources to utilize the available infrastructure, as identified through interviews and observations in Lonthoir, Dender, and Combir Kasestoren Villages. One of the obstacles identified is inadequate human resource capacity, partly because the educational qualifications of existing personnel are not specifically related to IT. Nevertheless, these villages have a number of university graduates who are generally computer literate; for example, Lonthoir Village has the largest number of university graduates in Banda Sub-district. However, the village government has not been able to recruit additional human resources because of budget constraints. This contrasts with the Boiyauw Village Government, which has demonstrated a strong commitment to advancing the village through electronic services implemented in the form of a village website. The Boiyauw Village website is relatively comprehensive in terms of services and information and continues to be updated. This can also be seen in the commitment of the Boiyauw Village Government, as reflected in the following interview (Research Result, 2023):

Head of Boiyauw Village: "Well, speaking of human resources here in Boiyauw, they are fairly ordinary—most people have only finished senior high school, and only recently have a few village children gone on to study outside Maluku. As for the village website, the most important thing first is willingness, and then following the ministry's directive requiring villages to comply. It should be noted that the Boiyauw Village website was created back in 2018. In 2018, none of the menu features or the homepage display actually related to the village; the content was still general information about Banda. Then came the policy requiring villages to create a website. But at that time, we in the village did not yet have the human resources to manage it. In the end, I started learning myself how to develop the village website and purchased a village-website-building service, although it was not yet fully functional that year. It only became fully functional in 2020, and now we use the Opensite and Desa Digital services, managed by village staff. They are paid, and they have been given training and a mechanism for managing the website. Our only real obstacle is the maintenance budget because maintenance has to be ongoing and requires commitment—but we keep the website running

and continue developing it. More attention is given to monthly and yearly data input so that the data remain updated and news coverage can be maximized."

Head of Lonthoir Village: "Lonthoir Village has had a website since 2019, but it has since gone offline because the operator left and there was no one to manage it. We wanted to find a replacement operator, but the website had already gone down, and there were also budget constraints—it has to be paid for every year, especially the maintenance costs, so we chose not to budget for it anymore, especially since the operator had left. So for village-fund reporting, population data, and so on, we still do it manually; it has to be brought physically to the district office. Only informal information sharing uses WhatsApp, but the physical documents still have to be delivered to the office. Public complaints also happen directly. There is also a WhatsApp group for sharing village information (Info Lonthoir), but most reporting is still done manually—information and letters are mostly shared through WhatsApp."

From the interviews above, the commitment of each village government varies considerably. Ultimately, this obstacle also creates a data security concern because there is no guaranteed security mechanism for protecting the privacy of village databases. As stated by the Boiyauw Village Government, additional budget allocations are required for maintenance because of limited resources for conducting regular maintenance. In Lonthoir and Combir Kasestoren Villages, the village governments face difficulties in allocating village funds for database development and security and for paying employee salaries. Thus, the high cost of implementation and maintenance constitutes a major obstacle that affects and is interrelated with other challenges. Other research findings also indicate the existence of a digital divide in community access to the internet. This means that not all communities have the same level of participation in utilizing electronic service programs, particularly when access depends on paid networks whose costs must be borne by community members. This also constitutes a challenge for the Boiyauw Village Government. Another obstacle is the work culture of the village apparatus, which remains oriented toward traditional administrative processes, including delays in information transparency between agencies and the continued use of paper-based processes.

Another problem is the readiness of supporting infrastructure. The operation and maintenance of e-government systems also need to be planned, and a clear legal framework needs to be established because information technology can create opportunities for cybercrime, including web-based attacks that could disrupt public services. This is a concern for some village governments in Banda Sub-district. Consequently, the Boiyauw Village Government allocates a relatively substantial budget for the maintenance of its electronic services. Change in the government sector is not easy; unlike the business sector, which can often adapt rapidly to internal and external dynamics, the public sector typically faces stronger institutional resistance to change. The challenges that arise should therefore not be avoided but instead identified and addressed through appropriate solutions.

Ultimately, changes in the strategic environment and technological advances encourage village government officials to improve bureaucratic performance and service delivery toward the realization of good governance. However, this situation must be supported by the timely flow of data and information between agencies so that an integrated system can be established between the government and other users. This raises the question of whether the transition from face-to-face services to system-based services can be sustained and implemented, as is still being attempted by the Lonthoir, Combir Kasestoren, and Dender Village Governments, as well as the sub-district government. As an important form of interaction, the government, community, and stakeholders implement e-government through information and communication technologies, including computers, the internet (wireless networks), and cellular networks, to improve service quality (Sihotang et al., 2025). However, service management is not without problems because access to information and communication technology is not evenly distributed across all segments of village communities. The uneven distribution of telecommunications facilities and infrastructure therefore contributes to a widening digital divide among communities.

Government officials at the sub-district and village levels must also assess the human resources available to them, the community's culture and readiness to use online public services, and the supporting infrastructure available. In the intangible dimension, the willingness of village government officials, such as those in Boiyauw Village, to adopt information technology and

address resistance to digitization programs is relatively evident compared with other villages in the Banda Sub-district area, including villages located closer to the capital of Maluku Province, Ambon City. If regional disparities indicate that the infrastructure required to develop e-government is inadequate and that electronic-service infrastructure has not been evenly distributed through district and sub-district government initiatives, village governments must also be prepared to address further intangible challenges. These challenges include the availability of financial resources, computer technology, and adequate human resources to operate such systems, as experienced by Lonthoir, Dender, and Combir Kasestoren Villages. However, given the progress made in Boiyauw Village, financial challenges may be addressed more effectively when there is sufficient political will from the village government.

E-Government Development Strategy in the Administration of Village Government, Banda Sub-district

The development of e-government in Banda Sub-district, Central Maluku Regency, faces challenges related to geography, economics, technology, politics, and culture. This research identified several phenomena indicating that e-government implementation is progressing slowly. The information technology used by village governments in Banda Sub-district was initially intended primarily to support village officials in promoting superior local products and tourism products. However, implementation has not been optimal because of the limited capacity of village officials to carry out the program.

The existence of village websites as part of village government information services in Banda Sub-district, particularly in villages that already have websites, provides a channel for publishing village information and delivering population-related services. Interactive services at the community level can also provide feedback to village governments through websites or contact persons designated by village officials. However, village governments in Banda Sub-district have not yet been able to provide fully interactive services because of limited human resources and other supporting factors, particularly information technology readiness. Furthermore, the Banda Sub-district government does not yet have a population database integrated with the village information system. For this reason, village governments need to develop database-processing applications to support village resource management systems.

The research results show that on Banda Naira Island, all villages are connected to the internet, but there are still 2 villages that do not have village websites, namely Rajawali Village and Kampung Baru Village. Village website management is not yet optimal in Dwiwarna, Merdeka, Tanah Rata, and Nusantara Villages. On Banda Besar Island, which comprises 12 villages, not all villages are connected to the internet, while villages that are connected experience problems, particularly unstable signals. Given this reality, there remains a gap in the implementation of governance at the village level between the service authority granted to villages under Law No. 6 of 2014 and Minister of Home Affairs Regulation No. 47 of 2016 and the service capabilities currently being provided. In other words, considerable work remains to create village public services that meet community expectations and align with current developments in IT-based e-government. The development of information systems therefore requires a clear e-government development strategy to support effective village administration.

Empirically, and based on field observations, this research formulated a strategy for developing e-government-based services in Banda Sub-district, Central Maluku Regency, as shown in the table below.

Table 3

E-Government Development Strategy in Implementing Village Government

No	Development Strategy	Strategy Description
1	Preparation	1. Prepare a master plan, an e-government service implementation strategy, and implementation guidelines set out in the form of regional regulations or regent regulations (planning-document preparation); 2. Build village websites for villages that do not yet have

		one;
		3. Develop telecommunications infrastructure networks;
		4. Cooperate with private parties through a Memorandum of Understanding (MoU) to overcome e-government service infrastructure barriers.
2	Maturation	1. Conduct socialization and training on information and communication technology management;
		2. Synchronize policy from the village level up to the central government.
3	Consolidation	1. Enact policies related to the electronic-based government system, thereby easing coordination and communication among the relevant Regional Government Agencies (OPD);
		2. Allocate a budget within the Regional Revenue and Expenditure Budget (APBD) at regency level and Village Revenue and Expenditure Budget (APBDes) at village level and place the e-government program as a priority.
4	Utilization	1. Promote village flagship products through e-government;
		2. Make it easier for the community to access village data;
		3. Serve as a space and means for village-data transparency;
		4. Document the activities and programs carried out by the village;
		5. Increase the sales value and utilization of the village's tourism sector.

Discussion

Utilization of E-Government in the Implementation of Village Governance

The findings of this study show that the implementation of village-website-based e-government in Banda Sub-district remains at a very limited stage. Of the 18 villages that were the focus of this research, only 6 villages (33%) have active village websites, 5 villages have websites but they are inactive, and the remaining 7 villages do not have village websites at all. This condition indicates that the implementation of Presidential Instruction No. 3 of 2003 on the National Policy and Strategy for e-Government Development, as well as the mandate of Law No. 6 of 2014 on Villages requiring the development of Village Information Systems, has not been implemented evenly at the village level.

The difference between Boiyauw Village and other villages such as Lonthoir, Combir Kasestoren, and Dender indicates that the success of e-government is not determined solely by the availability of infrastructure but is also associated with the commitment of village leadership and the political will of the village head. As stated by the Head of Boiyauw Village, the sustainability of the village website—which has been operating since 2018 and reached full functionality in 2020—was driven by the village head's personal initiative to learn website management independently, even though the available human resources were, on average, only high school graduates. This differs from Lonthoir Village, which has the highest number of university graduates in Banda Sub-district, yet whose website went offline after the managing operator left and there was no budget to recruit a replacement.

This phenomenon reinforces the argument that the digital divide among villages in Banda Sub-district is not purely a matter of formal-education-based human resource gaps but is also related to institutional readiness to allocate a sustained budget for system maintenance. This finding is consistent with the view that the digital divide is influenced by a combination of infrastructure factors, community demand for ICT devices, and the availability of ICT human resources, which together affect ICT utilization at the village level (Aryza, 2023; Mayasari et al., 2023).

In terms of community utilization, a fairly consistent pattern was found in several villages,

particularly Nusantara and Tanah Rata, where community members still prefer to visit the village office directly rather than access services through the website. This tendency is associated with two main factors: low digital literacy among village communities and the physical proximity of the village office to residents' homes. This condition shows that the mere presence of technological infrastructure does not automatically produce a behavioral shift in how communities access services. Therefore, socialization and digital education are as important as infrastructure development as prerequisites for successful e-government implementation ([Maulana & Bafadhal, 2020](#); [Ummah et al., 2022](#)).

Challenges and Barriers to E-Government Development

Referring to the evaluation based on Ministerial Regulation (*Permenpan RB*) No. 59 of 2020, this study identifies four main and interrelated categories of barriers: policy/regulation, planning and budgeting, human resources, and ICT infrastructure. These four aspects do not stand alone but form an interconnected relationship. For example, the absence of regulation and an e-government master plan at the district level may cause villages to interpret e-government implementation individually and inconsistently, which in turn can result in low budgeting priority and subsequently limit villages' capacity to recruit and retain competent ICT operators ([Simangunsong et al., 2018](#); [Singh et al., 2024](#)).

Budget constraints emerge as a major and influential factor among the identified barriers. The cases of Lonthoir and Combir Kasestoren Villages show that even when a village has an adequate pool of human resources, including university graduates, electronic services cannot be sustained without regular budget support for operator compensation and annual maintenance costs. Conversely, the case of Boiyauw shows that when there is political commitment from the village head, budget limitations may be addressed through prioritization, even with a workforce whose formal educational qualifications are relatively limited ([Anas et al., 2024](#); [Rohayati et al., 2022](#)).

Another identified barrier is resistance within the work culture of village officials, who remain accustomed to manual, paper-based service patterns. This is reflected in the practice of village-fund and population-data reporting in Lonthoir Village, which is still conducted manually by delivering physical documents to the district office, even though informal communication has already adopted instant messaging applications such as WhatsApp. This condition illustrates a gradual digital divide: the community and village officials have adopted personal communication technologies but have not yet fully transitioned to a structured and integrated government information system.

Network infrastructure is also a significant obstacle, particularly for villages on Banda Besar Island, which comprises 12 villages. Not all villages are connected to the internet, while those that are connected experience problems, particularly unstable signals. This geographic disparity across an archipelagic region reinforces the argument that e-government development strategies in island regions such as Banda Sub-district cannot simply be equated with those in mainland regions because telecommunications infrastructure challenges are geographically specific and may require cooperation with private network providers.

Data security is also a particular concern. The absence of a guaranteed security mechanism to protect the privacy of village databases creates potential cybersecurity risks, including cyberattacks that could disrupt public services. This concern has been raised by several village governments in Banda Sub-district. The development of village e-government therefore needs to be accompanied by a clear legal framework for data management, privacy, and security.

E-Government Development Strategy in Banda Sub-district

Based on these identified barriers, this study formulates an e-government development strategy consisting of four continuous stages: preparation, maturation, consolidation, and utilization.

The Preparation Stage places the development of a master plan and regulations (regional regulations or regent regulations) as the main foundation. This step is important because, without a uniform regulatory framework at the district level, each village may continue to interpret and

implement e-government partially according to the capacity and understanding of its respective village government, as reflected in the differences between Boiyauw and other villages. Building websites for villages that do not yet have them, developing telecommunications networks, and cooperating with private parties through an MoU scheme are supporting measures to address the infrastructure gap that has long been a structural obstacle, particularly in island villages such as Ay, Hatta, and Rhun, which do not yet have village websites.

The Maturation Stage focuses on building human resource capacity through socialization and training in ICT management, as well as synchronizing policies from the village level through to the central government level. This stage directly addresses the problem experienced by Lonthoir Village, where the absence of a trained operator caused the village website to cease operating. Ongoing and documented training is needed so that the sustainability of website management does not depend on a particular individual (personal dependency) but instead becomes an institutional village capacity that can be transferred and maintained when personnel change.

The Consolidation Stage emphasizes the enactment of policies related to the electronic-based government system and the allocation of budgets within the Regional Revenue and Expenditure Budget (APBD) at the regency level and the Village Revenue and Expenditure Budget (APBDes) at the village level as a priority. This stage directly responds to the finding that budget constraints are a major factor associated with other barriers. By making e-government a planned budget priority, the sustainability of system maintenance—which has been a major obstacle even in Boiyauw—can be better supported, while coordination among the relevant Regional Government Agencies (OPD) can also be facilitated.

The Utilization Stage is the downstream stage that directs e-government not merely toward fulfilling administrative obligations but toward serving as a strategic instrument to promote village flagship products, facilitate community access to village data, create a space for transparency, document village programs, and increase the economic value of the tourism sector. This stage is relevant given the potential of Banda Sub-district as an archipelagic area with marine and historical tourism attractions, particularly Banda Neira, whose promotion through village websites has so far been largely limited to activity information and has not fully developed Government-to-Business (G2B) collaboration.

These four strategic stages are sequential but also mutually reinforcing, with the successful implementation of the utilization stage depending on the adequate fulfillment of the preparation, maturation, and consolidation stages. Thus, e-government development efforts in Banda Sub-district cannot be viewed as a short-term project completed merely through website creation. Instead, they require a long-term commitment from the regency, sub-district, and village governments, in line with the six readiness frameworks—data systems, legal basis, institutions, human resources, technological infrastructure, and leadership and strategic thinking—that are the focus of this study.

CONCLUSION

The implementation of e-government in village governance in Banda Sub-district remains limited and has not yet reached the expected standards of electronic-based public service delivery. The findings show that implementation is constrained by several interrelated factors, including limited human resources, inadequate ICT infrastructure, budget limitations, weak regulatory support, and differences in leadership commitment among village governments. These conditions have resulted in uneven utilization of village websites and electronic services, with several villages maintaining active websites while others have inactive websites or have not yet developed them. Therefore, strengthening institutional readiness and establishing a consistent regulatory framework are essential to ensure that e-government is implemented systematically across villages in Banda Sub-district.

The development of e-government should be carried out through coordinated and sustainable stages covering preparation, maturation, consolidation, and utilization. The Central Maluku Regency Government needs to establish an e-government master plan, implementation guidelines, and supporting regulations while also ensuring sustainable budget allocation, strengthening telecommunications infrastructure, and improving the ICT competence of village

officials through training and capacity-building programs. Cooperation with private parties may also support improvements in telecommunications infrastructure in areas with limited network access. Through these efforts, e-government can be developed not only as an administrative instrument but also as a means of improving public-service efficiency, transparency, accountability, access to village information, and the utilization of village economic and tourism potential.

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AUTHOR CONTRIBUTION STATEMENT

Mike J. Rolobessy, Mukhlis Fataruba, and Hendriyani Sigmarlatu contributed to the preparation and completion of this research and manuscript. All authors participated in the research process, discussed the findings, contributed to the preparation of the manuscript, and approved the final version for publication.

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