

Optimizing the Empowerment of BUMDes 'Pesaguan Mandiri' in Clean Water Provision to Improve the Health and Welfare of the Pesaguan Kanan Village Community

Salawati¹, Yanti Budiasih², Erion³

Institut Teknologi dan Bisnis Ahmad Dahlan, Indonesia

salawati0004@gmail.com¹, yantibudiasih@yahoo.com², erionmamin@gmail.com³

Submitted: 10th January 2025 | **Edited:** 23rd March 2025 | **Issued:** 01st April 2025

Cited on: Salawati, S., Budiasih, Y., & Erion, E. (2025). Optimizing the Empowerment of BUMDes 'Pesaguan Mandiri' in Clean Water Provision to Improve the Health and Welfare of the Pesaguan Kanan Village Community. *SCIENTIFIC JOURNAL OF REFLECTION: Economic, Accounting, Management and Business*, 8(2), 514-523.

ABSTRACT

This study aims to optimize the empowerment of BUMDes "Pesaguan Mandiri" in providing sustainable access to clean water to improve the health and well-being of residents in Pesaguan Kanan Village, Matan Hilir Selatan District, Ketapang Regency. Using a qualitative case study approach, data were collected through in-depth interviews, direct observations, and document analysis involving BUMDes managers, village officials, and local residents. The results indicate that the provision of clean water is hindered by several interrelated factors, including limited capital, lack of human resource capacity in financial and managerial aspects, and the scarcity of freshwater sources due to coastal seawater intrusion. Despite these challenges, BUMDes "Pesaguan Mandiri" plays a pivotal role in mobilizing village-owned resources and infrastructure to enhance clean water services. The novelty of this study lies in highlighting a community-based model for managing water resources in rural coastal areas vulnerable to seawater intrusion. The findings offer practical implications for local governments and development practitioners in formulating integrated and participatory strategies to strengthen BUMDes as a key actor in rural infrastructure development and public service delivery

Keywords: BUMDes Empowerment, Clean Water Access, Rural Development, Coastal Community, Seawater Intrusion

INTRODUCTION

Access to clean and safe water is a critical determinant of public health, socio-economic development, and environmental sustainability. Pesaguan Kanan Village, located in Matan Hilir Selatan District, Ketapang Regency, West Kalimantan, is a rural coastal area grappling with significant challenges in ensuring access to potable water. Geographically, the village lies in a lowland coastal zone vulnerable to seawater intrusion, which adversely affects groundwater quality. This situation is exacerbated during dry seasons, where freshwater scarcity forces residents to rely heavily on expensive bottled water or rainwater harvesting systems.

Pesaguan Kanan Village, with a population of approximately 2,458 people, is divided into four hamlets: Panca Karya, Tunas Harapan, Suka Mulya, and Bina Usaha. The socio-economic profile illustrates the community's vulnerability, as 47% of the population are housewives, 22.2% are laborers, and only 9% work as fishermen (Village

Profile, 2023). This economic structure limits the purchasing power of the community to secure alternative water sources, compounding the issue of water insecurity.

The absence of clean water has direct implications for the health and welfare of the residents. Rural coastal communities like Pesaguan Kanan are at higher risk of waterborne diseases, including diarrhea, skin infections, and parasitic illnesses, which disproportionately affect children and vulnerable populations (Rahma et al., 2022). These health burdens worsen the socio-economic condition, reducing labor productivity and increasing healthcare expenses.

Nationally, access to clean water remains a challenge for rural areas in Indonesia. According to BPS (2022), only 74% of rural households in Indonesia have access to safe drinking water, compared to 92% in urban areas. In coastal regions, the problem is aggravated by environmental issues such as seawater intrusion, which contaminates groundwater reserves and limits freshwater availability.

Seawater intrusion is not only an environmental issue but also a threat to social equity and rural livelihoods. The inability to secure clean water forces marginalized communities into a cycle of poverty, with increased health risks and financial burdens due to the purchase of alternative water sources. Without intervention, these conditions contribute to widening disparities between rural and urban populations.

In response to rural development challenges, the Indonesian government launched Badan Usaha Milik Desa (BUMDes) as part of Law No. 6 of 2014 on Villages, aimed at fostering local economic autonomy. BUMDes are expected to manage village-owned assets and deliver essential services, including clean water provision. This initiative aligns with Indonesia's broader Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2020-2024, which emphasizes reducing inter-regional development gaps and enhancing basic service delivery in disadvantaged areas.

BUMDes "Pesaguan Mandiri" was established in 2017 as part of this national movement, with the goal of addressing the village's clean water challenges. However, the enterprise faces persistent obstacles, including limited capital, inadequate infrastructure, and insufficient human resource capacity. From a theoretical perspective, this research draws on the principles of community empowerment (Ife & Tesoriero, 2016) and rural development theory (Adisasmita, 2013), which underscore the importance of participatory decision-making and institutional strengthening at the grassroots level. BUMDes serves as a manifestation of these principles, providing a platform for local actors to drive development initiatives tailored to community needs.

Globally, this issue aligns with Sustainable Development Goal (SDG) 6: Clean Water and Sanitation and SDG 13: Climate Action, reflecting the interconnectedness of water security, public health, and climate resilience. Coastal villages like Pesaguan Kanan represent the frontline of climate impacts, where rising sea levels and erratic weather patterns intensify vulnerabilities related to freshwater scarcity.

Although existing studies have explored BUMDes as a driver of rural economic growth (Falakhuddin, 2023; Ibad, 2024), research remains limited on its role in addressing water security within environmentally stressed coastal settings. This research aims to address this gap by examining the empowerment process of BUMDes "Pesaguan Mandiri" in Pesaguan Kanan Village. Accordingly, this study seeks to identify the environmental, financial, and institutional barriers to clean water access, assess the operational performance of BUMDes, and formulate strategies to enhance its capacity in delivering sustainable water services. The findings are expected to

contribute to both academic discourse and policy formulation on rural water security in Indonesia's coastal regions

LITERATURE REVIEW

Village-Owned Enterprises (BUMDes) are strategic instruments for developing the local economy based on the potential and needs of the community. According to the Regulation of the Minister of Villages PDRT No. 4 of 2015, BUMDes aim to improve village welfare through the management of enterprises that are both service-oriented and profit-driven. Empowerment of BUMDes refers to efforts to enhance institutional capacity, management quality, and community participation so that these enterprises can fulfill both economic and social functions in a sustainable manner. Suharto (2019) explains that empowerment is a process of increasing the capacity of individuals and institutions to make strategic decisions that can result in significant social and economic change.

Access to clean water is a fundamental human need and a recognized human right. The World Health Organization (WHO, 2020) emphasizes that clean water access directly contributes to improved public health, particularly in reducing waterborne diseases such as diarrhea, cholera, and skin infections. In the context of sustainable development, access to clean water is included in the Sustainable Development Goals (SDG 6). Research by Pratiwi & Nugroho (2020) highlights those local institutional interventions, such as BUMDes managing clean water provision, significantly improve the quality of life in rural areas where infrastructure tends to be lacking.

Community health and welfare are deeply linked to access to basic services, including clean water. The social determinants of health framework by Solar & Irwin (2019) highlights those environmental factors, including access to clean water, are crucial in determining a community's health outcomes. When clean water is readily accessible, communities are better protected from disease and are also more productive, which leads to increased income and improved welfare. BUMDes that effectively manage clean water services can thus act as catalysts for inclusive and sustainable rural development.

Optimizing the empowerment of BUMDes in clean water provision requires collaborative efforts among the village government, BUMDes administrators, and the community. The stakeholder collaboration theory by Bryson, Crosby & Stone (2019) underlines the importance of cross-sector partnerships in planning and implementing community-based programs. A participatory approach ensures that the community is not merely a service recipient but also plays a role in decision-making and oversight. In this way, BUMDes are empowered not just as economic entities but also as socially responsive institutions that meet the real needs of rural populations.

METHOD

Research Design

This research employed a qualitative case study approach to obtain an in-depth understanding of the clean water accessibility issues in Pesaguan Kanan Village. The qualitative method allowed for a comprehensive exploration of social, economic, and institutional factors affecting water provision. The case study design was selected to focus specifically on BUMDes "Pesaguan Mandiri" and its role in managing local water supply services. According to Yin (2018), case studies are appropriate when researchers seek to analyze contemporary phenomena within real-life contexts, especially in

complex situations such as rural water management under environmental stressors like seawater intrusion.

Research Target/Subject

The research subjects included:

1. Key stakeholders such as the management board of BUMDes "Pesaguan Mandiri."
2. Village officials, including the village head and secretariat staff.
3. Local community members, particularly those who experience water shortages and rely on BUMDes services.

Purposive sampling was used to select informants based on their roles and relevance to the research objectives.

Research Procedure

The research was conducted through several stages. First, preliminary observations were carried out in Pesaguan Kanan Village to identify key issues related to clean water access. Second, data collection was performed through in-depth interviews, participant observation, and document review. Finally, the data were analyzed thematically to interpret the findings and formulate strategic recommendations. The stages include; Initial village profiling and problem identification, Field data collection (interviews, observations, documentation), Data validation and triangulation, and Data analysis and report writing.

Instruments, and Data Collection Techniques

The instruments used in this study consisted of:

1. Interview guidelines to direct in-depth interviews with village officials, BUMDes managers, and local residents.
2. Observation checklist to record the physical condition of water facilities and community practices related to water use.
3. Document analysis forms for reviewing BUMDes financial reports, village documents, and related regulations.

The data collection techniques include:

1. In-depth Interviews: Conducted with key informants such as the village head, BUMDes managers, and local residents.
2. Participant Observation: The researcher directly observed water-related infrastructure, such as boreholes, pipelines, and refillable gallon production units.
3. Document Analysis: Secondary data were obtained from BUMDes reports, village profiles, and official records.

Data Analysis Technique

Thematic analysis was employed to interpret the qualitative data. This method involved coding and categorizing the data into themes that align with the research objectives, such as "factors limiting clean water access," "BUMDes operational challenges," and "strategies for water service improvement." Data validation was ensured through triangulation, member checking with informants, and peer debriefing with fellow researchers to maintain credibility and reliability.

RESULT

Factors Limiting Access to Clean Water in Pesaguan Kanan Village

The study revealed several interconnected factors restricting clean water access in Pesaguan Kanan Village. The primary issue is seawater intrusion, which has degraded groundwater quality, resulting in brackish and non-potable water, especially in coastal

hamlets. This environmental challenge worsens during the dry season, forcing residents to depend on rainwater or purchase bottled water at high costs.

Another key factor is the limited capital of BUMDes "Pesaguan Mandiri." Established with initial funding from the APBDes, BUMDes struggles to expand infrastructure due to financial constraints. The lack of additional investment limits its ability to construct deeper boreholes or extend pipelines to underserved areas.

Furthermore, human resource limitations are evident. The BUMDes management lacks expertise in financial reporting, technical operations, and project planning, resulting in inefficient water service delivery and low financial accountability. These findings align with prior studies (Falakhuddin, 2023; Ibad, 2024) highlighting how rural water supply systems often face compounded environmental and institutional challenges.

Additionally, the over-extraction of groundwater in coastal areas such as Pesaguan Kanan may contribute to land subsidence and further exacerbate seawater intrusion (Cahyadi et al., 2017), presenting long-term environmental risks if not managed sustainably. These findings align with prior studies (Falakhuddin, 2023; Ibad, 2024) highlighting how rural water supply systems often face compounded environmental and institutional challenges.

Environmental and Institutional Factors Limiting Access to Clean Water

The research findings highlight that Pesaguan Kanan Village faces multiple environmental and institutional challenges in securing clean water access. The most pressing issue is seawater intrusion, which has severely degraded groundwater sources. This condition is particularly critical in the coastal hamlets of Tunas Harapan and Suka Mulya, where boreholes yield brackish and undrinkable water. The phenomenon is worsened during prolonged dry seasons, leaving households dependent on costly bottled water or refillable gallon water supplied by BUMDes.

From an institutional perspective, BUMDes "Pesaguan Mandiri" operates under capital constraints. Although established in 2017, the enterprise's funding remains limited to initial village budget allocations (APBDes) and small-scale income from water distribution services. Consequently, the BUMDes is unable to expand its infrastructure, such as drilling new boreholes or extending water pipelines to remote coastal areas.

Organizational and Managerial Challenges within BUMDes "Pesaguan Mandiri"

The effectiveness of BUMDes in managing clean water services is also hampered by organizational and managerial deficiencies. Interviews revealed that BUMDes personnel lack formal training in financial management, project planning, and technical operations related to water resource management. The absence of standard operating procedures (SOPs) and financial accountability mechanisms weakens the institution's capacity to secure external funding or develop partnerships with government or private actors.

Additionally, coordination between BUMDes and village government remains suboptimal. While both institutions share the goal of improving community welfare, overlapping roles and weak communication have led to delays in project execution, particularly in infrastructure expansion.

Community Response and Water Usage Behavior

The research also identified mixed community responses to BUMDes water services. While inland hamlets such as Panca Karya benefit from piped water access, many coastal households remain underserved. Residents interviewed expressed

dissatisfaction over the unequal distribution of services and the financial burden of purchasing gallon water. However, most residents acknowledged BUMDes as a critical institution for village development, noting its efforts in employment creation and raising awareness on water conservation practices.

The community’s willingness to participate in village meetings and contribute to maintenance fees signals potential for greater engagement in future BUMDes projects.

SWOT Analysis of BUMDes “Pesaguan Mandiri”

Table 1. Population by Occupation in Pesaguan Kanan Village (2023)	
Strengths	Weaknesses
Village-owned assets and autonomy	Limited financial capital
Existing borehole and pipeline	Lack of skilled human resources
Community trust and support	Weak financial reporting
Opportunities	Threats
Potential partnerships (gov/private)	Seawater intrusion worsening
Support from village development programs	Climate change impacts
Demand for clean water increasing	Policy gaps at district level

Comparative Insights: Lessons from Southeast Asian Coastal Villages

Coastal villages across Southeast Asia face similar challenges related to water insecurity and seawater intrusion. For instance, studies in coastal communities in Vietnam’s Mekong Delta reveal that local cooperatives and village enterprises have adopted integrated approaches, combining groundwater management with rainwater harvesting systems (Tran et al., 2020). In the Philippines, the introduction of community-managed desalination units supported by NGOs has significantly improved water access in remote coastal barangays (Gonzales & Ramos, 2019).

These cases highlight key success factors, including:

1. Strong collaboration between community institutions and external partners (government and NGOs).
2. Diversification of water sources through technological interventions.
3. Community empowerment models that ensure local ownership and participation in water governance.

In contrast, BUMDes “Pesaguan Mandiri” has yet to implement alternative water sourcing strategies or establish partnerships that could enhance technical capacity and infrastructure development. Drawing lessons from these comparative cases, BUMDes in Pesaguan Kanan could explore the feasibility of hybrid models, such as integrating rainwater harvesting systems or small-scale desalination units into its existing water provision services.

The Impact of Water Scarcity on Village Livelihoods

Water scarcity in Pesaguan Kanan has significant socio-economic repercussions on local livelihoods. The limited availability of affordable and potable water reduces the productivity of households engaged in informal sectors, such as daily laborers and fisherfolk. Women, particularly housewives who comprise nearly 47% of the population, bear the brunt of these shortages as they are primarily responsible for securing water for domestic use. Reduced access to water directly affects agricultural productivity and fish processing activities, further limiting income-generating opportunities. Some households have reported reducing vegetable garden activities or limiting fish-smoking production due to water constraints. The economic burden is also intensified by the high costs of purchasing bottled or refillable gallon water, especially

The Role of BUMDes "Pesaguan Mandiri" in Clean Water Provision

Despite these limitations, BUMDes "Pesaguan Mandiri" plays a pivotal role in improving access to clean water. The organization operates four boreholes and produces refillable gallon water, distributing piped water to around 21 households. The inland hamlets benefit more from these services compared to coastal areas.

Additionally, BUMDes has contributed to local economic activities by creating jobs related to water production and distribution. Through community engagement, BUMDes raises awareness about water conservation and proper sanitation practices. This role is consistent with rural development principles emphasizing the empowerment of local institutions to address community needs (Adisasmita, 2013; Ife & Tesoriero, 2016). However, compared to BUMDes in other villages (Rahma et al., 2022), "Pesaguan Mandiri" exhibits limitations in scaling its services.

Trends in Clean Water Production

Table 2. Population by Occupation in Pesaguan Kanan Village (2023)

Occupation	Number of Residents	Percentage (%)
Housewife	1,152	47.0
Daily Laborer	542	22.2
Fisherman	214	9.0
Other occupations	550	21.8
Total	2,458	100

Source: Village Profile, 2023

The socio-economic composition shows that a large portion of the population relies on informal sectors, which affects their ability to afford bottled water, reinforcing dependency on local water services.

Table 3. Annual Refillable Gallon Production by BUMDes "Pesaguan Mandiri"

Year	Gallons Produced	Households with Piped Water
2018	9,321	7
2019	13,662	11
2020	19,342	21
2021	21,444	21
2022	14,225	21
2023	11,327	21

Source: BUMDes "Pesaguan Mandiri" Financial Report, 2023

The data shows a significant rise in production between 2018 and 2021, but a notable decline in 2022 and 2023 due to limited capital and aging infrastructure.

Linking to Global and National Context

The challenges experienced by Pesaguan Kanan are emblematic of broader issues faced by rural coastal communities globally. Similar patterns have been documented in Southeast Asia and other regions where climate change intensifies seawater intrusion and freshwater scarcity (Herrera-Pantoja & Hiscock, 2006). Nationally, BPS data (2022) confirms that rural areas, especially coastal zones, lag behind urban centers in accessing safe drinking water. This situation underscores the urgency of strengthening local institutions like BUMDes to meet SDG 6 targets and reduce rural-urban disparities.

Strategies to Enhance Sustainable Water Access

To address these challenges, the following strategies are recommended:

1. Capital Strengthening: Mobilize additional funding through partnerships with local governments and private sector initiatives.

2. Capacity Building: Organize training for BUMDes staff focusing on financial management, technical operations, and project planning.
3. Infrastructure Development: Expand borehole drilling projects and extend pipeline networks, especially to coastal hamlets.
4. Community-Based Approaches: Foster stronger community participation in planning, monitoring, and maintaining water facilities.

By implementing these strategies, BUMDes "Pesaguan Mandiri" can improve water security and contribute more effectively to rural development goals aligned with SDG 6 (Clean Water and Sanitation).

Broader Implications

The case of Pesaguan Kanan reflects common challenges faced by coastal villages in Indonesia, where seawater intrusion, underinvestment, and weak institutional capacity hinder sustainable water provision. Strengthening community-based institutions like BUMDes is crucial in promoting water security, improving public health, and achieving local economic resilience.

Additionally, there is a noticeable gap in district-level policies that could support BUMDes and village governments in overcoming financial and technical barriers. Strengthening community-based institutions like BUMDes is crucial in promoting water security, improving public health, and achieving local economic resilience

CONCLUSION

This study concludes that Pesaguan Kanan Village faces significant barriers to securing sustainable access to clean water, primarily due to environmental challenges such as seawater intrusion and institutional limitations within BUMDes "Pesaguan Mandiri." The village's geographic vulnerability as a coastal settlement exacerbates groundwater salinity issues, forcing residents to rely on costly alternative water sources. Despite these challenges, BUMDes "Pesaguan Mandiri" plays a crucial role in providing clean water services, particularly in inland hamlets, through borehole operations and piped water distribution. However, the institution's limited capital, insufficient technical capacity, and weak financial governance hinder its ability to expand infrastructure and service coverage.

This research also highlights mixed community responses and identifies gaps in coordination between BUMDes and the village government. The SWOT analysis reveals both opportunities and threats, suggesting that BUMDes must adapt its strategies to address evolving environmental and institutional dynamics. Comparative insights from coastal villages in Vietnam and the Philippines underscore the importance of adopting integrated water management models and forming partnerships with external stakeholders to strengthen local water governance. To improve water security and contribute to climate adaptation efforts, this study recommends the following strategic interventions:

1. Strengthening capital through multi-stakeholder partnerships.
2. Enhancing staff capacity in technical and managerial areas.
3. Expanding infrastructure to reach underserved coastal areas.
4. Advocating for stronger district-level policy support.
5. Promoting community participation in planning and monitoring processes.

The findings of this study are expected to contribute to the broader discourse on rural water security, BUMDes empowerment, and sustainable development in Indonesia's coastal regions. This research also aligns with national development

priorities and global goals such as SDG 6 (Clean Water and Sanitation) and SDG 13 (Climate Action).

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