



SWOT Analysis Of Raw Water Source Management At The Regional Drinking Water Company (PDAM) Tirta Hidayah, Bengkulu City

Sherly Marta Sahara ¹, Harius Eko Saputra ², Yanuar Rikardo ³

^{1,2,3} Administration Study Program Faculty of Social Sciences Universitas Dehasen Bengkulu

Email: sherly@gmail.com

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Abstract. This study aims to evaluate the strategic management of raw water sources at the Regional Drinking Water Company (PDAM) Tirta Hidayah in Bengkulu City using a SWOT analysis approach. The availability of clean water is a critical component for public health and sustainable development. However, water quality degradation due to pollution and climate change poses significant challenges for public utilities like PDAM. Employing a qualitative descriptive method, the research gathers data through direct observation, in-depth interviews with key stakeholders, and documentation analysis. The findings indicate that PDAM Tirta Hidayah possesses notable strengths, such as the application of modern water treatment technologies, adherence to health regulations including the Ministry of Health Regulation No. 2 of 2023, and a professional operations team. Nevertheless, several weaknesses persist, including limited treatment capacity, inconsistent water quality, high operational costs, and pollution of the Bentiring River, which is the primary water source. Opportunities for improvement lie in adopting advanced water processing technologies, fostering public-private partnerships, and increasing community awareness regarding water conservation. However, external threats such as climate variability and inadequate infrastructure remain pressing issues. Based on the SWOT analysis, a comprehensive strategic plan is recommended to enhance the effectiveness, efficiency, and sustainability of raw water management in Bengkulu. These strategies should address both internal shortcomings and external risks while leveraging existing organizational strengths and market opportunities. This study contributes to the broader discourse on public sector water governance and offers actionable insights for policymakers and utility managers.

Keywords: *SWOT Analysis, Water Resource Management, Public Utility, PDAM, Bengkulu.*

INTRODUCTION

The availability and management of clean water have become pressing global concerns, particularly in urban areas experiencing rapid development and population growth. As one of the most essential natural resources, water is not only vital for sustaining life but also for driving economic activity, public health, and environmental stability. In Indonesia, the issue of water security remains complex due to varying levels of infrastructure, geographical disparities, climate variability, and governance challenges (Puslitbang SDA, 2021). Among the institutions responsible for ensuring water access at the local level is the Regional Drinking Water Company, or Perusahaan Daerah Air Minum (PDAM), which plays a central role in distributing clean water to communities.

PDAM Tirta Hidayah, located in Bengkulu City, is one such institution tasked with managing the raw water sources and delivering safe water to residents. However, as the demand for clean water continues to rise, the challenges associated with maintaining the quality and sustainability of water sources have also become more significant. One of the major concerns is the degradation of the Bentiring River, which serves as a primary raw water intake.

The river has been subject to pollution from domestic and industrial activities, sedimentation, and seasonal fluctuations that affect both water quality and quantity. Furthermore, PDAM Tirta Hidayah must also contend with outdated infrastructure, increasing operational costs, and the need to comply with stringent health and environmental regulations such as the Indonesian Ministry of Health Regulation No. 2 of 2023.

The urgency of addressing these issues lies in the basic principle that access to clean water is a fundamental human right. The United Nations (2015) Sustainable Development Goal (SDG) 6 explicitly emphasizes the importance of clean water and sanitation, underscoring the necessity for efficient and equitable water management systems. For local governments and water utility companies, this means not only expanding service coverage but also ensuring the long-term sustainability of water sources through strategic planning and effective management practices.

Strategic analysis tools such as the SWOT framework—assessing Strengths, Weaknesses, Opportunities, and Threats—offer valuable insights into the internal and external factors influencing an organization's performance. SWOT analysis enables stakeholders to evaluate current operational capacities, identify growth opportunities, and mitigate potential risks (Gürel & Tat, 2017). By applying this framework to PDAM Tirta Hidayah, it becomes possible to generate a comprehensive understanding of the company's strategic position and inform policy recommendations for enhancing its performance.

In terms of internal strengths, PDAM Tirta Hidayah has adopted several key measures to improve service delivery. These include the use of chlorination and filtration technologies to meet national health standards, as well as efforts to professionalize staff and standardize operational procedures. However, weaknesses such as limited treatment capacity, outdated pipeline networks, and occasional service interruptions have compromised the utility's ability to meet consumer expectations and regulatory benchmarks. Financial constraints further complicate efforts to upgrade infrastructure and expand coverage to unserved areas, particularly in peripheral urban zones.

Externally, the company faces opportunities to improve through partnerships with private entities, technological innovations in water treatment, and increased public awareness about water conservation. However, these potential advantages are counterbalanced by threats including climate change-induced droughts, upstream pollution, and increasing competition for water resources among domestic, industrial, and agricultural users. Moreover, institutional fragmentation and limited coordination among local government agencies often result in inefficiencies and regulatory overlaps that hinder comprehensive water resource planning.

Research into PDAM Tirta Hidayah's strategic management is especially relevant given the increasing importance of integrated water resource management (IWRM) in Indonesia's policy discourse. IWRM emphasizes the coordinated development and management of water, land, and related resources to maximize social and economic welfare without compromising the sustainability of vital ecosystems (Global Water Partnership, 2000). Within this framework, PDAM must not only act as a service provider but also as a steward of the environment, ensuring that raw water sources are protected and sustainably managed.

This study, therefore, aims to analyze the management of raw water sources by PDAM Tirta Hidayah in Bengkulu City using a SWOT analysis framework. By identifying internal strengths and weaknesses as well as external opportunities and threats, the research seeks to develop strategic recommendations that can support the utility's operational and environmental goals. The study utilizes a qualitative descriptive methodology, combining data from interviews with PDAM management, local government representatives, and community members, as well as observations and document analysis.

In addition to contributing to the academic discourse on public utility management and environmental governance, the findings of this research are expected to provide practical value

for policymakers, PDAM executives, and other stakeholders involved in urban water management. Specifically, the study emphasizes the importance of a proactive and adaptive approach in addressing both technical and institutional challenges, thereby ensuring that clean water provision in Bengkulu City can be maintained and improved for future generations.

LITERATURE REVIEW

The Concept of Strategy

The term "strategy" originates from the Greek word *strategia*, meaning "the art of the general," and has evolved from a military context to a core concept in organizational management (Mintzberg, 1994). Strategy refers to an integrated set of actions and commitments that align organizational strengths with environmental opportunities and threats (Gluck, 1980). Chandler (1962) defined strategy as the determination of long-term goals and the allocation of resources necessary to achieve them. Contemporary definitions extend this view by incorporating adaptability and responsiveness to uncertainty (Tjiptono, 2019). Assauri (2013) outlines six simultaneous functions of strategy: communicating vision, linking strengths with opportunities, exploiting current success, mobilizing resources, directing future action, and responding to change. These strategic functions are particularly relevant to PDAMs operating in dynamic environmental and regulatory contexts.

SWOT Analysis Framework

SWOT analysis is a foundational tool for strategic planning that examines internal and external factors influencing an organization (Gürel & Tat, 2017). Internally, it considers **Strengths** and **Weaknesses**; externally, it evaluates **Opportunities** and **Threats**. In the context of PDAM Tirta Hidayah, strengths include modern treatment technology, regulatory compliance, and skilled personnel. Weaknesses involve pollution at the intake source, operational inefficiencies, and inconsistent water quality. Externally, opportunities exist in public-private partnerships, community engagement, and technological advancement. Conversely, threats such as climate variability and infrastructure limitations pose significant challenges. The SWOT framework aids in synthesizing these factors to develop strategic responses that align with organizational goals.

Strategic Management Theory

Strategic management encompasses a series of processes involving environmental scanning, strategy formulation, implementation, and evaluation (Wheelen & Hunger, 2003). It aims to align an organization's internal capabilities with external demands to ensure long-term sustainability. Salusu (2015) emphasizes that strategic management is not a one-time event but a continuous loop of feedback and adaptation. In the case of PDAM, strategic management is crucial for navigating the complexities of water treatment, regulation, and customer service.

The strategic management process follows four phases:

1. Environmental Scanning: Analyzing external threats (e.g., climate change, regulation) and internal capabilities (e.g., infrastructure, workforce).
2. Strategy Formulation: Developing long-term goals and action plans.
3. Strategy Implementation: Allocating resources and operationalizing the plans.
4. Evaluation and Control: Monitoring outcomes and adjusting strategies accordingly.

This cyclical model enables PDAM Tirta Hidayah to continually refine its approach to water resource management.

Public Utilities and Water Resource Governance

PDAMs are regionally owned enterprises tasked with delivering clean water under the supervision of local government (UU No. 23/2014). They play a dual role as public service providers and stewards of environmental resources. According to the Ministry of Health Regulation No. 2/2023, PDAMs must ensure that water quality meets standards for pH, turbidity, microbiological safety, and chemical content. Effective water governance requires not only technical competence but also institutional coordination. Integrated Water Resource Management (IWRM) is a widely endorsed framework that promotes the holistic management of water, land, and ecosystems (Global Water Partnership, 2000). IWRM principles encourage PDAMs to consider environmental, social, and economic dimensions in their strategic planning, particularly in addressing issues such as raw water pollution and seasonal variability.

METHODS

This study employs a descriptive qualitative research method, aiming to obtain a comprehensive understanding of the strategies used in managing raw water sources at PDAM Tirta Hidayah, Bengkulu City. Qualitative research is particularly suitable for capturing complex phenomena such as organizational strategy, internal operations, and stakeholder perceptions in a real-world setting (Creswell, 2014). The research focuses on exploring the internal strengths and weaknesses as well as external opportunities and threats (SWOT) that influence the effectiveness of raw water treatment and distribution. The unit of analysis is the PDAM Tirta Hidayah organization, particularly the water treatment plant at the Surabaya installation, which sources raw water from the Bentiring River. Data collection techniques included:

1. In-depth interviews with key informants such as the operational staff, laboratory personnel, technical managers, and representatives of the city government.
2. Participant observation, involving direct visits to the raw water intake site and the water treatment facility to document processes and operational conditions.
3. Document analysis, including standard operating procedures (SOP), water quality reports, government regulations (e.g., Ministry of Health Regulation No. 2/2023), and internal PDAM documentation.

Data were analyzed using a SWOT framework, categorizing findings into strengths, weaknesses, opportunities, and threats. This framework enabled the researchers to evaluate both the internal conditions of PDAM Tirta Hidayah and its external environment, leading to the formulation of strategic recommendations. Triangulation was used to validate findings by cross-referencing interview results, field observations, and documentary evidence. This method ensures the reliability and credibility of the research outcomes (Patton, 2002). In conclusion, the methodological approach adopted in this study provides a structured yet flexible framework for understanding strategic challenges and potentials in municipal water resource management.

RESULTS

The analysis of raw water source management at PDAM Tirta Hidayah Bengkulu was conducted using the SWOT framework, synthesizing data obtained from interviews, field observations, and document review. The findings highlight the internal capabilities and challenges of the organization, as well as the external factors influencing its operations. Below is a detailed elaboration of the results grouped into Strengths, Weaknesses, Opportunities, and Threats.

1. Strengths

One of the prominent strengths of PDAM Tirta Hidayah lies in its water treatment process, which utilizes physical, chemical, and biological methods to comply with quality standards outlined in the Ministry of Health Regulation No. 2 of 2023. The Surabaya installation, which

sources raw water from the Bentiring River, employs sedimentation, filtration, and chlorination processes. These methods ensure the reduction of turbidity and elimination of pathogenic microorganisms, thus meeting safety benchmarks for public consumption. Additionally, the PDAM benefits from having competent and well-trained personnel, particularly in the laboratory and technical units. The operational team displays a high level of awareness regarding standard operating procedures and demonstrates the ability to respond to emergency conditions, such as seasonal changes in water turbidity or pipeline maintenance. Another internal strength is the availability of an in-house water quality laboratory. This allows real-time monitoring of raw and processed water, ensuring immediate corrective actions when deviations are detected. Data from the lab is used to adjust treatment dosages and validate that output meets chemical and microbiological standards.

2. Weaknesses

Despite the aforementioned strengths, the institution faces critical weaknesses. A major issue is the decreasing quality of the Bentiring River, the main raw water source. Interviews with PDAM staff and direct observations reveal that the river experiences frequent contamination due to upstream activities, including domestic waste discharge and small-scale industrial runoff. As a result, the raw water entering the plant often exceeds turbidity limits, especially during the rainy season. Moreover, the current capacity of the water treatment installation is insufficient to meet the growing demand for clean water in Bengkulu City. Although the installed capacity theoretically supports the needs of a substantial portion of the population, actual performance is hindered by aging equipment, frequent breakdowns, and inconsistent water pressure across the distribution network. Another internal limitation is the absence of automated monitoring systems in several parts of the plant. While the laboratory performs manual testing regularly, the lack of online sensors means that sudden spikes in contamination levels might not be addressed promptly. This gap poses a risk to public health and regulatory compliance. Furthermore, the operational budget remains constrained, making it difficult to invest in infrastructural upgrades or modern technologies. Financial dependency on government subsidies limits PDAM's flexibility in responding to technical challenges or initiating service expansion projects.

3. Opportunities

Externally, PDAM Tirta Hidayah stands to benefit from several potential opportunities. First, technological innovation in water treatment offers cost-effective and energy-efficient solutions. Technologies such as membrane filtration, UV disinfection, and IoT-based monitoring systems could significantly enhance water quality and operational responsiveness. Second, increased public awareness and education about water conservation presents a social opportunity. Campaigns aimed at promoting responsible water use and discouraging river pollution could reduce pressure on raw water sources and foster community support for PDAM initiatives. Third, regulatory reforms at the national level increasingly emphasize the autonomy of regional enterprises. With greater legal and institutional flexibility, PDAM can explore public-private partnerships (PPP) or collaborative projects with NGOs and universities to enhance its capacity. Such partnerships could assist in funding infrastructure upgrades or implementing research-driven solutions to local water challenges. Fourth, the implementation of integrated urban water management policies by local government opens avenues for better inter-agency coordination. This includes aligning waste management, land use planning, and water resource protection under a common framework, potentially reducing the environmental impact on raw water sources.

4. Threats

Despite these opportunities, PDAM Tirta Hidayah is exposed to several external threats. Climate variability, especially the increase in extreme weather events, poses a serious risk to water availability. The region's rainy season can lead to high turbidity and flash floods, while the dry season brings reduced flow and concentration of pollutants. These conditions complicate the treatment process and may compromise water safety if not managed effectively. Rapid urbanization and land-use change are also contributing to raw water source degradation. The unregulated expansion of housing and commercial areas along riverbanks has led to increased sedimentation, solid waste accumulation, and non-point source pollution, all of which burden PDAM's water treatment systems. Another threat is limited enforcement of environmental regulations. Although laws exist to protect river ecosystems, lack of consistent monitoring and political will has resulted in ongoing violations by individuals and industries. This institutional gap diminishes the effectiveness of upstream conservation efforts and shifts the burden of water quality management onto PDAM alone. Additionally, competitive pressure from alternative water sources, such as private bore wells and bottled water companies, could erode PDAM's customer base, particularly if service reliability or perceived water quality remains subpar.

DISCUSSION

The findings of this study reveal a multifaceted picture of raw water source management at PDAM Tirta Hidayah Bengkulu, characterized by a mix of internal capabilities and external constraints. When contextualized within the framework of strategic management theory and existing literature on public utility performance, several critical insights emerge. Firstly, the strengths identified—namely, the presence of modern treatment processes, a qualified operational team, and a functioning internal laboratory—align with what Chandler (1962) and Gluck (1980) describe as core organizational assets necessary for long-term strategic sustainability. These strengths place PDAM in a relatively stable position to fulfill its basic service mandate. However, as Wheelen and Hunger (2003) argue, strategic capability must be dynamic and responsive to external turbulence. Without constant reinvestment in capacity-building, even strong internal systems may become obsolete. The weaknesses uncovered in the research—such as raw water contamination, limited treatment capacity, budget constraints, and manual operations—are consistent with observations in other studies on public utilities in Indonesia (Lambey, 2023; Suratmojo, 2022). These findings reinforce the notion that infrastructural limitations are not merely technical problems but also managerial and financial ones. PDAM's inability to upgrade its systems stems from broader structural issues, including its dependency on government funding and lack of tariff autonomy, which inhibit strategic agility. From an external perspective, the opportunities identified in this study—such as technological innovation, public education, regulatory support, and partnership potential—demonstrate a favorable environment for reform.

This is in line with the principles of Integrated Water Resource Management (IWRM), which emphasize cross-sectoral collaboration and stakeholder engagement (Global Water Partnership, 2000). PDAM's leadership could leverage these opportunities by developing pilot projects with universities or NGOs to trial new water treatment methods or awareness campaigns, which may attract additional funding or technical expertise. However, these opportunities are not without risk. The threats—including climate variability, unregulated urban expansion, poor enforcement of environmental laws, and competition from alternative sources—highlight the fragility of the current system. These findings echo the argument made by Bryson (2005) regarding strategic issues: if left unaddressed, they can compromise not only service quality but also institutional legitimacy. PDAM must consider not just operational fixes but also

long-term risk management plans that incorporate climate adaptation and regulatory engagement. A key theoretical contribution of this study lies in its application of the SWOT framework as a strategic diagnostic tool. While SWOT is often criticized for its simplicity, this study shows that when coupled with qualitative field data and context-specific analysis, it can produce actionable insights. For instance, recognizing that limited infrastructure (a weakness) is exacerbated by environmental pressures (a threat), PDAM can develop a strategic alignment approach—using its internal strengths (trained personnel, SOP adherence) to pursue external support mechanisms (such as PPPs or regional resilience funds). Furthermore, the study supports Assauri's (2013) emphasis on the importance of strategy in linking internal capacity with external opportunity. PDAM's challenge now is not only to recognize these relationships but also to institutionalize them through strategic planning processes, such as setting performance indicators, budgeting for innovation, and embedding environmental risk in operational policies. In summary, PDAM Tirta Hidayah operates within a constrained but strategically navigable environment. The key to sustaining and improving service lies in its ability to translate SWOT findings into a structured action plan that is both technically feasible and politically supported. By aligning its internal strengths with external opportunities, while mitigating weaknesses and threats, PDAM can enhance its role as a reliable public utility and a proactive environmental steward.

CONCLUSION

This study has examined the strategic management of raw water sources at PDAM Tirta Hidayah Bengkulu through the lens of SWOT analysis. The research reveals that while the organization has developed certain internal strengths—such as its professional operational team, internal laboratory, and use of standardized treatment methods—it simultaneously struggles with significant limitations, including infrastructure deficiencies, raw water pollution, and limited financial flexibility.

Externally, PDAM operates in an environment that presents both risks and potential gains. Opportunities such as technological innovation, community education, and regulatory support could serve as leverage points to improve service quality and sustainability. However, these are tempered by threats including climate change, environmental degradation, and weak enforcement of upstream pollution controls.

From a strategic standpoint, PDAM Tirta Hidayah must transition from a reactive to a proactive management approach. This includes strengthening internal systems through automation and training, while actively seeking external collaboration and funding for infrastructure upgrades. The SWOT analysis provides a roadmap for aligning the organization's internal capacities with emerging external challenges and opportunities.

Ultimately, the sustainability of clean water supply in Bengkulu depends not only on the technical capacity of PDAM but also on institutional leadership, community engagement, and integrated policy support. By embedding strategic planning into its organizational practices, PDAM can better fulfill its dual mandate as both a public utility and a steward of environmental resources.

LIMITATION

While this study provides valuable insights into the strategic management of raw water sources at PDAM Tirta Hidayah, it is important to acknowledge several limitations that may affect the generalizability and depth of the findings. First, the research was conducted using a qualitative descriptive method with a relatively limited number of key informants. Although triangulation was applied through interviews, observations, and document analysis, the scope of

perspectives was constrained to internal stakeholders. Broader engagement with external actors—such as environmental NGOs, community representatives, or upstream polluters—could have provided a more holistic view of external threats and opportunities. Second, the analysis is context-specific, focused solely on PDAM Tirta Hidayah in Bengkulu City. Therefore, the findings may not fully reflect the operational realities of other PDAMs in different regions of Indonesia, which may vary in terms of institutional structure, water sources, and socio-political conditions. Third, the SWOT framework, while useful for mapping strategic factors, does not offer in-depth prioritization or quantification of each element. The absence of quantitative tools such as TOWS Matrix, Balanced Scorecard, or performance benchmarking may limit the capacity to evaluate the relative weight or urgency of each strategic issue. Lastly, the study did not incorporate longitudinal data. As a result, trends in water quality, financial performance, or institutional development over time were not analyzed. Future studies could address this by integrating time-series data to assess whether implemented strategies yield measurable improvements. These limitations, however, do not diminish the relevance of the findings but rather suggest areas for further research and institutional reflection.

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