

Optimization of Clean Water Services by PERUMDA Tirta Bhagasasi

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Abstract

This study analyzes the optimization of clean water services provided by PERUMDA Tirta Bhagasasi in Bekasi Regency, focusing on institutional performance, service quality, and key factors influencing service delivery. Using a qualitative descriptive case study approach, data were collected through interviews, field observations, and document analysis. The findings show that clean water services have not yet reached optimal standards, as indicated by unequal service distribution, inconsistent water quality, fluctuating water pressure, and limited-service continuity in several areas. Structural constraints such as aging infrastructure, high non-revenue water (NRW), declining raw water quality, and insufficient budget allocation significantly hinder service improvement. Managerial issues, including limited coordination, gaps in human resource competence, and inadequate complaint-response mechanisms, further weaken service effectiveness. The study concludes that optimizing service performance requires an integrated strategy involving infrastructure rehabilitation, capacity enhancement, digital innovation, institutional strengthening, sustainable raw water management, and multi-stakeholder collaboration. These efforts are essential to ensure equitable, efficient, and sustainable clean water services for the growing population of Bekasi Regency.

Keywords: *Clean Water Services, Public Service Optimization, PERUMDA Tirta Bhagasasi.*



A. INTRODUCTION

Clean water services constitute one of the most essential public needs that must be managed effectively and efficiently to ensure availability, quality, and accessibility for all citizens. PERUMDA Tirta Bhagasasi holds a critical role as the primary regional water utility serving both Bekasi City and Bekasi Regency. Its strategic position is reinforced by the growing population, rapid urbanization, and extensive industrial development in Bekasi, which collectively increase the demand for reliable, high-quality clean water services. Despite its importance, the company faces complex challenges arising from institutional, technical, managerial, and environmental factors.

A key structural issue concerns the dual ownership of PERUMDA Tirta Bhagasasi by both the Bekasi City and Regency governments. This shared ownership frequently creates coordination difficulties, especially in areas such as investment decision-making, tariff adjustments, and the establishment of service development priorities. Ambiguities in authority distribution and differing political or administrative interests often hinder the acceleration of service optimization programs. Consequently, a comprehensive assessment of the company's performance becomes urgent in order to determine its capacity to maintain water

quality standards, meet increasing consumption needs, and ensure equitable distribution of services.

From a public health perspective, the Ministry of Health emphasizes the importance of adequate and safe drinking water, recommending a daily consumption of at least two liters for Indonesian adolescents and adults. Therefore, both the quantity and quality of water must adhere to established standards. Regulations on water quality covering classifications from Class I to Class IV define the minimum water quality requirements for various uses, ranging from drinking water production to agricultural irrigation. These regulations are intended to preserve ecological functions, guide water quality management, and prevent water pollution in a sustainable manner.

Historically, PERUMDA Tirta Bhagasasi has operated since the early 1980s, providing water services to the Bekasi region even before the administrative separation between the city and regency in 1997. While its service area has expanded over time, the company continues to face persistent issues including limited service coverage, high levels of network leakage, customer dissatisfaction, and infrastructure constraints. These problems indicate the need for responsible and professional management in accordance with public sector efficiency and effectiveness principles. Scholars such as Bahrullah Akbar (2021) underscore that the success of regional public companies depends on strong internal control systems, transparent decision-making, and performance reporting that prioritizes public interest.

Technically, clean water scarcity in Bekasi is heightened by population growth, increased per-capita water use, and pressure on raw water sources. Studies (Albulescu, 2012) demonstrate that population growth exacerbates water scarcity, a condition particularly relevant for Bekasi due to its proximity to Jakarta and its rapid socio-economic development. Addressing water scarcity requires two basic approaches: ecological resilience which focuses on maintaining the integrity of ecological systems and engineering resilience, which emphasizes improving the efficiency and reliability of water supply systems. For Bekasi, engineering resilience is more feasible, as ecological management often involves multi-regional coordination beyond local authority.

Nationally, research and reports from the Ministry of Public Works reveal that many regional water utilities continue to struggle with technical inefficiencies, high non-revenue water (NRW) levels, and weak financial management (Miranti, 2022). These challenges must be addressed to help Indonesia achieve Sustainable Development Goal (SDG) 6 on Clean Water and Sanitation. Furthermore, the 2024 Sustainable Development Goals Report highlights the urgency for local governments to expand equitable access to safe drinking water. In the context of public sector modernization, digital innovation is increasingly recognized as a key strategy. Studies (Mistoro et al., 2025) show that digitalization enhances transparency, responsiveness, and organizational performance innovations that PERUMDA Tirta

Bhagasasi must adopt, including smart water management systems, e-billing, and digital service portals.

Despite various improvement efforts, customer complaint data from January to August 2025 reveal persistent service gaps. A total of 25,428 complaints were submitted through channels such as WhatsApp, Front Desk, telephone, and social media, indicating substantial dissatisfaction with service delivery. Branches in densely populated and industrial areas such as Babelan, Tarumajaya, Pondok Ungu, and Bekasi City recorded the highest number of complaints, reflecting a mismatch between service capacity and local demand. These conditions illustrate the gap between public expectations and the actual performance of the company.

According to Cheema (Blunt & Rondinelli, 1997), public service delivery should be responsive, efficient, transparent, and participatory. However, current conditions show limited responsiveness, slow complaint resolution, and inadequate service innovation. Previous studies on Tirta Bhagasasi generally focused on operational performance or water quality, but few have examined comprehensive optimization strategies integrating managerial, policy, and community participation dimensions.

Given these gaps, this research focuses on optimizing clean water service delivery by PERUMDA Tirta Bhagasasi through the lens of decentralized governance and Cheema's framework. This study aims to evaluate the alignment of existing service conditions with regulatory standards, assess the sustainability of water management, identify key and priority factors in service improvement, and propose strategic recommendations for strengthening the water supply system. Ultimately, this research is expected to contribute to academic discourse on public administration and provide practical insights for policymakers and PERUMDA management in enhancing clean water infrastructure, governance, and long-term service sustainability in Bekasi Regency.

B. LITERATURE REVIEW

The theoretical framework of this study is built upon several interrelated bodies of theory that together provide a comprehensive lens for analyzing the optimization of clean water services by PERUMDA Tirta Bhagasasi. At the core is Cheema's (Blunt & Rondinelli, 1997) concept of decentralization and public service governance, which emphasizes the redistribution of authority, responsibilities, and resources from central to local levels to improve responsiveness and efficiency in public service delivery. Cheema highlights three key dimensions: the institutional structure, which concerns organizational arrangements and legal authority; management functions, which encompass planning, organizing, directing, and monitoring; and resource management, which includes the allocation and utilization of financial, human, and technological resources. In the context of PERUMDA Tirta Bhagasasi, these dimensions are particularly relevant given its dual ownership by Bekasi City and Bekasi Regency, which creates coordination challenges in decision-making, investment, and service development policies.

Complementing this perspective is the public sector performance and regional public company management approach, which views regional public enterprises not only as economic entities but also as instruments for fulfilling social mandates. Bahrullah Akbar (2022) stresses the importance of internal control systems, clear decision-making mechanisms, and performance-based reporting as fundamental elements in ensuring transparency, accountability, and alignment with public interests. These principles are essential for evaluating how PERUMDA Tirta Bhagasasi manages its operations, balances financial sustainability with public service obligations, and responds to citizen needs in the provision of clean water services (Wijayanti & Setyawan, 2022). Service performance is further illuminated through theories of customer satisfaction and service quality, particularly the SERVQUAL dimensions of reliability, responsiveness, assurance, empathy, and tangibles (Mareta Dewi & Mursyidah, 2022). The high number of customer complaints recorded by Tirta Bhagasasi indicates gaps across these dimensions and underscores the need to assess how far existing services meet user expectations.

The framework also incorporates the concept of system resilience in water service management, which can be understood through ecological and engineering resilience. Ecological resilience relates to the capacity of natural systems such as watersheds and river basins to maintain their functions amid disturbances, while engineering resilience focuses on the reliability and efficiency of built infrastructure, including treatment facilities, distribution networks, and reservoirs (Sinha et al., 2023). Given that many raw water sources are transboundary and require inter-regional coordination, ecological resilience presents complex governance challenges. Therefore, in the case of PERUMDA Tirta Bhagasasi, engineering resilience becomes a more directly manageable domain, as it is closely linked to internal improvements in non-revenue water reduction, pipeline maintenance, and operational reliability (Zampieri, 2021).

Furthermore, the study is anchored in the framework of sustainable development, particularly Sustainable Development Goal (SDG) 6 on Clean Water and Sanitation, which calls for universal, safe, and sustainable access to drinking water (Glass, 2023; Muarif, 2025). Sustainability in this context is viewed in environmental, economic, and social terms: protecting and preserving water resources, ensuring cost-effective and financially viable operations, and guaranteeing equitable access for different social groups and geographic areas. National disparities in access to clean water highlight the strategic importance of optimizing the performance of regional water utilities such as PERUMDA Tirta Bhagasasi, positioning the company as a key actor in the local realization of global development targets.

Finally, the theoretical framework integrates the perspective of digital innovation in public service management. Contemporary public administration literature shows that digitalization through tools such as smart water management systems, e-billing, GIS-based monitoring, and online complaint-handling platforms can significantly enhance efficiency, transparency, responsiveness, and data-driven

decision-making. Studies on e-leadership and institutional readiness emphasize that the success of digital transformation depends not only on technology, but also on leadership capacity, organizational culture, and institutional arrangements. In the case of PERUMDA Tirta Bhagasasi, the adoption of digital innovations is seen as a strategic pathway to improving service quality, strengthening revenue management, and increasing customer satisfaction. Taken together, these theoretical strands decentralization and governance, public enterprise management, resilience, sustainable development, digital innovation, and service quality form an integrated analytical framework for examining the current performance of PERUMDA Tirta Bhagasasi and for formulating strategies to optimize its clean water service delivery in Bekasi.

C. METHOD

The research method used in this study is a qualitative approach with a descriptive case study design. In general, research methods are understood as systematic and structured ways to obtain information relevant to a particular research problem. Sugiyono defines research methods as a scientific way of obtaining valid data with the aim of discovering, developing, and proving certain knowledge so that it can be used to understand, solve, and anticipate problems in a given field. In this sense, research methods are closely tied to the characteristics of scientific inquiry, namely rational, empirical, and systematic thinking. On this basis, the research method in this study is understood as a scientific procedure for generating data that serve specific purposes and uses in the context of public administration and public service management (Sugiyono, 2013).

This study adopts a qualitative approach because the main focus is not on numerical measurement, but on exploring processes, meanings, and the dynamics of governance in clean water service delivery. Qualitative research, as explained by Sugiyono (2013), is grounded in a post-positivist philosophy and is used to investigate natural conditions of the research subject, where the researcher acts as the key instrument. Data collection is conducted through triangulation techniques (a combination of several methods), data analysis is inductive or qualitative in nature, and the results place greater emphasis on meaning rather than generalization. Such an approach is particularly relevant for understanding how principles of governance, management, and sustainability are applied in the operations of PERUMDA Tirta Bhagasasi in Bekasi Regency.

In line with qualitative traditions, this study employs a descriptive case study design. According to John and David, qualitative research can take various designs, including descriptive method, narrative research, phenomenology, grounded theory, ethnography, and case study. The researcher chose a descriptive case study design in order to provide a detailed and in-depth portrayal of the research object. Through this design, the study seeks to explore and understand the optimization of services and the sustainability strategies of clean water provision implemented by PERUMDA Tirta Bhagasasi. The descriptive orientation enables the researcher to

systematically describe the existing conditions, governance practices, and policy implementations without manipulating the research setting.

The case study focuses on clean water service provision by PERUMDA Tirta Bhagasasi in Bekasi Regency, particularly in relation to efforts to optimize services and develop sustainable strategies. Data are expected to be obtained from various sources such as documents, observations, and interviews with relevant stakeholders, and then analyzed inductively to identify patterns, themes, and relationships among concepts. Referring to Sadu Wasistiono (2024), the descriptive case study design is considered appropriate for capturing the complexity of public service performance and institutional arrangements in regional public companies. Through this methodological framework, the study aims to produce rich, contextually grounded descriptions and interpretations that can contribute both to theoretical development in public administration and to practical improvements in the management of clean water services.

D. RESULT AND DISCUSSION

1. Discussion of the Optimization of Clean Water Services by PERUMDA Tirta Bhagasasi

The findings of this study show that the optimization of clean water services by PERUMDA Tirta Bhagasasi in Bekasi Regency is still at a developing stage and has not yet reached an optimal condition as expected in public service standards. From an institutional and organizational perspective, the company formally possesses a clear organizational structure, division of tasks, and standard operating procedures (SOPs) that are aligned with the regulatory framework governing regional public companies (BUMD). The existence of a Board of Directors supported by technical and non-technical units indicates that the institutional design is, in principle, adequate to support the core functions of water production, distribution, financial management, and customer services. However, at the implementation level, there remains a gap between the normative design and actual practice. Overlapping duties between units, particularly between technical and customer service units in handling service disruptions and complaints, as well as the dominance of vertical, administrative coordination, illustrate that organizational mechanisms have not fully supported fast, integrated, and customer-oriented service delivery.

Coordination and communication among service units still tend to be structural and reactive rather than substantive and preventive. Coordination is generally activated when there is a service problem, rather than institutionalized as a continuous, integrated process to manage risks and improve service quality. Horizontal coordination between production, distribution, technical operations, and customer service units has not functioned optimally, resulting in fragmented responses to disruptions, slow resolution of complaints, and inconsistencies in information delivered to customers. In terms of public service theory, this condition indicates that the "whole-of-organization" approach has not yet been fully realized,

and that sectoral ego and fragmented information flows remain an obstacle to optimal service performance.

The analysis of service performance through the dimensions of quality, quantity, and continuity of water supply further demonstrates that service optimization is still constrained by both technical and governance factors. Technically, the water treatment processes follow established standards, yet customers in certain areas still report cloudy water, fluctuating pressure, and intermittent flows, especially during peak usage hours and in peripheral service zones. This indicates that, while production and treatment may meet technical standards at the plant level, the quality and reliability of water at the consumer's tap are not yet uniform across service areas. Quantitatively, total production capacity is generally considered sufficient on paper, but high non-revenue water (NRW), aging infrastructure, and unequal distribution capacity weaken the effective availability of water to end-users. Continuity of supply is also not guaranteed for all customers over 24 hours, prompting households in some areas to rely on storage tanks or alternative water sources, which in turn reduces public trust in the utility.

From a systems perspective, the capacity of the service network covering production, storage, and distribution has not fully kept pace with rapid growth in population, housing developments, and industrial expansion in Bekasi Regency. Existing production units and transmission–distribution networks are under increasing pressure due to rising demand, while modernization and expansion of infrastructure have not progressed proportionally. High levels of leakage and physical losses in the network diminish effective capacity and further reduce service equity. At the same time, PERUMDA Tirta Bhagasasi has developed multiple complaint channels front desk, WhatsApp, telephone, email, and social media (Instagram and Facebook) which in principle broaden citizens' access to the institution and strengthen participation in service evaluation. However, the absence of a fully integrated complaint management system means that the large volume of complaints is not yet transformed into structured data for strategic decision-making and continuous quality improvement. Responsiveness to complaints is often adequate at the initial administrative stage, but follow-up actions are not always consistent, timely, or transparently communicated, so that the company's formal responsiveness has not been matched by a sustained substantive improvement in service.

In summary, the discussion on the optimization of clean water services shows that PERUMDA Tirta Bhagasasi has made significant efforts in improving institutional arrangements, expanding service coverage, and diversifying complaint channels, but these efforts have not yet fully overcome structural, technical, and managerial constraints. The gap between formal service standards and user experiences is mainly rooted in weaknesses in coordination, network capacity, quality control along the distribution chain, and the use of complaint data as a strategic governance instrument. Therefore, service optimization requires not only technical improvements in production and distribution, but also a deep

strengthening of internal governance, inter-unit coordination, information management, and responsiveness as core elements of public service performance.

2. Discussion of the Factors Influencing the Optimization of Clean Water Services

The optimization of clean water services by PERUMDA Tirta Bhagasasi is strongly influenced by a number of interrelated factors, particularly the competence of human resources, the condition and sustainability of raw water sources, the physical condition of treatment installations, the robustness of the distribution network, and the availability of financial resources. First, human resource competence emerges as a central factor affecting both operational efficiency and the quality of interactions with customers. The research indicates that, although many employees have adequate basic knowledge of production, distribution, and regulatory aspects, there are still gaps in specialized technical knowledge (such as leakage control and network optimization), the use of information technology, and performance-based service management. Skill levels in problem-solving, data analysis, and the use of digital tools are uneven, and variations in attitudes and professional behavior reflect that the internalization of public service values such as responsiveness, empathy, and accountability has not yet been equal at all levels. This imbalance between knowledge, skills, and attitudes directly affects the consistency and quality of service delivery in the field.

Second, the condition of raw water sources constitutes a structural challenge that fundamentally shapes the limits of service optimization. PERUMDA Tirta Bhagasasi depends heavily on surface water from major rivers, complemented by some use of groundwater. However, surface water quality is increasingly under pressure from domestic wastewater, industrial activities, and rapid urbanization along river corridors. These environmental pressures require more complex treatment processes, greater use of chemicals, and more intensive monitoring, which increase operational costs and vulnerability to service disruptions. Seasonal fluctuations in river discharge during the dry season also reduce the security of water supply, especially when demand continues to increase. From the perspective of sustainable public service provision, the limited quality and reliability of raw water sources undermine the ability of the utility to provide stable, safe, and equitable services over the long term, unless accompanied by integrated watershed management and multi-sector coordination.

Third, the physical condition of treatment installations and distribution infrastructure significantly influences the actual performance experienced by customers. Several water treatment plants and components of mechanical–electrical equipment have operated for decades and are experiencing declining efficiency. Aging facilities, combined with limited investment in rehabilitation and modernization, reduce the overall capacity and operational resilience of the system. In the distribution network, old pipes, leaks, pressure imbalances, and inadequate expansion to new growth areas contribute to high non-revenue water and prevent

effective service equalization. The network's vulnerability to external environmental influences such as infiltrations from polluted soil or groundwater also increases the risk of secondary contamination, even when water quality at the plant outlet meets standards. This condition illustrates that infrastructure, as a core physical resource, is not yet fully capable of supporting the level of service quality and reliability expected by citizens.

Fourth, financial capacity and budget availability are determining factors that either enable or constrain optimization efforts. The company's funding sources derived from operating revenues, capital injections from the regional government, and certain government programs are sufficient to sustain routine operations, but relatively limited for large-scale investment needs. A considerable portion of the budget is absorbed by fixed operational costs (electricity, routine maintenance, and personnel expenses), leaving a narrow fiscal space for the expansion of networks, replacement of obsolete pipes, and upgrading of treatment plants. In terms of public service theory, the insufficiency of development-oriented budget allocation slows down the achievement of minimum service standards and delays the realization of equitable access for all regions within the regency. This condition reflects the close link between regional fiscal capacity, political commitment to the water sector, and the quality of basic services received by the population.

Taken together, the discussion of these factors indicates that the optimization of clean water services by PERUMDA Tirta Bhagasasi cannot be understood solely as a technical issue of improving production and distribution systems. It is the outcome of an interaction between human resource competence, environmental and resource constraints, infrastructure quality, and financing structures. Weaknesses in any one of these dimensions can undermine improvements in the others and result in partial, unsustainable service enhancements. Therefore, future optimization strategies must adopt an integrated approach that simultaneously strengthens human resources through continuous capacity building, secures and protects raw water sources through environmental governance, modernizes treatment and distribution infrastructure, and enhances budget availability through innovative financing and stronger regional government support. Only through such a comprehensive approach can PERUMDA Tirta Bhagasasi move closer to the ideal of providing clean water services that are effective, efficient, equitable, and sustainable for the residents of Bekasi Regency.

E. CONCLUSIONS

The clean water services provided by PERUMDA Tirta Bhagasasi have not yet reached an optimal level in accordance with public service standards and community expectations. There remains a clear gap between the formal service standards and the actual conditions experienced by residents. This is reflected in the unequal distribution of services across regions, fluctuations in water pressure and continuity especially during peak hours and in peripheral areas and variations in water quality received by customers. These shortcomings are increasingly critical in

the context of rapid population growth, expansion of residential areas, and industrial development in Bekasi Regency, which continuously raise the demand for safe and reliable clean water.

The research identifies several structural and managerial constraints that significantly hinder the improvement of service performance. The main challenges include limited and aging infrastructure, particularly in the transmission and distribution network, which contributes to a high level of water loss (non-revenue water) due to leakage and physical deterioration of pipes. In addition, the capacity of water treatment facilities has not fully kept pace with rising demand, while the quality of raw water sources is declining due to pollution and environmental pressures. These technical constraints are compounded by limitations in budget availability, which is still largely absorbed by routine operational expenditures, leaving insufficient fiscal space for large-scale rehabilitation and network expansion. Problems in management, planning, and human resource development such as uneven technical competence, suboptimal coordination between units, and limited use of information technology also weaken the overall effectiveness of service delivery.

The study concludes that improving clean water services in Bekasi Regency requires a comprehensive, integrated, and sustainable strategy. This strategy must involve not only technical interventions, such as the rehabilitation and replacement of unfit pipeline networks, the enhancement of production and distribution capacity, and the strengthening of water quality monitoring, but also institutional and managerial reforms. Strengthening the organization and improving human resource capacity through continuous training, professionalization of staff, and internalization of public service values are essential to support better governance practices. Furthermore, the adoption of appropriate technologies, including digital-based service management and leakage control systems, is needed to increase efficiency, transparency, and responsiveness. Equally important is the reinforcement of collaboration among the regional government, PERUMDA Tirta Bhagasasi, and other stakeholders, including relevant agencies and the community, to safeguard raw water sources, support investment needs, and ensure that clean water services are recognized and managed as a fundamental right of citizens.

The optimization of clean water services by PERUMDA Tirta Bhagasasi is not solely a technical challenge, but a multidimensional governance issue involving resources, institutions, infrastructure, and public participation. Only through integrated efforts at these various levels can clean water services in Bekasi Regency be delivered in a more effective, equitable, and sustainable manner in the future.

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