KESANS: International Journal of Health and Science
2808-7178 / 2808-7380
http://kesans.rifainstitute.com/index.php/kesans/index

Service Management Strategy of the Tirta Mayang Regional Water Company in Jambi City

[1]Ade Prayatna Lubis*, [2]Hutwan Syarifuddin, [3]Nazarudin
[1] Environmental Science, Universitas Jambi, Indonesia*; email: adebatak89@gmail.com
[2] Universitas Jambi, Indonesia
[3] Universitas Jambi, Indonesia
*Correspondence

Article Information
Submitted: **23 December 2025**
Accepted: **08 January 2026**
Publish: **15 January 2026**

Keyword: Service Management; Strategy; Perumdam Tirta Mayang;

Abstract
Introduction: *Climate change places significant pressure on the sustainability of clean water services, especially in areas that rely on a single source of raw water.* ***Objective:*** *This study aims to analyze the service conditions of Perumdam Tirta Mayang, Jambi City based on customer perceptions, identify internal and external factors that influence service sustainability, and formulate adaptive management strategies in dealing with the impacts of climate change.* ***Methods:*** *The research used quantitative and qualitative descriptive methods through field observations, in-depth interviews, and distribution of questionnaires to 100 active customers in 11 sub-districts in the service area, which were analyzed using SWOT analysis and IFAS and EFAS matrices.* ***Results and Discussion:*** *The level of customer satisfaction is in the good category. However, challenges still arise in the form of dependence on the Batanghari River as the sole source of raw water, decreased water pressure during the dry season, and increased turbidity during the rainy season. The SWOT analysis resulted in a strength score of 3.50 and a weakness score of 1.79 for internal factors, as well as an opportunity score of 3.48 and a threat score of 1.71 for external factors, which places perumdam tirta mayang in quadrant I.* ***Conclusion:*** *Recommended priority strategies include accelerating the construction of new intakes and WTPs to diversify raw water sources, optimizing the use of digital technology in processing and distribution systems, gradually improving the piping network, and strengthening cross-sector collaboration, including with the government, universities, and community organizations.*

How to Cite **Ade Prayatna Lubis, Hutwan Syarifuddin, Nazarudin/Service Management Strategy of the Tirta Mayang Regional Water Company in Jambi City, Vol. 5, No. 4, 2026**
DOI https://doi.org/10.54543/kesans.v5i4.534
e-ISSN/p-ISSN **2808-7178 / 2808-7380**
Published by **CV Rifainstitut/KESANS: International Journal of Health and Science**

Introduction

Clean water is a basic human need and a public service that shapes health outcomes, economic productivity, social welfare, and environmental sustainability. However, access to safely managed drinking water remains a global challenge. The World Health Organization reported that in 2022 more than 2.2 billion people still lacked access to safe drinking water, while in Indonesia coverage of improved drinking water reached only 89.27% of households, with a persistent gap between urban and rural areas (WHO, 2022). This situation highlights the urgency of improving the quality and equity of clean water services at the local level. At the same time, the sustainability of clean water services is increasingly under pressure from climate change, which affects both the availability and quality of raw water. Changes in rainfall patterns and more frequent extreme events such as floods and droughts directly influence raw water supply and increase treatment burdens (Heryani et al., 2022). Rainfall variability and rising temperatures are also linked to declining water quantity and quality, thereby increasing the risk of service disruptions (Pawitan, 2018). Recent findings further indicate that several regions in Indonesia face growing risks to water quality and sanitation as a direct consequence of climate change, making clean water service quality more vulnerable (Kurniawan et al., 2024).

Jambi City faces similar conditions. Perumdam Tirta Mayang, the main provider of clean water services, relies on the Batanghari River as its primary raw water source, where flows fluctuate seasonally and during episodes of extreme rainfall. Reduced discharge during dry periods can limit raw water availability and concentrate pollutants, while heavy rainfall can increase turbidity and contamination that complicate treatment and affect distribution continuity. These challenges require not only technical responses, but also management readiness to maintain service continuity and quality for the community.

Most previous studies have focused on technical performance, operational efficiency, or broad economic and institutional aspects. However, research that specifically examines the internal and external organizational factors shaping service management strategies and service continuity under climate change—particularly in the context of Perumdam Tirta Mayang in Jambi City—remains limited. Moreover, the integration of adaptation strategies into urban water management is considered suboptimal and requires more participatory approaches so that adaptation measures align with the needs of urban communities affected by climate change (Kirono et al., 2014). Beyond technical issues, institutional governance also plays a critical role, as limited coordination among agencies can constrain how cities manage water services and climate adaptation efforts (Rahmasary & Koop, 2020). The urgency of this research is reinforced by the fact that many climate adaptation studies on clean water services are still conducted at national or regional scales, while local-level approaches—particularly those focusing on Perumdam Tirta Mayang in Jambi City—have not been widely explored (Aldyan, 2023).

Therefore, this study focuses on Perumdam Tirta Mayang's clean water service management strategies in responding to climate change risks in Jambi City. The findings are expected to enrich the literature on climate change adaptation in local water services and provide practical inputs for the Jambi City Government and utility management in infrastructure planning, governance improvement, and climate risk mitigation to sustain service continuity for the community.

Method

This research is a descriptive study with a qualitative approach, describing the condition of the object under study. It was conducted from September to October. The research location was within the service area of Perumdam Tirta Mayang, Jambi City. Perumdam Tirta Mayang's service area currently covers 11 sub-districts in Jambi City.
In qualitative research, data is obtained from various sources, using various data collection techniques, and is conducted continuously until data saturation is reached. In qualitative research, analysis is conducted by selecting data that is important, new, unique, and relevant to the research problem or question. The analysis is based on all collected data, using various data collection techniques, including observation, interviews, and documentation (Sugiyono, 2020).

The research approach used is qualitative research, emphasizing an in-depth understanding of a problem or phenomenon. The subjects of this study were the management of Perumdam Tirta Mayang, Jambi City, the Jambi City Government, and the community using clean water services. Quantitative data, in the form of numbers or figures, is used to support the analysis of this research. The data includes questionnaire results obtained from respondents consisting of management and customers of Perumdam Tirta Mayang, Jambi City. The questionnaire assessed internal and external factors influencing Perumdam Tirta Mayang's service performance in addressing the impacts of climate change. Quantitative data analysis was conducted using IFAS (Internal Strategic Factors Analysis Summary) and EFAS (External Strategic Factors Analysis Summary).

Results and Discussion

Internal Strategy Factors Internal Strategy Factors

The following are internal strength factors obtained from the results of interviews and data analysis of Perumdam Tirta Mayang, Jambi City: Government and legislative support are crucial for improving clean water services. The Jambi City Government is targeting an increase in service coverage to nearly 100% and a strengthening of clean water provision policies as a basic public need (Interview, Mayor of Jambi, 2025). Furthermore, the Jambi City Council (DPRD) plays a role in overseeing and providing budgetary support for infrastructure improvements (Interview, DPRD, 2025). This political synergy strengthens the managerial capacity of Perumdam Tirta Mayang in service development.

Perumdam Tirta Mayang has implemented control technology such as SCADA for real-time monitoring of water quality and distribution flow. This presents an opportunity to improve the quality of processing in the future (Interview, President Director of Perumdam Tirta Mayang, 2025). Utilization of this technology increases operational efficiency, faster detection of disruptions, and improves service response. Collaboration between the City Government, the Regional People's Representative Council (DPRD), and the company is supported by potential funding from the State Budget (APBN) for infrastructure development, such as strengthening the pipe network and increasing production capacity (Interview, Jambi City DPRD and President Director of Perumdam Tirta Mayang, 2025). This synergy empowers Perumdam Tirta Mayang in realizing higher-quality services

The following are internal weaknesses identified through interviews and analysis of the operational conditions of Perumdam Tirta Mayang in Jambi City: The company remains entirely dependent on the Batanghari River to meet the needs of all customers in Jambi City. When water levels decrease during the dry season or turbidity increases

during the rainy season, production can be disrupted (Interview, President Director of Perumdam Tirta Mayang, 2025). This single dependency makes the company highly vulnerable to changes in environmental conditions. Several pipelines are old and prone to leaks. Furthermore, accurate network condition data has not been fully integrated into the company's information system (Interview, Chairman of the Jambi City DPRD, 2025). This hampers the speed of response in handling water distribution disruptions. Customer aspirations have not been fully channeled because two-way communication with community organizations such as the Indonesian Consumer Protection Agency (YLKI) and the Neighborhood Association (RT) Forum has not been well established. These institutions could act as public service advocacy partners (Interview, YLKI, 2025). The absence of an integrated climate information system leaves the company unprepared to face the risks of climate change, such as decreased raw water flow or increased turbidity due to flooding. Without an early warning system, companies' responses to climate disruptions tend to be reactive, rather than preventive, potentially disrupting the stability of clean water services in the future (Interview, President Director of Perumdam Tirta Mayang, 2025).

External Strategy Factors

The following are external opportunity factors that Perumdam Tirta Mayang, Jambi City, can utilize to improve its performance and quality of service: Collaboration opportunities are wide open with universities, research institutions, and the private sector to support innovation in water treatment technology. The Chairman of the Indonesian Consumer Protection Agency (YLKI) assessed that education and cross-institutional collaboration are crucial in improving the quality of public services (Interview, YLKI, 2025). Through this collaboration, Perumdam Tirta Mayang can obtain support for applied research and improve technical competency. The availability of funding from the central government, such as the Special Allocation Fund and programs under the Ministry of Public Works and Public Housing (PUPR), represents a strategic opportunity for strengthening clean water service infrastructure. The Mayor of Jambi expressed his commitment to increasing service coverage and preparing the necessary funding (Interview, Mayor of Jambi, 2025).

The support of the Regional People's Representative Council (DPRD) also strengthens the acceleration of public service facility development (Interview, Chairman of the Jambi City DPRD, 2025). The public is beginning to demonstrate water-saving behavior and is increasingly critical of the quality of clean water services. This situation presents an opportunity for companies to strengthen their outreach, education, and conservation efforts, which will support the sustainability of services (Interview, Head of the RT Forum, 2025). The development of modern technologies such as SCADA and IoT sensors supports increased efficiency in monitoring water quality and distribution networks, as well as increasing the speed of operational response and monitoring of service disruptions in real time. (Interview, President Director of Perumdam Tirta Mayang, 2025). The growth of housing in Jambi City opens up opportunities for service expansion and increasing the number of active customers. If balanced with proper technical planning, this condition can become economic capital in developing services in the future (Interview, Mayor of Jambi, 2025).

The following are external threat factors faced by Perumdam Tirta Mayang in Jambi City in providing and managing clean water services: Climate change causes instability in the Batanghari River discharge, especially during the long dry season when the water level drops, which disrupts pump operations. Meanwhile, during the rainy season, increased water turbidity causes an increase in the need for processing chemicals (Interview, President Director of Perumdam Tirta Mayang, 2025). This condition can hinder the continuity of clean water services. The unavailability of alternative raw water sources makes the company vulnerable to pollution, high sedimentation, and fluctuations in river discharge. Other raw water sources must be prepared immediately to reduce the risk of service disruptions (Interview, Mayor of Jambi City and President Director of Perumdam Tirta Mayang, 2025). Industrial activities, mining, and domestic waste disposal around the Batanghari River cause a decline in raw water quality. This pollution increases the burden on water treatment at the installation and poses a health risk to the community if not treated optimally (Interview, President Director of Perumdam Tirta Mayang, 2025). Some of the pipelines are aging and prone to leaks, resulting in high levels of non-revenue water loss. Accelerated pipe renovation is needed to prevent continued distribution disruptions (Interview, Chairman of the Jambi City DPRD, 2025). This situation impacts distribution efficiency and the company's economics.

SWOT Matrix Analysis

A SWOT analysis is a method used to identify various internal and external factors that influence the effectiveness of clean water service management and development at Perumdam Tirta Mayang in Jambi City. Through this analysis, strengths and opportunities can be utilized to improve company performance, while weaknesses and threats can be anticipated through appropriate and targeted strategies.

The SWOT approach serves not only as a tool for evaluating internal and external conditions but also as a guide in developing strategic steps for the company to adapt to environmental dynamics, government policies, and community needs for clean water services. The SWOT analysis serves as the basis for formulating Perumdam Tirta Mayang's development strategy to maintain service continuity, improve operational efficiency, and expand the reach of clean water services in Jambi City. The internal factor SWOT strategy matrix (IFAS) can be seen in Table 1. Matriks Faktor Internal

Table 1
Matrix Faktor Internal

No	STATEMENT	Weight	Average	Mark (B x R)
	Strange (S)			
1	Support from the Jambi City Government and the Jambi City DPRD	0.22	3.80	0.84
2	There are plans to build new intake and IPA	0.20	3.40	0.67
3	The quality of the processed water is stable and meets standards.	0.15	2.60	0.39
4	The existence of technological innovation in water treatment	0.21	3.60	0.75
5	Cross-institutional synergy in supporting service sustainability	0.22	3.80	0.84
	Amount	**1.00**	**17.20**	**3.50**
	Weakness (W)			

1	Collaboration with community institutions is not yet optimal	0.20	1.4	0.28
2	Management of the piping network is not optimal	0.29	2	0.57
3	Dependence on one source of raw water (Batanghari River)	0.29	2	0.57
4	There is no integrated climate data and no early warning system is available.	0.23	1.6	0.37
	Amount	**1.00**	**7**	**1.79**
	DIFFERENCE (S - W)			**1.71**

Source: Processed primary data, 2025

Based on the analysis results in Table 1, the total Strength factor score was 3.50, while the total Weakness factor score was 1.79, resulting in a difference of 1.71. This score indicates that Perumdam Tirta Mayang Jambi City's internal conditions are strong, thus ensuring the company has a good capacity to improve service performance in the short and long term.

The highest strength factor was found in the support indicator from the Jambi City Government and the Jambi City Regional People's Representative Council (DPRD), as well as cross-agency synergy, which each scored 0.84. This support was reinforced by the Mayor of Jambi's statement that increasing clean water service coverage is a top priority for regional development (Interview, 2025). The Chairman of the Jambi City DPRD also emphasized a commitment to oversight and budget support for strengthening drinking water infrastructure (Interview, 2025).

The operational technology innovation factor scored 0.75, indicating that the use of control systems such as SCADA supports efficiency and speed of service response. This aligns with the statement by the President Director of Perumdam Tirta Mayang, who stated that real-time network monitoring helps the company mitigate the risk of service disruptions (Interview, 2025).

Another strength is the planned construction of a new intake and water treatment plant (score 0.67) as a strategic step to increase clean water supply capacity. The city government has planned to build a new intake in the Kota Baru area in an effort to provide a more reliable source of raw water (Interview, 2025). Meanwhile, the relatively stable quality of the treated water received a score of 0.39, which is also supported by the public's perception that cloudy water is now becoming less common (Interview, Head of the Neighborhood Association Forum, 2025).

Internal weaknesses still require the company's attention. The biggest weaknesses lie in suboptimal management of the pipe network and dependence on a single source of raw water, each with a score of 0.57. The Chairman of the Jambi City Regional People's Representative Council (DPRD) stated that aging pipes continue to cause distribution disruptions in several areas (Interview, 2025). Furthermore, the President Director of Perumdam Tirta Mayang also stated that its raw water source still relies on the Batanghari River, making it vulnerable to changes in water discharge and quality (Interview, 2025).

Other weaknesses include minimal collaboration with community organizations such as the Indonesian Society for the Environment (YLKI) and the Neighborhood Association (RT) Forum (score 0.28), as well as the lack of an early warning system and climate data integration (score 0.37), which also impacts delayed response to service disruptions and poor anticipation of extreme weather risks.

Overall, the score difference of 1.71 indicates that Perumdam Tirta Mayang's internal strengths still strongly support the development of a strategy for developing more optimal clean water services. Institutional strengthening and technological innovation are key assets in this strategy, while weaknesses related to the distribution network, raw water sources, and information systems need to be addressed through policies and continuous improvement programs. The External Factors SWOT Strategy Matrix (EFAS) can be seen in Table 2.

Table 2
External Factor Matrix

No	STATEMENT	Weight	Average	Mark
	Opportunity (O)			
1	There is potential for collaboration with research institutions, universities and the private sector in clean water technology innovation.	0.20	3.40	0.66
2	Funding support from the central government and donor agencies (e.g. Special Allocation Funds and the Ministry of Public Works and Housing programs)	0.20	3.40	0.66
3	Increasing public awareness of the importance of clean water and saving water use	0.21	3.60	0.74
4	Advances in water treatment technology (digitalization, SCADA systems, IoT sensors, and energy efficiency)	0.21	3.60	0.74
5	Increasing housing growth along with increasing population growth	0.20	3.40	0.66
	AMOUNT	**1.00**	**17.40**	**3.48**
	Threat (T)			
1	There is no alternative source of raw water other than the Batanghari River.	0.31	2.0	0.63
2	The impact of extreme climate change	0.31	2.0	0.63
3	Damage to pipe infrastructure and distribution network leaks due to technical age	0.16	1.0	0.16
4	Increasing pollution of the Batanghari River from industrial and domestic activities	0.22	1.4	0.31
	AMOUNT	**1.00**	**6.4**	**1.71**
	DIFFERENCE (O - T)			1.77

Based on the analysis results in Table 2, the total Opportunities score was 3.48, while the total Threats score was 2.28. The difference between these two scores is 1.77, indicating that the external environment provides strong support for Perumdam Tirta Mayang in developing the quality of clean water services in Jambi City. This means that external opportunities still significantly outweigh the risks faced by the company. The largest opportunity factors were found in the indicators of advances in water treatment technology and public awareness of the importance of clean water, each with a score of 0.74. Technological advances such as SCADA systems and operational digitization allow for increased efficiency and rapid detection of disruptions, as emphasized by the President Director of Perumdam Tirta Mayang regarding the potential use of membrane technology and real-time monitoring systems in the company's services (Interview, 2025). Meanwhile, increasing public awareness of protecting water sources and saving water consumption presents an opportunity for the company to encourage conservation behavior.

Furthermore, potential collaboration with universities, research institutions, and the private sector (score 0.66) opens up opportunities for developing technological innovation and applied research to improve clean water services. Funding support from

the Central Government and the Ministry of Public Works and Public Housing (score 0.66) also presents a strategic opportunity to accelerate the development of new infrastructure such as intakes, water treatment plants, and distribution networks, as stated by the Mayor of Jambi City in an effort to strengthen raw water availability through the construction of new intakes and infiltration lakes (Interview, 2025). The continued growth of residential areas (score 0.66) also presents a potential market for expanding the company's service coverage.

Meanwhile, the biggest threats are the lack of alternative raw water sources other than the Batanghari River and the impact of extreme climate change, each with a score of 0.63. The risk of changes in discharge, flooding, and increasing water turbidity are serious issues that have the potential to disrupt service continuity. This aligns with statements by the Mayor of Jambi and the President Director of Perumdam Tirta Mayang, who emphasized the need for alternative raw water sources to improve the resilience of clean water services in the future. Another threat is damage to the pipeline network due to aging (score 0.16). Although considered minor, it still requires attention as it can increase water loss and reduce distribution pressure. Pollution of the Batanghari River (score 0.31) due to industrial and domestic activities also has the potential to increase water treatment costs and reduce service quality if integrated environmental monitoring is not implemented. Overall, the EFAS analysis results, with a score of 1.77, indicate that Perumdam Tirta Mayang remains in a favorable external environment. Opportunities for technological enhancement, government support, and customer growth can be maximized to support a resilient clean water service strategy in the face of climate change risks and limited raw water resources.

SWOT Analysis Quadrants

A SWOT quadrant analysis was conducted to determine the organization's strategic position based on the evaluation of internal and external factors analyzed using the IFAS and EFAS matrices. This approach aims to identify Perumdam Tirta Mayang's strategic position in developing policies for managing and improving clean water services in Jambi City. By identifying the quadrant position, the most appropriate strategy can be determined to support the company's performance in facing the dynamics of both internal and external environments. Based on the SWOT analysis, the strengths (S) score was 3.50, the weaknesses (W) score was 1.79, the opportunities (O) score was 3.48, and the threats (T) score was 1.71. To determine the SWOT strategy, the difference between strengths and weaknesses was calculated at 1.71, and the difference between opportunities and threats was calculated at 1.77

SWOT Analysis Strategy

The SWOT matrix analysis yields four strategic groups: SO, WO, ST, and WT strategies. These strategies are as follows:

1. The SO strategies that can be implemented are as follows:
    a. Accelerate the construction of new intakes and water treatment plants (WTPs) with support from the central government and expand research and innovation collaboration with universities and the private sector. This strategy aims to increase service capacity and ensure sustainable raw water availability amidst increasing community demand. Support from the Jambi City Government and the Jambi City Council (DPRD) will enable accelerated strategic infrastructure development, while collaboration with universities and the

private sector will strengthen technological innovation in water treatment, thereby further improving operational efficiency.

b. Optimize the implementation of technologies such as SCADA, IoT, and digitalization of operational systems to improve production efficiency and service quality. The use of digital technology provides the ability to monitor water pressure, detect leaks, and monitor water quality in real time. In addition to accelerating response to disruptions, digitalization of services also supports information transparency for customers amid growing public awareness about clean water quality.
c. Expand the water distribution network to new residential areas by leveraging funding synergies and government support. The growth of housing development in Jambi City presents an opportunity to increase service coverage and company revenue. This strategy will ensure equitable access to clean water for residents in new areas and support the target of increasing service coverage to nearly 100%.
d. Develop a water conservation and education program based on community participation and educational institutions. This approach is aimed at raising public awareness of the importance of sustainable water management. Appropriate education can help reduce excessive water consumption and maintain the sustainability of raw water sources, as well as strengthen community involvement in maintaining environmental quality.

2. The following WO strategies can be implemented:
   a. Optimizing collaboration with the Neighborhood Association (RT) Forum and the Indonesian Consumer Protection Foundation (YLKI) to improve public communication, water literacy, and customer complaint response. This step can address weak collaboration with the community and increase public trust in Perumdam Tirta Mayang's services. Improved two-way communication will also help channel community aspirations regarding clean water needs.
   b. Integration of climate information and early warning systems through collaboration with the Meteorology, Climatology, and Geophysics Agency (BMKG) and hydrological research institutions. This strategy is necessary to anticipate the unpredictable impacts of climate change. The availability of integrated climate data will improve the company's capacity to prepare mitigation measures in the event of a decrease in water discharge or a spike in turbidity in the Batanghari River.
   c. Collaborating on research and innovation with universities and the private sector to increase piping efficiency and reduce NRW. This collaboration supports technological and technical improvements to the distribution system through more accurate leak detection and improved network mapping, thereby minimizing water loss.

3. The following ST strategies can be implemented:
   a. Diversifying raw water sources by accelerating the construction of new intakes to reduce the risk of dependence on the Batanghari River. This strategy is crucial considering that the Batanghari River is currently the only source of raw water and is highly vulnerable to fluctuations in discharge and

pollution caused by industrial activities and climate change. Utilizing support from the Jambi City Government and the Jambi City Regional People's Representative Council (DPRD) can accelerate the development of alternative water sources to maintain the resilience of clean water services in extreme situations.

b. Strengthening the digital system for real-time water quality monitoring and control to address the threats of pollution and climate change. The application of technologies such as SCADA and IoT sensors can enable early detection of water quality disturbances. This allows for a more effective response to prevent water quality degradation during extreme rainfall events and increased turbidity in the Batanghari River.
c. Rehabilitation and rejuvenation of the pipeline network with multi-party funding support to minimize the risk of leaks and distribution disruptions. Some aging pipelines pose a potential threat to smooth service. By strengthening collaborative funding from various institutions, the pipeline network repair process can be carried out sustainably to improve distribution efficiency and reduce water loss.

The following WT strategies can be implemented: Developing a climate change-based risk mitigation plan to strengthen the resilience of raw water sources

Conclusion

Based on the research results regarding the Service Management Strategy of Perumdam Tirta Mayang, it can be concluded that Perumdam Tirta Mayang current service conditions are in the good category, particularly in terms of supply continuity, water quality, and ease of water bill payment. However, service is still affected by fluctuations in the Batanghari River discharge, changes in raw water quality, and limitations in distribution infrastructure, particularly during the dry season and extreme rain. Internal and external factors affecting Perumdam Tirta Mayang's service consist of various aspects that influence the sustainability of clean water supply in Jambi City.

The most influential internal factors include support from the City Government and the Regional People's Representative Council (DPRD), plans to build new intakes and WTPs, the use of water treatment technology, and the stability of the quality of produced water, a key strength of the company. External factors include central government funding support, advances in digital technology, public awareness of clean water, and the growth of housing development, which opens up opportunities for service expansion. Based on the SWOT analysis, Perumdam Tirta Mayang's service in Jambi City has more strengths than weaknesses, with a total strength score of 3.50 and a weakness score of 1.79, resulting in a difference of +1.71. Meanwhile, the total opportunity score of 3.48 is higher than the threat score of 1.71, with a difference of +1.77. This indicates that Perumdam Tirta Mayang is in a sufficiently supportive internal and external environment for sustainably improving its clean water service performance.

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