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Research Article

EVALUATION OF ECONOMY, EFFICIENCY, AND EFFECTIVENESS IN THE MANAGEMENT OF OPERATIONAL COSTS OF A REGIONAL PUBLIC WATER UTILITY COMPANY THROUGH THE VALUE FOR MONEY APPROACH (A STUDY AT PERUMDA AIR MINUM TIRTA KARAJAE, PAREPARE CITY)

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Abstract
This study aims to evaluate the operational cost performance of a regional water utility enterprise, using PERUMDA Air Minum Tirta Karajae Kota Parepare as a case study, through the Value for Money (VfM) approach for the 2021-2025 period, covering the level of economy, efficiency, and effectiveness. This research applies a quantitative descriptive method using secondary data in the form of income statements, budget reports, customer data, and water production and distribution reports. Data were analyzed by calculating the economy, efficiency, and effectiveness ratios based on the realization and budget of operational costs and operating revenue. The results show that the economy ratio averaged 98.23%, categorized as very economical, although a deviation occurred in 2023. The efficiency ratio averaged 106.18%, indicating that operational costs generally exceeded operating revenue. The effectiveness ratio averaged 93.21%, indicating that revenue realization has not yet reached the budgeted target, despite improvements in non-financial indicators such as customer growth and reduced non-revenue water. Overall, the performance of the regional water utility has not fully achieved the ideal 3E condition (Economy, Efficiency, Effectiveness), indicating the need for stronger operational cost control and more realistic revenue target setting.

Keywords: Economy, Efficiency, Effectiveness

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INTRODUCTION

Water is the most fundamental requirement for human life, making the provision of proper and sustainable clean water one of the main responsibilities of local governments through regionally owned enterprises (BUMD). Under Law Number 23 of 2014 on Regional Government and Government Regulation Number 54 of 2017 on Regionally Owned Enterprises, a Regional Public Corporation (PERUMDA) is a BUMD whose entire capital is owned by a single region and is not divided into shares (Ainiyyah, 2022). As an entity that carries a public-service mission while also being required to achieve operational efficiency, a regional water utility faces the challenge of balancing social and business aspects. Data from the Agency for the Development of Drinking Water Supply Systems (BPPSPAM) in 2023 revealed that as many as 42% of regional water utilities in Indonesia were still classified as unhealthy, reflecting low service coverage and various operational problems (Amir, 2023; Chioatto, 2023).

PERUMDA Air Minum Tirta Karajae, which operates in Parepare City, is one such BUMD carrying a vital responsibility for supplying clean water to the community. The company relies on the Karajae River as its main raw-water source, supported by several deep wells as a backup source (Hegab, 2023; Song, 2024). Through Parepare City Regional Regulation Number 10 of 2021, the company's status was changed to Perusahaan Umum Daerah Air Minum Tirta Karajae. Although the number of customers grew from 22,508 household connections in 2021 to 26,346 household connections in 2025, accompanied by a decrease in non-revenue water, the company still faces challenges in maintaining a balance between improved service and operational cost efficiency. The company has even been reported unable to distribute dividends to the Regional Government in recent years, indicating that improved service does not necessarily translate into improved financial performance.

Preliminary company data also show a consistent gap between the targeted and realized operating revenue during the 2021-2025 period, with an average achievement of only 93.21% of the budget, while in 2023 the realized operating expense actually exceeded the set budget, causing the company to suffer a substantial operating loss. This condition indicates planning and budget-control issues that warrant further examination.

The Value for Money (VfM) approach is a relevant analytical framework for assessing public-sector organizational performance because it integrates three key dimensions: economy, efficiency, and effectiveness (Binnemans, 2023; Tan, 2024). This approach is expected to ensure that spending on water-supply management is economical, efficient, and produces effective outcomes for the community (Breyer, 2024; Rath, 2024). Suridiyanti et al. (2024) found that operational cost control at the Pangkep Regency water utility was economical despite fluctuating growth, while Alola, (2023) showed that applying VfM principles can produce an economy ratio in the range of 80%-90%, which is considered fairly economical. Nevertheless, studies specifically analyzing the operational cost performance of PERUMDA Air Minum Tirta Karajae through the VfM approach remain very limited, given that the geographic, demographic, and socio-economic characteristics of South Sulawesi require a more specific study.

Based on the above description, this article aims to analyze the operational cost performance of PERUMDA Air Minum Tirta Karajae, Parepare City, for the 2021-2025 period through the Value for Money approach, covering the level of economy, efficiency, and effectiveness, while providing a comprehensive picture of the company's performance as a basis for evaluation and strategic recommendations for sustainable improvement of public services.

RESEARCH METHOD

This study employs a quantitative approach with a descriptive-quantitative research design, since the data are analyzed in numerical form obtained from the company's financial statements and then calculated using Value for Money ratios to assess operational cost performance without comparing or relating it to other variables (Chen, 2024; Luo, 2024).

Research Location and Time

This research was conducted at PERUMDA Air Minum Tirta Karajae, located in Parepare City, South Sulawesi Province. The location was selected based on data accessibility, relevance to the research problem, and its representativeness of regional water utility characteristics in Eastern Indonesia, with the data analyzed covering the 2021-2025 period.

Operational Definition of Variables

Economy is defined as the company's ability to save on operational costs without reducing service quality, measured by comparing the realized operating expense to the budgeted operating expense. Efficiency is defined as the ability to manage operational costs optimally to generate maximum revenue, measured by comparing the realized operating expense to the realized operating revenue. Effectiveness is defined as the degree of success in achieving the planned revenue target, measured by comparing the realized operating revenue to the budgeted operating revenue (Chang, 2024; Khan, 2023).

Types and Sources of Data

This research uses secondary data sourced from official PERUMDA Air Minum Tirta Karajae documents, including the Income Statement and Income Budget for the 2021-2025 period, customer-number data, and water production and distribution reports.

Data Collection Technique

Data were collected through a documentation technique, namely tracing and recording the company's financial statements and operational reports relevant to the study period. The collected data were then compiled and arranged into annual tables to facilitate the calculation of the Value for Money ratios (Cheng, 2023; Jones, 2024).

Data Analysis Technique

The data were analyzed descriptively and quantitatively by calculating the economy, efficiency, and effectiveness ratios based on the realized and budgeted operating revenue and expense, after which the results were interpreted according to Value for Money performance-assessment criteria and their trend over the 2021-2025 period was analyzed.

Value for Money Calculation Formulas

Economy Ratio = (Realized Operating Expense ÷ Budgeted Operating Expense) × 100%, with the criteria: ratio < 100% economical, ratio = 100% break-even economical, and ratio > 100% uneconomical. Efficiency Ratio = (Realized Operating Expense ÷ Realized Operating Revenue) × 100%, with the criteria: ratio < 100% efficient, ratio = 100% break-even efficient, and ratio > 100% inefficient. Effectiveness Ratio = (Realized Operating Revenue ÷ Budgeted Operating Revenue) × 100%, with the criteria: ratio > 100% effective, ratio = 100% break-even effective, and ratio < 100% ineffective. Trend analysis was used to observe the development pattern of the economy, efficiency, and effectiveness ratios of the company's operational cost performance over the 2021-2025 period.

RESULTS AND DISCUSSION

The research results are presented in the form of financial-data recap tables and Value for Money ratio trend charts to facilitate interpretation of the company's operational cost performance over the 2021-2025 period.

Table 1 presents a recap of the realized and budgeted operating revenue and expense of PERUMDA Air Minum Tirta Karajae over the 2021-2025 period, forming the basis for calculating the Value for Money ratios.

Table 1. Recapitulation of Realized and Budgeted Operating Revenue and Expense of PERUMDA Air Minum Tirta Karajae, 2021-2025

Year	Budgeted Revenue (IDR)	Realized Revenue (IDR)	Budgeted Expense (IDR)	Realized Expense (IDR)
2021	33,940,369,500	31,239,302,499	36,728,737,193	34,670,508,715
2022	39,577,255,250	39,265,461,576	38,925,435,259	37,357,302,126
2023	44,034,609,650	40,351,107,300	42,696,018,711	45,479,240,169
2024	44,433,177,200	40,525,143,060	44,418,973,933	42,213,816,796
2025	**44,845,859,200**	**41,238,196,634**	**44,833,081,895**	**44,493,390,969**

Source: Income Statement and Income Budget of PERUMDA Air Minum Tirta Karajae, processed (2026)

Table 2. Recapitulation of Economy, Efficiency, and Effectiveness Ratios of PERUMDA Air Minum Tirta Karajae, 2021-2025

Year	Economy (%)	Criteria	Efficiency (%)	Criteria	Effect. (%)	Criteria
2021	94.40	Very Economical	110.98	Inefficient	92.04	Ineffective
2022	95.97	Very Economical	95.14	Very Efficient	99.21	Ineffective
2023	106.52	Uneconomical	112.71	Inefficient	91.63	Ineffective
2024	95.04	Very Economical	104.17	Inefficient	91.20	Ineffective
2025	99.24	Very Economical	107.89	Inefficient	91.96	Ineffective
Average	**98.23**	–	**106.18**	–	**93.21**	–

Source: Data processed (2026)

Table 2 presents a recap of the calculated economy, efficiency, and effectiveness ratios over the 2021-2025 period, while the trend of each ratio is shown in Figures 1 to 3 below.

Table 2 presents a recapitulation of the economy, efficiency, and effectiveness ratios of PERUMDA Air Minum Tirta Karajae from 2021 to 2025. Based on the data, the financial performance dynamics across the three indicators show variations from year to year. The economy ratio fluctuated with an average of 98.23%, where the company recorded "Very Economical" criteria in 2021, 2022, 2024, and 2025 (ranging from 94.40% to 99.24%), but peaked at 106.52% in 2023, which was categorized as "Uneconomical." Meanwhile, the efficiency ratio showed an "Inefficient" trend with an average of 106.18%, where four out of the five observation years were in the inefficient zone including the highest peak of 112.71% in 2023 except for 2022, which successfully achieved the "Very Efficient" criteria at 95.14%. As for the effectiveness ratio, it consistently fell under the "Ineffective" criteria every year from 2021 to

2025, ranging between 91.20% and 99.21% with an average of 93.21%, where the highest achievement was recorded in 2022 and the lowest in 2024. Overall, although PERUMDA Air Minum Tirta Karajae was generally able to maintain cost economy well, its operational efficiency performance and target achievement effectiveness still require substantial improvements throughout the period.

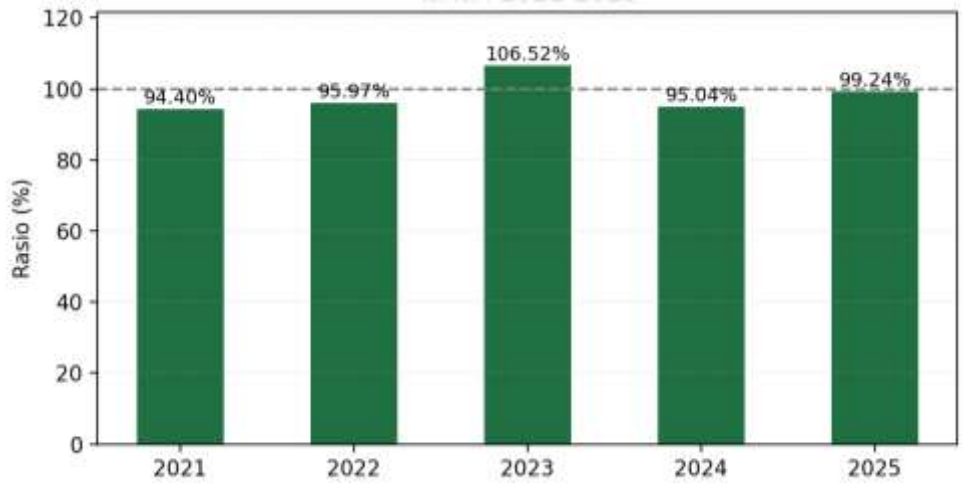


Figure 1. Trend of the Economy Ratio of PERUMDA Air Minum Tirta Karajae, 2021-2025

Figure 1 illustrates the trend of the economy ratio of PERUMDA Air Minum Tirta Karajae over the period from 2021 to 2025. Overall, the company demonstrated strong cost control in acquiring operational inputs, as the ratio remained within the "Very Economical" criteria for most of the observed years specifically in 2021 (94.40%), 2022 (95.97%), 2024 (95.04%), and 2025 (99.24%).

However, a notable upward fluctuation occurred in 2023, when the economy ratio rose to 106.52%, temporarily entering the "Uneconomical" category. This surge reflects a temporary increase in spending relative to the budgeted allocation. Despite this single-year peak, the ratio managed to decrease back below the 100% threshold in subsequent years, maintaining an overall five-year average of 98.23%, which highlights the company's general capability to manage its input budgets effectively over time.

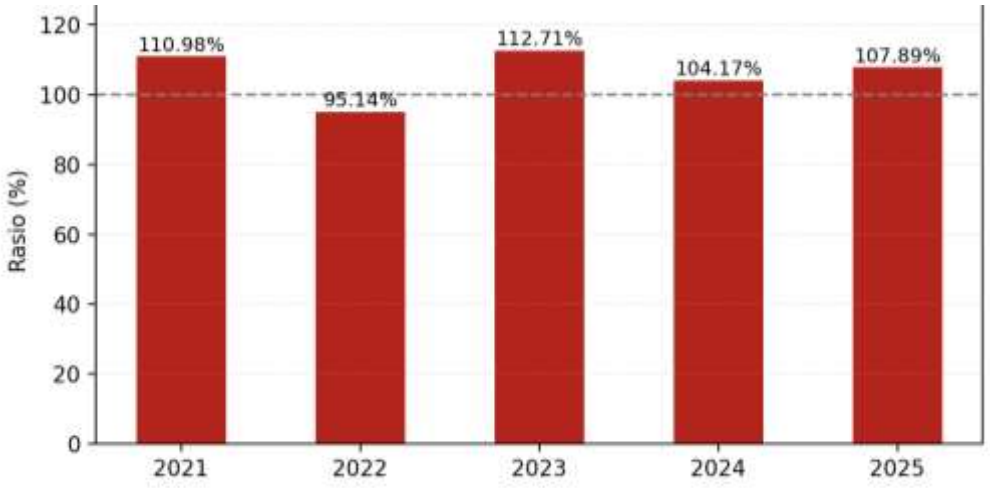


Figure 2. Trend of the Efficiency Ratio of PERUMDA Air Minum Tirta Karajae, 2021-2025

The graph highlights a noticeable fluctuation in operational efficiency over the observed years. In 2021, the efficiency ratio stood high at 110.98%, falling into the "Inefficient" category. However, a significant positive shift occurred in 2022 as the ratio dropped to 95.14%, reaching its optimal level and qualifying as "Very Efficient." Following this temporary improvement, the ratio surged sharply to its peak of 112.71% in 2023, marking the highest level of inefficiency during the period. Although the ratio slightly decreased to 104.17% in 2024, it rose again to 107.89% in 2025. Overall, the line chart demonstrates an unstable trajectory that remains predominantly above the threshold for efficiency, reflecting an ongoing challenge for PERUMDA Air Minum Tirta Karajae to maintain consistent operational cost control and resource management.

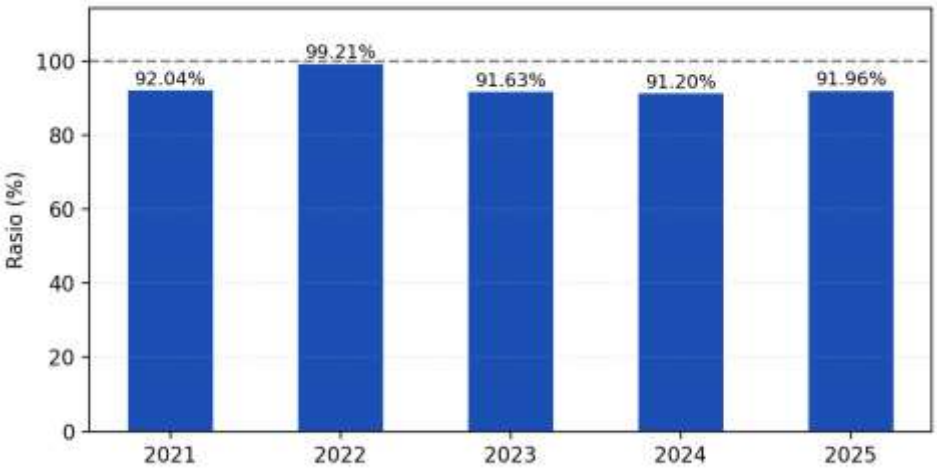


Figure 3. Trend of the Effectiveness Ratio of PERUMDA Air Minum Tirta Karajae, 2021-2025

The economy level of the operational cost performance of PERUMDA Air Minum Tirta Karajae over the 2021-2025 period averaged 98.23%, which according to Value for Money assessment criteria is classified as very economical, since the realized operating expense generally remained below the set budget (Dwivedi, 2023; Farghali, 2024). Nevertheless, in 2023 the economy ratio actually exceeded 100%, indicating that the realized operating expense exceeded the budget due to rising network-maintenance and water-production costs. This condition is consistent with the findings of Jorge, (2023) that fluctuations in fuel and water-treatment chemical prices also affect operating-expense control at water utilities in Parepare City.

The efficiency level of operational costs shows an average ratio of 106.18%, which according to Value for Money criteria is classified as inefficient, since the realized operating expense generally exceeded the realized operating revenue (Mohammed, 2023; Wang, 2024). This inefficient condition occurred in four of the five years observed, with the peak inefficiency recorded in 2023 at 112.71%. This indicates that the growth in the number of customers has not been fully matched by revenue growth capable of covering operational costs, a finding also reported by (Curcio, 2025; Lin, 2024)in a study on production-cost efficiency at the Parepare City water utility.

The effectiveness level of operating revenue shows an average ratio of 93.21%, which according to Value for Money criteria is classified as not yet effective, since the realized operating revenue consistently remained below the set budget throughout the 2021-2025 period. Only in 2022 did the effectiveness ratio approach the ideal target, at 99.21%. This condition

indicates a tendency to set overly optimistic revenue targets relative to the company's real capacity, consistent with the findings of Adebayo, (2023) that the accuracy of revenue projections is an important factor in achieving a business's financial targets.

Overall, the operational cost performance of PERUMDA Air Minum Tirta Karajae has not yet fully achieved the ideal 3E condition (Economy, Efficiency, Effectiveness) that lies at the core of the Value for Money approach (Anu, 2023). The company has shown fairly good achievement in the economy aspect but still faces significant challenges in the efficiency and effectiveness aspects (Shah, 2024; Zhao, 2023). The novelty of this study lies in its application of a five-year trend analysis, which reveals that improvements in non-financial service indicators, such as customer growth and reduced non-revenue water, are not automatically followed by improved financial performance. These findings imply the need to strengthen operational cost control and to set more realistic revenue targets as a basis for improving the financial governance of PERUMDA Air Minum Tirta Karajae going forward (Lee, 2023; McGrath, 2023).

CONCLUSION

The operational cost performance of PERUMDA Air Minum Tirta Karajae, Parepare City, for the 2021-2025 period, as assessed through the Value for Money approach, shows achievements that vary across dimensions. The economy level is classified as very economical with an average ratio of 98.23%, the efficiency level is classified as inefficient with an average ratio of 106.18%, and the effectiveness level is classified as not yet effective with an average ratio of 93.21%. Overall, the ideal 3E condition (Economy, Efficiency, Effectiveness) has not been fully achieved, so PERUMDA Air Minum Tirta Karajae needs to strengthen operational cost control, particularly for network-maintenance and water-production expenditure items, and to set more realistic revenue targets based on the company's actual capacity. Future research is recommended to extend the observation period and compare the performance of PERUMDA Air Minum Tirta Karajae with other regional water utilities of similar characteristics, in order to obtain a more comprehensive picture of performance.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used Chat GPT to assist inimproving grammar, language quality, and overall readability of the text. After using this tool, the author(s) Carefully reviewed and edited the content as necessary and take full responbility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.
Author 4: Conceptualization; Project administration.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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