



RISK-BASED AUDITS TO REDUCE WATER LOSS (NRW) IN PDAM COMPANIES IN SUPPORTING GOOD CORPORATE GOVERNANCE

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ABSTRACT

Keywords: Risk-Based Audit, Non-Revenue Water, Good Corporate Governance, Risk Management

Risk-Based Audit to Reduce Water Loss (NRW) at PDAM Giri Tirta, Gresik Regency, is an important approach to supporting sustainable Good Corporate Governance (GCG). This research is designed as a case study of qualitative methods to analyze the implementation of risk-based audits in PDAM Giri Tirta, Gresik Regency. Primary data was obtained through interviews with the general director, the director of the Internal Control Department, the meter recording section, and the accounting section. In contrast, the secondary data was composed of financial documentation. The results show that the water leakage rate is still high, but risk-based audits can help identify and reduce water loss and improve the operational efficiency of PDAMs. The theoretical implication of this study is a paradigm shift in auditing towards a risk-based approach, while it can practically help PDAM companies manage risks and improve operational performance

INTRODUCTION

Regulation Number Kep-117/M-MBU/2002, issued on July 31, 2002, establishes Good Corporate Governance (GCG) standards for State-Owned Enterprises (SOEs) in Indonesia, later reinforced by Mandate Number Per-01/MBU/2011 (Sutedi, 2011). The Board of Commissioners and Supervisory Board oversee GCG adherence, focusing on management standards like visibility, liability, commitment, self-sufficiency, and equity, along with specific assessment parameters.

The regulation aims to improve corporate governance and enhance public trust in the integrity and professionalism of State-Owned Enterprises (SOEs) in Indonesia (Kamal, 2010). It defines risk as the uncertainty linked to decisions or actions that may lead to negative outcomes. According to the Great Dictionary of the Indonesian Language, risk refers to the detrimental consequences of actions. Risks can be managed through strategies, with uncertainty being a significant contributing factor, influenced by environmental, economic, social, and political changes.

Predicting future events is difficult, with human error potentially heightening risks from natural disasters such as earthquakes and floods. External factors like regulatory changes can also influence business risks. While natural disasters are unavoidable, effective anticipation and planning can mitigate their impact.

Risks that can be faced:

1. **Financial Risk:** Investors can lose money if the value of the stock falls. Portfolio diversification and a good understanding of the market can reduce these risks.
2. **Health Risks:** Uncertainty about a person's health condition can lead to serious illness or unwanted accidents. The way to reduce this risk is to get health insurance and adopt a healthy lifestyle.
3. **Business Risks:** Organizations encounter various business risks, including operational risks like equipment failures and market risks associated with customer demand fluctuations, price changes, and economic conditions. To ensure stability and sustainability, it is crucial for organizations to implement effective mitigation strategies to manage uncertainty and the potential negative impacts of these risks.
4. **Environmental Risks:** Environmental changes can be triggered by environmental changes. Risks such as pollution or climate change can affect businesses and society as a whole.

An important step to reduce this risk is to raise awareness of environmental impacts and take action to reduce these impacts. Lowering risk in various aspects of our lives is essential, such as business, finance, and health.

How to Reduce Risk:

1. **Risk Identification:** Risk identification is an essential initial step in risk reduction efforts, focusing on analyzing current conditions to pinpoint threats that could hinder organizational goals. Key risks to identify include operational, market, and financial risks associated with the organization's processes.
2. **Risk Assessment:** The following stage involves carrying out a risk assessment after identifying the risks. This includes assessing the possible negative impacts and possible risks. In investing, for example, we assess the risks associated with market volatility and possible losses.
3. **Risk Management:** Risk management involves actions to control and reduce potential risks. This includes contingency planning, preventive measures, and implementing suitable policies. It is an ongoing process that requires regular evaluation and adjustments to effectively manage risks and achieve objectives.

Risk management involves identifying, measuring, and controlling risks, often using insurance for liability mitigation. Risk-based audits enhance operational resilience by pinpointing vulnerabilities and optimizing resources, linking good corporate governance (GCG) to informed decision-making. The Risk-Based Internal Audit (RBIA) combines risk management with auditing to ensure compliance with GCG principles, improving monitoring and assessing risk management effectiveness. Research indicates that effective risk management is essential for achieving organizational objectives and promoting transparency, asset protection, and sustainability. Studies also explore fraud risks and internal audit enhancements to improve risk management capabilities.

The research explores the impact of risk management on internal auditors' actions at BPJS Ketenagakerjaan and employs machine learning to predict cybersecurity risks based on company characteristics. It references prior studies on risk-based auditing and suggests a three-

step prioritization method, emphasizing the necessity of unique risk management and internal audit functions for high-risk clients to improve organizational efficiency. Additionally, the study evaluates the implementation of Risk-Based Audit (RBIA) in addressing Non-Revenue Water (NRW) issues in Indonesia's PDAM Giri Tirta, highlighting the country's significant water loss rates. It underscores the need for adherence to corporate governance principles and cites successful strategies from Phnom Penh's water authority for managing unaccounted water loss to enhance service quality and efficiency

RESEARCH METHODS

Research location

PDAM Giri Tirta Gresik Regency, a regional public company responsible for managing clean and drinking water, must operate professionally and prepare annual performance and financial reports that clearly outline funding flows. The organization has an internal governance system to monitor management effectiveness and prevent fraud. Since 2020, the Internal Supervisory Unit has conducted inspections, but as of 2023, the risk profile indicates a high level of water leakage remains a significant concern.

PDAM Giri Tirta Gresik Regency established an Internal Supervisory Unit in 2020, which conducted inspections from 2020 to 2023 as per the determined PKPT. However, the 2023 risk profile indicates a very high risk value for water leakage.

Kinds and supplies of research data

This research utilizes a qualitative case study method to investigate PDAM Giri Tirta in Gresik Regency, relying on original data from interviews with key informants, including the general director and various staff members. Secondary data from accounting documentation is also included. The study employed a Snowball sampling technique, where initial subjects were identified, and they referred additional participants to enrich the data gathered.

Unit Analysis

The analysis target of this study is Risk-Based Audit to Reduce Water Loss Rate (NRW) in PDAM Companies in supporting Sustainable Good Corporate Governance .

Data acquisition techniques

Data collection techniques in this study include observation, interviews, and documentation. The interview process involves meeting informants, with similar questions posed to each to ensure a consistent framework. The goal is to address the formulated problems, guided by a question list that can evolve based on informant responses. The key indicators for the questions include clarity, accountability, commitment, independence, and equity.

Report

Researchers collect data and identify informants for the study. The following table 1 shows the data that has been found.

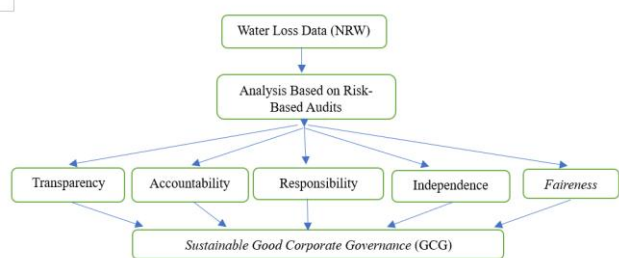
Table 1: Data Information

No.	Name	Position	Age	Term	Working Period
1	Week A	General Director	45 years	3 years	5 years
2	Mrs. C	Head of Internal Supervisory Unit	45 years	1 year	15 years
3	Mrs. D	Accounting Staff	37 years	5 years	15 years
4	Week E	Meter logger	40 years	10 years	15 years
Data acquisition by observation and interviews					

The technique in obtaining data for research is using interviews. To be able to answer the formulation of the problem, a list of questions is made that will later develop according to the informant's answers, including:

The research involved a comprehensive examination of interview data, which was first reduced by selecting important information and discarding the irrelevant. This data was then grouped by similar criteria and organized into a pattern. Conclusions were drawn from this analysis and validated through additional interviews with other respondents.

Thinking Analysis Framework



Empirical data coding uses the following in-depth interview method with informants:

The difference between water from suppliers compared to water that can be sold.

The company sources water from multiple supply companies in Surabaya to meet user demands, as its own capacity is insufficient. Water is procured through a take-or-pay contract, which aims to balance risk and ensure delivery, though it hasn't effectively met community needs in Gresik. The JIPE Industrial area, an integrated project in Gresik, plays a crucial role in Indonesia's industrial development and logistics. The company supplies PT Freeport in

Jiipe, covering only 25% of its water needs. Major water suppliers include PT DEWATA BANGUN TIRTA (200 lps), PT ADARO TIRTA GRESIK (400 lps), PT PP KRAKATAU TIRTA (1000 lps), and two collaborations with PT CLEAN WATER EAST JAVA PROVINCE (Umbulan water: 1000 lps; Mojolagres water: 60 lps).

Mr. A highlights that air is a basic necessity that shouldn't require marketing. He explains the organization's financial challenges, stating they've faced two consecutive years of losses due to rising costs of bulk water and a "take or pay" obligation that mandates them to pay for 1,000 liters per second despite only utilizing 500. Efforts to control expenses have been made, but purchasing water remains uncontrollable. **Mrs. B** discusses various collaborations to expand water capacity, detailing partnerships with multiple companies to serve different regions, especially the Jiipe area, which still lacks service. **Mrs. E** adds that losses result from idle water capacity due to the "take or pay" contracts, as purchased water cannot be sold to customers. She mentions management's efforts to offer this unused capacity to industries and expand services through government funding, though results haven't met expectations.

The interviews revealed that a key factor contributing to losses at Perumda Giri Tirta is its cooperation with bulk water providers under a take-or-pay system. This arrangement requires the company to pay for a minimum amount of water, regardless of actual customer consumption. For instance, if customer absorption is only 500 liters per second, Perumda Giri Tirta must still pay for 1000 liters per second, leading to monthly financial losses.

Mrs. B noted that Perumda Giri Tirta has collaborated with PT Dewata, PT Dewata Bangun Tirta, and PT Adaro Tirta Gresik to address water supply needs. However, internal water sources are inadequate, particularly in underserved northern areas, making partnerships essential to mitigate water supply shortages.

Mrs. E highlighted that idle capacity is a major source of losses for Perumda Giri Tirta, as purchased water is not fully utilized. Despite management's efforts to sell excess water to industries and seek government funding for service expansion, these initiatives have not met expected targets. The primary losses stem from the inability to use all purchased water and challenges related to network expansion and optimizing utilization.

THE PRINCIPLE OF TRANSPARENCY IN GOOD CORPORATE GOVERNANCE
Is the information conveyed that the water loss rate of 37% is due to pipe leakage or other reasons?
PRINCIPLES OF ACCOUNTABILITY IN GOOD CORPORATE GOVERNANCE
What are the responsibilities of the directors/leaders/management related to the company's losses for 2 consecutive years?
PRINCIPLES OF RESPONSIBILITY IN GOOD CORPORATE GOVERNANCE

What does the company do about the losses that persistently occur to the company? and what policies are in place to minimize losses experienced by the company?

THE PRINCIPLE OF INDEPENDENCE IN GOOD CORPORATE GOVERNANCE

In the employee recruitment process, is there a gender difference? What is the reason?
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Leaks from old pipes that have been built since the Dutch colonial era.

Leaks from old pipes contribute to significant water loss, known as Non-Revenue Water (NRW), but this issue is compounded by administrative losses and inaccuracies in water meter readings, leading to unaccounted water.

In an interview, **Mr. A** addressed Non-Revenue Water (NRW), which includes physical leaks from broken pipes and administrative leaks from illegal connections and inaccurate meter readings. He pointed out that many water meters remain unreplaced, causing inaccuracies. **Mrs. C** mentioned that water losses also arise from customer record discrepancies and damaged meters, worsened by funding limitations. **Mrs. B** noted the significant recording errors from outdated meters. **Mr. E** discussed documenting leaks via photos and videos, highlighting challenges with data recording. The consensus stresses the urgent need for investment in meter replacements and leak management to tackle water shortages.

From the results of the interviews that have been conducted, it can be concluded that the main cause of the water loss rate (NRW) in Perumda Giri Tirta comes from two main sources, namely physical leakage and administrative leakage.

- 1. Physical Leakage:** Mr. A explains that physical leakage occurs not only in pipelines but also in the planting reservoir and water treatment process, leading to water loss before reaching consumers. Mrs. C adds that limited funds hinder comprehensive repairs and replacements of old pipes.
- 2. Administrative Leaks:** The text discusses issues related to inaccurate water usage records, attributed to damaged or outdated water meters and illegal wrapping. Mr. A and Mrs. B highlighted that these old meters contribute to discrepancies between distributed and recorded water. Mrs. C noted that water meter replacements are being implemented gradually due to budget constraints, but positive outcomes from replacements in 2023 have been recognized.
- 3. Handling Steps:** In an interview with Mr. E, he discussed the process of documenting physical leaks through photos or videos for reporting to superiors. He emphasized the importance of this verification step but noted challenges in using Android devices, which do not allow users to view historical data directly.

Overall, the main factors affecting NRW at Perumda Giri Tirta are physical leaks due to outdated infrastructure and administrative leaks caused by inaccurate water meters and illegal connections. Limited funds are the main obstacle in solving this problem.

Theft of water from meter loggers

The third factor in the large amount of unaccounted water (NRW) is water theft from meter loggers. Of course, this factor is mostly done by customers who work with company insiders. Interview with :

Mr. A discussed illegal connections and wrapping in water processing, detailing imposed fines and the formation of a team to address these issues. Sanctions include administrative penalties and harsher consequences for offenders. He emphasized the importance of accurate meter readings and the need to replace faulty meters. **Mrs. C** noted that water loss can result from both pipe leaks and inaccuracies in customer records due to damaged or opaque meters.

Interviews indicated that water theft and meter manipulation, often with insider collusion, are primary causes of Non-Revenue Water (NRW) in Perumda Giri Tirta. To combat this, the company has enacted legal measures and formed specialized teams for enforcement. Increasingly inaccurate meter readings due to damage also contribute to NRW, leading to plans to replace faulty meters. The company has suffered losses for two years, compounded by a stagnant water tariff since 2018, making it the lowest in East Java, which exacerbates its financial difficulties.

Mr. A addresses the low water tariffs in East Java, emphasizing the need for subsidies from the Regent while prioritizing social missions to serve underserved villages. **Mrs. B** points out challenges with tariff submissions during political periods, stressing that increasing household tariffs is vital for financial sustainability. **Mrs. C** mentions that household tariffs have remained unchanged since 2018, with recent adjustments approved only for specific commercial categories.

The new tariff of PDAM Giri Tirta Gresik that applies is the one that applies from April 2024:

- Small Business Group of Rp. 5,000/m³ up Rp. 6.500/m³ to 10 Uses m³ first.
- Large business groups Rp. 7,500/m³ increased by Rp. 8,500/m³ for First 0 m³ use
- Small industry group Rp. 5000/m³ up Rp. 6,500/m³ For users The first 10 m³.

The company has experienced losses for two consecutive years primarily due to the lack of water tariff adjustments since 2018. Gresik's basic water tariff is among the lowest in East Java at Rp 1,600 per m³, significantly lower than Surabaya's Rp 3,000 per m³. Mr. A noted that the low tariff is intended as a social responsibility to provide affordable water, but without sufficient local government subsidies, achieving break-even points is challenging, especially amid increasing production costs.

Mr. A mentioned efforts to sell water to the industrial sector, facing strong competition, but revenue is insufficient to offset losses from low household water tariffs. Ms. B added that while a proposal to increase tariffs has been made, only industrial rates were approved due to political circumstances. The heavy reliance on household customers, comprising 80% of the client base, presents a significant challenge to achieving Full Cost Recovery (FCR).

Mrs. C highlighted that the lack of water tariff adjustments from 2018 to 2023 has created financial challenges for the company. While management proposed reclassifying customer

groups and adjusting tariffs, only small commerce, large commerce, and small industry received approval in April 2024, leaving household customer tariff increases still pending. This ongoing absence of adjustments has added to Perumda Giri Tirta's financial strain, underscoring the need for more comprehensive government and Supervisory Board policies to balance social missions with financial sustainability.

Water supply companies encounter various operational risks, including contractual discrepancies (Take or Pay), aging infrastructure leading to leaks, meter theft, and politically influenced tariff adjustments. To mitigate these risks, companies can renegotiate contracts and diversify resources, though this requires legal and market costs. Aging pipes necessitate regular maintenance and timely replacements to prevent costly repairs. Meter-related theft can be reduced through enhanced surveillance and collaboration with authorities. Additionally, companies must engage stakeholders to develop informed tariff policies to navigate political and social pressures affecting financial stability.

RESULTS AND DISCUSSION

The main issue of Non-Revenue Water (NRW) for PDAM Giri Tirta Gresik stems from three factors: discrepancies between supplied and sold water, leaks from aging pipes from the Dutch colonial era, and meter recorders' water theft. Political constraints impede tariff increases, complicating loss recovery. To tackle the NRW challenge and promote sustainable Good Corporate Governance (GCG), implementing GCG principles clarity, accountability, responsibility, independence, and equity is essential. The article highlights how risk-based audits can enhance water management and operational efficiency.

- 1. Transparency:** Transparency is crucial in managing water leaks, as accurate financial reports and operational data enhance public trust. Regular internal audits ensure relevant information is accessible to stakeholders, promoting data-driven decision-making.
- 2. Accountability:** The principle of accountability mandates clear responsibilities for water management within each PDAM department. Risk-based audits can assess performance in reducing NRW, while an effective reporting system enables evaluation of policies and ensures accountability in decision-making.
- 3. Responsibility:** Water companies are responsible for maintaining infrastructure and managing water resources. Implementing risk-based audits can help PDAM identify potential leak risks. Additionally, collaborating with the community and training employees to detect leaks are essential for enhancing management efficiency.
- 4. Independence:** Independent decision-making and audit committees enhance managerial integrity, provide objective evaluation of water management systems, and promote transparency in reporting to stakeholders.
- 5. Fairness:** Fairness in water management is crucial, requiring public education, cross-subsidy policies, and risk-based audits to balance company interests and community interests.

The application of GCG principles via risk-based audits offers a robust framework for PDAM Giri Tirta Gresik to lower non-revenue water (NRW). This approach aims to enhance operational efficiency, minimize financial losses, and secure sustainable water supply for the community, aligning with improved Good Corporate Governance objectives.

Implementing Good Corporate Governance principles in managing water leakage offers a framework for drinking water companies to tackle Non-Revenue Water (NRW) challenges. Emphasizing clarity, accountability, responsibility, independence, and equity helps reduce leakage, enhance operational efficiency, and ensure sustainable water availability for communities.

ANALYSIS

This study demonstrates the significance of the Risk-Based Audit approach in minimizing Non-Revenue Water (NRW) at PDAM Giri Tirta Gresik, thereby enhancing sustainable Good Corporate Governance (GCG). Employing the Exponential Non-Discriminatory Snowball Sampling method, the research identifies major risks such as pipe leaks, water theft, and meter errors that contribute to high NRW. The findings suggest that risk-based audits effectively identify and mitigate these risks, ultimately supporting better corporate governance. Data triangulation further bolsters the credibility of the results and provides valuable insights into risk management strategies.

Risk-based audits have effectively reduced Non-Revenue Water (NRW) at PDAM Giri Tirta Gresik, contributing to sustainable Good Corporate Governance (GCG). The study offers practical recommendations for enhancing the use of risk-focused audits to improve operational efficiency and sustain community services

CONCLUSION

The study suggests strategic steps to support sustainable **Good Corporate Governance** (GCG) in PDAM Giri Tirta Gresik to minimize water loss and reduce non-revenue water (NRW) grade. These steps include

- 1. Review and Adjustment of Contracts with Suppliers:** PDAMs should reassess contracts with water suppliers to align them with the company's current needs, particularly in growing industrial areas like JIPE and PT Freeport. This will help prevent water wastage due to the company's challenges in marketing the supplied water.
- 2. Infrastructure Modernization:** Management must update aging pipes and metering devices to 5-10 years' economic life, adjusting to cash flow conditions, and submit funding to Gresik Regency Government as a stakeholder.
- 3. Employee Coaching and Supervision:** To enhance operational effectiveness, management should implement strict coaching, supervision, and rewards for outstanding employees, while also implementing strict sanctions for negligence.

The research highlights the effectiveness of a Risk-Based Internal Audit (RBIA) in promoting sustainable Good Corporate Governance (GCG) by identifying key issues, particularly the significant political influence in setting water tariffs. PDAM Giri Tirta Gresik has the lowest basic water tariff in East Java, but a tariff adjustment set for April 2024 aims to enhance the company's financial health. The findings underscore the necessity of risk-based audits for efficient management and sustainable operations, ensuring quality services to the community.

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