

*Research Article*

## The Influence of Financial Behavior and Operational Efficiency on Financial Performance with Financial Performance as a Moderating Variable at PERUMDA Air Minum Lae Nchiho Dairi

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**Abstract:** The Regional Drinking Water Company (Perusahaan Daerah Air Minum/PDAM) Lae Nchiho, Dairi Regency, faces significant challenges related to the low level of financial literacy and financial behavior of its human resources, which negatively affect financial performance, particularly the Return on Equity (ROE) indicator. A lack of understanding and discipline in internal financial management has led to waste and operational inefficiency. This phenomenon highlights the importance of improving financial literacy and financial behavior as a strategic effort to enhance the company's efficiency and profitability. The purpose of this study is to examine and analyze the influence of human resources' financial behavior and operational efficiency on financial performance, with financial literacy serving as a moderating variable. This research applies a quantitative descriptive approach, using data analysis with the SEM PLS 3.0 method. The study involved a total population and sample of 70 employees of the Regional Drinking Water Company (Perumda Air Minum) Lae Nchiho in Dairi Regency, particularly those working in finance and operations divisions, selected through purposive sampling techniques. The findings reveal that, partially, the variables of human resources' financial behavior and operational efficiency significantly influence financial performance and affect financial literacy. Moreover, financial literacy significantly influences financial performance. However, simultaneously, financial behavior and operational efficiency do not significantly affect financial performance when moderated by financial literacy.

**Keywords:** Financial Behavior; Financial Literacy; Financial Performance; Human Resources; Operational Efficiency.

Received: July 20, 2025;  
Revised: August 12, 2025;  
Accepted: August 29, 2025;  
Online Available: September 16, 2025;  
Curr. Ver.: September 19, 2025



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### 1. Introduction

Financial performance is a vital indicator for assessing the success and sustainability of a company's operations, including Regional-Owned Enterprises (BUMD). It reflects how effectively the company manages its resources to generate profit, maintain efficiency, and achieve its strategic objectives. In the context of BUMD, strong financial performance is not only essential for generating profit but also for supporting sustainable and high-quality public services.

Financial performance is a fundamental aspect in ensuring a company's survival and growth. It demonstrates the firm's ability to generate profits, manage assets efficiently, and maintain sustainable operations. Companies with weak financial performance are at risk of restricted business activities, declining service quality, and even bankruptcy (Rahmawati et al., 2023).

One of the crucial elements influencing financial performance is the competence of human resources (HR), particularly in terms of financial literacy. Adequate financial literacy enables employees to understand budget structures, manage costs, and make financial decisions that positively impact efficiency and profitability.

Previous studies reveal that employees with higher financial literacy tend to be more prudent in preparing budgets and avoiding waste, thereby supporting the company's financial stability (Cucinelli et al. 2023). Strong financial literacy equips employees to comprehend financial systems, prepare budgets accurately, and control operational costs (Akinyede, 2019).

However, financial literacy alone is not sufficient. Financial behavior of HR also plays a decisive role in maintaining operational efficiency and effectiveness. Prudent financial behavior—such as disciplined financial planning, expenditure control, and responsible asset utilization—can reduce waste and improve internal financial governance (Struckell et al., 2023).

Some studies indicate that not all variables, such as literacy or financial behavior, directly affect financial performance. In fact, several findings suggest that excessive efficiency without proper asset management can have negative consequences (Cucinelli et al., 2023).

When supported by good financial literacy and financial behavior, operational efficiency is expected to be achieved. Operational efficiency is key to optimizing resources and reducing production costs. Efficient companies can improve profit margins and competitiveness, which directly enhance financial performance (Kurniasih et al., 2024).

Operational efficiency serves as a bridge between individual competence and overall corporate performance. It reflects the company's ability to utilize resources optimally to deliver services at minimal cost. Efficient firms can reduce production costs, improve profit margins, and maintain long-term competitiveness (Simonse et al, 2024).

Sulastri et al. (2024) argue that operational efficiency has a tangible impact on optimizing resources necessary to enhance profitability, particularly in improving Return on Equity (ROE). This view is reinforced by Wiriyawan et al. (2024), who found that operational efficiency significantly influences banks' financial performance in Indonesia, demonstrating that efficient use of resources can improve profitability and strengthen key financial ratios such as ROE. Together, these findings highlight the critical role of operational efficiency in shaping data-driven financial inclusiveness and long-term sustainability in the banking sector.

PERUMDA Air Minum Lae Nciho in Dairi Regency faces significant challenges stemming from low HR financial literacy and behavior, which weaken financial performance, particularly the ROE indicator. A lack of understanding and discipline in internal financial management has led to waste and operational inefficiency. This phenomenon underscores the urgency of improving financial literacy and financial behavior as strategic measures to enhance efficiency and profitability.

In addition to internal factors, Regional Drinking Water Companies (PERUMDA) as local government enterprises face external pressures such as government regulations, public expectations for clean water services, and budget constraints from local governments. In such situations, operational efficiency becomes a pressing necessity rather than a strategic option. Healthy financial performance is essential not only for survival but also for growth and for making a tangible contribution to regional development.

In performance measurement, Return on Equity (ROE) serves as a key indicator because it reflects how effectively the company generates profit from its equity. ROE is not only of concern to internal management but also to external stakeholders such as local governments, investors, and the public. Therefore, improving ROE requires strengthening internal financial systems that involve HR quality and sustainable operational efficiency (Nasution et al., 2023).

Although several prior studies have examined efficiency or financial ratios, research simultaneously linking financial literacy, financial behavior, and operational efficiency with ROE in the context of local enterprises remains limited. Most studies have focused on technical aspects such as financial statement analysis, without considering non-technical dimensions such as HR quality and behavior. In fact, financial literacy and behavior are human factors that strongly influence decision-making and cost management at the operational level.

This study offers an important contribution by presenting a more holistic approach in assessing the financial performance of regional enterprises. It not only evaluates figures from financial statements but also explores root issues from within the organization—specifically, the extent to which employee competence and financial behavior affect the company's financial outcomes. Such an approach is expected to provide benefits not only for academic purposes but also as a basis for internal policy improvements at PERUMDA Air Minum Lae Nciho, Dairi Regency.

## 2. Literature Review

### 2.1. Financial Behavior

The way individuals or organizations regulate, manage, spend, save, and invest their money is referred to as financial behavior (Halim, 2024). Financial behavior represents personal financial management, reflected in an individual's ability to control income and expenses in order to achieve financial goals (Aleryani et al., 2023).

### 2.2. Operational Efficiency

Operational efficiency is the extent to which a business or organization can optimally utilize its resources (labor, time, raw materials, and energy) to generate the highest possible output at the lowest possible cost (Sulastri et al., 2024).

### 2.3. Financial Performance

Financial performance, typically measured using financial indicators that reflect a company's ability to generate revenue, manage assets, and fulfill obligations, refers to the extent to which an organization successfully achieves its financial objectives (Rahmania et al., 2024).

## 3. Proposed Method

The data analysis technique in this study was conducted quantitatively using Structural Equation Modeling with the Partial Least Squares (SEM-PLS) approach, and the results of the data analysis were obtained using:

### 3.1. Validity and Reliability Test

The validity test of the data can be carried out using:

- Convergent validity test is conducted by determining the outer loading value, where the requirement for this test is that an indicator is considered valid if the outer loading value is  $\geq 0.70$  (Baffour Gyau et al., 2024).
- Average Variance Extracted (AVE) test, where the requirement is that if a construct variable explains more than half of the indicator's variance, then the construct variable is considered valid and feasible for use, indicated by an Average Variance Extracted (AVE) value of  $\geq 0.50$  (Baffour Gyau et al., 2024).
- Discriminant validity test, where the requirement is that the square root of AVE ( $\sqrt{\text{AVE}}$ ) of each indicator must be higher in its own construct compared to other constructs (Baffour Gyau et al., 2024).

Reliability testing can be conducted using the composite reliability test, where the requirement for this test is that if the composite reliability (CR) value is  $> 0.70$ , it indicates that the construct variable is reliable or consistent (Aranda et al., 2024).

### 3.2. Measurement Model Test

The purpose of the measurement model test is to verify whether the indicators used accurately represent the constructs or latent variables being measured. This is related to how CR and AVE are calculated, as well as the extent to which the indicators are reliable and valid (Baffour Gyau et al., 2024).

### 3.3. Structural Model

- Path coefficients describe the intensity and direction of the relationship between variables (Aranda et al., 2024).
- Bootstrapping is used to obtain t-statistics for hypothesis testing (typically 5,000 subsamples) (Appiah-Kubi et al., 2024).
- P-value has a requirement: for an effect to be considered significant, its value must be less than 0.05.
- The contribution of independent factors to the dependent variable is measured using R-Square ( $R^2$ ). A substantial model is indicated by an  $R^2$  score of  $\geq 0.50$ .

## 4. Results

### 4.1. Description and Characteristics of Data

The output regarding the data description in this study can be seen in the following table:

**Table 1.** Data by Gender

Gender	Number of Respondents	Percentage (%)
Male	59	84,28
Female	11	15,72
Total	70	100

Source: PLS 3.0 Analysis Results, 2025

Based on the available statistics, male respondents represent the largest percentage who completed the questionnaire, totaling 59 respondents or 84.28%, while female respondents account for the smallest percentage, with 11 respondents or 15.72%.

**Table 2.** Data by Age.

Age (Years)	Number of Respondents	Percentage (%)
25-30	12	17,14
31-40	45	64,28
41-50	9	12,85
Above 50	4	5,73
Total	70	100

Source: PLS 3.0 Analysis Results, 2025

Based on the data in the table above, respondents in the age range of 31 to 40 years were the largest group to complete the questionnaire, with 45 respondents or 64.28%. Meanwhile, respondents aged above 50 years represented the smallest group, with only 4 respondents or 5.73%.

**Table 3.** Data by Length of Service.

Length of Service (Years)	Number of Respondents	Percentage (%)
5	12	17,14
10	30	42,85
20	22	31,43
Above 20	6	8,58
Total	70	100

Source: PLS 3.0 Analysis Results, 2025

Based on the data described above, the largest group of respondents who completed the questionnaire were those who had worked at the company for 10 years, totaling 30 people (42.8%). Meanwhile, the smallest group of respondents were those who had worked at the company for more than 20 years, totaling 6 people (8.58%).

### 4.2. Convergent Validity Analysis

To understand the validity test using convergent validity analysis, the results can be seen in the following table:

**Table 4.** Results of Convergent Validity Test.

Variable	Indicator	Outer Loading	Description
Human Resource Financial Behavior (X <sub>1</sub> )	PKS 1	0,734	Valid
	PKS 2	0,744	Valid
	PKS 3	0,809	Valid
	PKS 4	0,739	Valid
Operational Efficiency (X <sub>2</sub> )	EOP 1	0,807	Valid
	EOP 2	0,865	Valid
	EOP 3	0,785	Valid
	EOP 4	0,845	Valid
	EOP 5	0,860	Valid
Human Resource Financial Literacy (Z)	LKS 1	0,795	Valid
	LKS 2	0,752	Valid
	LKS 3	0,818	Valid
	LKS 4	0,808	Valid
	LKS 5	0,774	Valid

Financial Performance (Y)	KKEU 1	0,776	Valid
	KKEU 2	0,801	Valid
	KKEU 3	0,753	Valid
	KKEU 4	0,759	Valid
	KKEU 5	0,835	Valid

Source: PLS 3.0 Analysis Results, 2025

From the data above, it can be seen that all construct variable values are valid, as indicated by all outer loading values of the construct variables being greater than 0.7.

#### 4.3. Average Variance Extracted (AVE) Analysis

The results of the AVE test can be seen in the following table:

**Table 5.** Results of AVE Test.

Variabel	AVE Value
Human Resource Financial Behavior (X <sub>1</sub> )	0,767
Operational Efficiency (X <sub>2</sub> )	0,765
Human Resource Financial Literacy (Z)	0,752
Financial Performance (Y)	0,743

Source: PLS 3.0 Analysis Results, 2025

According to the output results, the AVE value of each construct variable shows a data distribution that meets the assumption of data validity, since all AVE test values are greater than the significance level of 0.05.

#### 4.4. Composite Reliability Analysis

The results of the composite reliability test can be seen in the following table:

**Table 6.** Results of Composite Reliability Test.

Variable	Composite Reliability Value
HR Financial Behavior (X <sub>1</sub> )	0,809
Operational Efficiency (X <sub>2</sub> )	0,834
HR Financial Literacy (Z)	0,844
Financial Performance (Y)	0,859

Source: Processed Data Results with PLS 3.0, 2025

The output results of the CR test show that the values of all construct variables are greater than the significance level of 0.05, indicating that all construct variable data are well distributed and the dispersed data are consistent and reliable.

#### 4.5. Discriminant Validity Analysis

The results of the discriminant validity analysis can be seen in the following table:

**Table 7.** Discriminant Validity Test Results.

Construct	PKS	EOP	LKS	KKEU
PKS	0,809	0,671	0,383	0,296
EOP		0,806	0,385	0,278
LKS			0,790	0,586
KKEU				0,778

Source: Processed Data Results with PLS 3.0, 2025

From the data in the table above, it can be seen that the correlation of AVE X<sub>1</sub> = 0.809 has a higher value than the correlation between X<sub>1</sub> and X<sub>2</sub> (0.671), X<sub>1</sub> and Z (0.383), and X<sub>1</sub> and Y (0.296). The correlation of AVE X<sub>2</sub> = 0.806 is greater than the correlation between X<sub>1</sub> and Z (0.385) and X<sub>1</sub> and Y (0.278). Likewise, AVE Z = 0.790 is greater than the correlation between X<sub>1</sub> and Y (0.586). This indicates that all correlations of the construct variables are consistent with the assumption of discriminant validity.

#### 4.6. R Square Test

The results of the R Square test can be seen in the following table:

**Table 8.** R Square Test Results.

Variable	R Square Value
Human Resource Financial Behavior ( $X_1$ )	0,760
Operational Efficiency ( $X_2$ )	0,766
Human Resource Financial Literacy ( $Z$ )	0,835
Financial Performance ( $Y$ )	0,820

Source: Processed Data Results with PLS 3.0, 2025

Based on the R Square test results, it can be seen that the financial literacy variable is able to explain the variables of human resource financial behavior, operational efficiency, and financial performance by 83.5%, while the remaining 16.5% is explained by other variables that are not presented in this study.

#### 4.7. Hypothesis Testing

The output of the hypothesis testing can be seen in the following table:

**Table 9.** Hypothesis Testing.

Hypothesis	Relationship	t-Statistic	p-Value	Decision
H <sub>1</sub>	PKS $\longrightarrow$ KKEU	7,420	0,045	Accepted
H <sub>2</sub>	EOP $\longrightarrow$ KKEU	8,140	0,037	Accepted
H <sub>3</sub>	PKS $\longrightarrow$ LKS	7,170	0,030	Accepted
H <sub>4</sub>	EOP $\longrightarrow$ LKS	8,190	0,041	Accepted
H <sub>5</sub>	LKS $\longrightarrow$ KKEU	7,930	0,000	Accepted
H <sub>6</sub>	PKS* LKS $\longrightarrow$ KKEU	0,016	0,064	Rejected
H <sub>7</sub>	EOP* LKS $\longrightarrow$ KKEU	0,025	0,052	Rejected

Source: Processed Data Results with PLS 3.0, 2025

Based on the hypothesis testing output, the following conclusions can be drawn:

H1: The human resource financial behavior variable has a significant effect on the financial performance variable. This influence can be identified from the t-statistic value of 0.742, which is greater than 0.05, and the p-value of 0.045, which is smaller than 0.05.

H2: The operational efficiency variable has a significant effect on the financial performance variable. This influence can be identified from the t-statistic value of 0.814, which is greater than 0.05, and the p-value of 0.037, which is smaller than 0.05.

H3: The human resource financial behavior variable has a significant effect on the human resource financial literacy variable. This influence can be identified from the t-statistic value of 0.717, which is greater than 0.05, and the p-value of 0.030, which is smaller than 0.05.

H4: The operational efficiency variable has a significant effect on the human resource financial literacy variable. This influence can be identified from the t-statistic value of 0.819, which is greater than 0.05, and the p-value of 0.041, which is smaller than 0.05.

H5: The human resource financial literacy variable has a significant effect on the financial performance variable. This influence can be identified from the t-statistic value of 0.793, which is greater than 0.05, and the p-value of 0.000, which is smaller than 0.05.

H6: The human resource financial behavior variable does not have a significant effect on the financial performance variable with financial literacy as a moderating variable. This can be seen from the t-statistic value of 0.016, which is smaller than 0.05, and the p-value of 0.064, which is greater than 0.05.

H7: The operational efficiency variable does not have a significant effect on the financial performance variable with financial literacy as a moderating variable. This can be seen from the t-statistic value of 0.025, which is smaller than 0.05, and the p-value of 0.054, which is greater than 0.05.

From the research findings, the following figure was obtained:

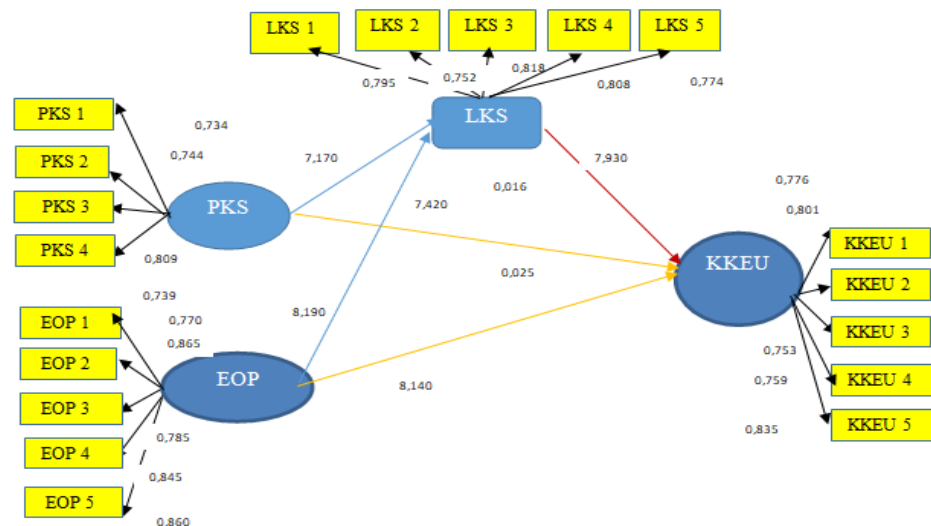


Figure 1. Bootstrapping Diagram.

## 5. Discussion

### 5.1. The Effect of Human Resource Financial Behavior on the Financial Performance at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency

Based on the research findings, the human resource financial behavior variable has a significant effect on financial performance at Perusahaan Umum Daerah Air Minum Lae Nciho. This finding is consistent with the study of Wahyono et al. (2021), which states that financial performance is not only influenced by individual behavior in managing finances but is largely determined by how such behavior is manifested in structured management and governance.

### 5.2. The Effect of Operational Efficiency on the Financial Performance at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency

The results indicate that operational efficiency has a significant effect on the financial performance of Perusahaan Umum Daerah Air Minum Lae Nciho. This situation is in line with the study of Struckell et al. (2023), which emphasizes that operational efficiency impacts financial performance when efficient operational processes are able to improve financial governance and ensure effective cost control.

### 5.3. The Effect of Human Resource Financial Behavior on Human Resource Financial Literacy at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency

The findings conclude that human resource financial behavior significantly affects human resource financial literacy in Perusahaan Umum Daerah Air Minum Lae Nciho. This is consistent with the study of Achbah et al. (2024), which explains that good financial literacy among employees is shaped by transparent and accountable financial behavior.

### 5.4. The Effect of Operational Efficiency on Human Resource Financial Literacy at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency

The study concludes that operational efficiency significantly influences human resource financial literacy in Perusahaan Umum Daerah Air Minum Lae Nciho. This finding is supported by Yordudom et al. (2024), who explain that operational efficiency reflects the extent to which a company can optimally utilize its resources (labor, costs, time, and assets). Strong efficiency is expected to foster a disciplined work culture and encourage employees to better understand financial concepts.

### **5.5. The Effect of Financial Literacy on the Financial Performance at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency**

The results show that human resource financial literacy significantly affects the financial performance of Perusahaan Umum Daerah Air Minum Lae Nciho. This is consistent with the study of Achbah et al. (2024), which states that employees with higher financial literacy are better able to make rational financial decisions, manage costs more carefully, avoid financial mistakes, and identify opportunities for investment or efficiency.

### **5.6. The Effect of Human Resource Financial Behavior on the Financial Performance at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency with Human Resource Financial Literacy as a Moderating Variable**

The research results indicate that human resource financial behavior does not significantly affect financial performance at Perusahaan Umum Daerah Air Minum Lae Nciho when human resource financial literacy is used as a moderating variable. This aligns with the findings of Erlina (2023), who stated that improvements in financial performance are not driven by better employee financial behavior but rather by weaknesses in the company's financial system.

### **5.7. The Effect of Operational Efficiency on the Financial Performance at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency with Human Resource Financial Literacy as a Moderating Variable**

The findings suggest that operational efficiency does not significantly influence financial performance at Perusahaan Umum Daerah Air Minum Lae Nciho when human resource financial literacy serves as a moderating variable. This is consistent with Menne et al. (2024), who explains that while efficiency is necessary to maintain service quality, enhancing financial performance requires additional strategies such as expanding the customer base, improving collection rates, and implementing more realistic tariff policies.

## **6. Conclusion**

- Partially, financial behavior of human resources (HR) has a significant effect on financial performance at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency.
- Partially, operational efficiency has a significant effect on financial performance at the Regional Drinking Water Company Lae Nciho, Dairi Regency.
- Partially, financial behavior has a significant effect on financial literacy of HR at the Regional Drinking Water Company Lae Nciho, Dairi Regency.
- Partially, operational efficiency has a significant effect on financial literacy of HR at the Regional Drinking Water Company Lae Nciho, Dairi Regency.
- Partially, financial literacy of HR has a significant effect on financial performance at the Regional Drinking Water Company Lae Nciho, Dairi Regency.
- Simultaneously, financial behavior of HR does not have a significant effect on financial performance at the Regional Drinking Water Company Lae Nciho, Dairi Regency, with financial literacy of HR as a moderating variable.
- Simultaneously, operational efficiency does not have a significant effect on financial performance at the Regional Drinking Water Company Lae Nciho, Dairi Regency, with financial literacy of HR as a moderating variable.

## **7. Recommendations**

The best suggestions for improvement at the Regional Drinking Water Company (Perusahaan Umum Daerah Air Minum) Lae Nciho, Dairi Regency, are as follows:

- For the Regional Drinking Water Company Lae Nciho: The company should pay greater attention to the factor of financial literacy and the understanding of financial systems among human resources, as this has been proven to significantly influence the company's financial performance.
- For the Regional Government: There is a need for regulatory support and more realistic tariff policies to ensure the sustainability of the financial performance of the regional drinking water company without compromising public service delivery.
- For Future Researchers: It is recommended to include other relevant variables (such as work motivation, service quality, and customer satisfaction) to enrich the research model and provide broader insights.



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