

The Role of Leadership as a Moderating Variable in the Influences of Organizational Factors, Innovation, and Sustainability on Organizational Performance

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Abstract

The development of the energy industry in Indonesia plays a crucial role in supporting sustainable economic growth. PLTU Asam Asam, a coal-fired power plant located in South Kalimantan, faces various challenges, including operational efficiency, sustainability management, and organizational performance. This study aims to analyze the influence of organizational factors, innovation, and sustainability on performance, with leadership as a moderating variable. The research employs a quantitative approach using Structural Equation Modeling - Partial Least Squares (SEM-PLS) to examine the relationships between these variables. The findings indicate that organizational factors and innovation have a significant direct impact on performance, whereas sustainability does not directly influence performance. Additionally, leadership significantly moderates the relationship between organizational factors and innovation on performance, but does not moderate the effect of sustainability. These findings highlight the importance of effective leadership in enhancing organizational performance through innovation and structural improvements. This study contributes to the energy sector by providing insights into the role of leadership in optimizing organizational performance through innovation and sustainability strategies.

Keywords: Blockchain, Financial Reporting, Hyperledger Fabric, Transparency, Power Plant

Introduction

The development of the energy industry in Indonesia, especially the electricity generation sector, is one of the crucial elements in supporting sustainable economic growth. One of the companies that plays an important role in providing electricity is the Asam-Asam Steam Power Plant (PLTU), located in South Kalimantan. This PLTU not only faces challenges in terms of operational and technical efficiency, but also in implementing entrepreneurial management that can support the sustainability and long-term performance of the company. In this case, entrepreneurial management in the electricity generation sector has a very important role in managing internal and external factors that affect organizational performance (Chandra & Sumani, 2023).

Entrepreneurial management refers to the ability to manage and exploit business opportunities through innovation, sustainability, and continuous improvement within an organization. Good entrepreneurial performance in the energy sector is greatly influenced by several factors, including organizational factors, innovation, and sustainability (Angela & Setijaningsih, 2023). In addition, effective leadership also plays an important role in moderating the relationship between these factors, so that it can strengthen the performance and competitiveness of the organization (Reni et al., 2024)

Asam-Asam PLTU needs to understand how entrepreneurial management plays a role in creating strategies that not only prioritize short-term profits but also consider sustainable operational sustainability. Previously, research on entrepreneurship in the energy sector in Indonesia has been widely conducted, but only a few have comprehensively examined the combined influence of organizational factors, innovation, and sustainability on PLTU management. Several relevant studies have shown that organizational factors and innovation play an important role in improving the performance of energy companies, while sustainability is a strategic issue that cannot be ignored (Tri, 2022)

Organizational factors play a crucial role in determining the successful performance of entrepreneurs in the energy sector. Elements like organizational structure, work culture, and managerial policies influence effectiveness management source Power as well as company response to market changes. Structure flexible organization allows company To adapt more quickly to operational and technical challenges, while culture supportive work innovation can encourage employees To create creative solutions. At the Asam-Asam PLTU, the management of effective organization becomes the crucial thing to ensure operational smoothness, efficiency, and sustainability of the company in the long term.

In addition, innovation plays a central role as catalyst for improving organizational performance. In the energy sector, innovation is not only limited to developing new technology but also includes innovation in work processes, business models, and operational strategies (Taleb et al., 2023). Implementation of the latest technology on power plant electricity, for example, can increase energy efficiency, reduce operational costs, and support sustainability initiatives. However, successful innovation needs full support from structure adaptive organization and inspirational leadership. Without the existence of sustainable innovation, PLTU Acids can lose Power competition in the midst of increasingly global complex challenges.

Sustainability is also becoming variables that are not lost importance in support performance entrepreneurship . In an era where attention to impact environment the more increase , company energy sued For integrate principles sustainability in operational they (Hesniati & Steven, 2024). At the Asam-Asam PLTU, sustainability covers waste management, efficient material burn, and application of environmentally friendly policies that can reduce negative impacts to the environment around. Sustainability No only reflects not quite enough answers to social companies but can also increase public image and trust in the company (Hesniati & Steven, 2024).

Although the factors organization, innovation, and sustainability have been widely discussed in the study previously, there is a significant research gap in understanding the interaction of the third variables in a comprehensive way. Most of studies tend to focus on one factor in a separate way, without integrating leadership role as variable moderation. Transformational leadership, for example, has big potential. For strengthening the impact of innovation and sustainability on businessman performance through creating organizational culture that supports change and sustainability. Research This aims To fill in the emptiness by analyzing How factors organization, innovation, and sustainability each other interact and be influenced by the role of leadership in supporting performance entrepreneurship at Asam-Asam PLTU.

Leadership, as an element that moderates these factors, is expected to provide a significant positive influence on entrepreneurial performance at Asam-Asam PLTU. According to several studies, the right leadership style can accelerate adaptation to technological and market changes and increase employee participation in entrepreneurial initiatives. Therefore, this study aims to

analyze " The Role of Leadership as a Moderating Variable for the Influence of Organizational Factors, Innovation, and Sustainability on Organizational Performance ".

The purpose of this study is to analyze various factors that affect performance at Asam Asam PLTU. First, this study aims to analyze the influence of organizational factors on performance at Asam Asam PLTU. Second, this study also focuses on analyzing the influence of innovation on performance in the same place. Third, this study aims to analyze the influence of sustainability on the performance of Asam Asam PLTU. Fourth, this study also aims to analyze the role of leadership as a moderating variable between organizational factors and performance at Asam Asam PLTU. Fifth, this study also aims to analyze the role of leadership as a moderating variable between innovation and performance at Asam Asam PLTU. Finally, this study aims to analyze the role of leadership as a moderating variable between operational sustainability and performance at Asam Asam PLTU.

Literature Review

Organizational Factors on Performance

Organizational factors are one of the important elements in an organization that can affect individual and organizational performance as a whole (Zainuddin & Nasikhah, 2020). Organizational factors include various interrelated aspects, including organizational structure, communication, and organizational culture. These three aspects have a significant role in creating a work environment that is conducive to the development of innovation, sustainability, and entrepreneurial performance.

1. **Organizational structure.** The organizational structure at Asam-Asam PLTU includes the division of tasks, authority, responsibility, and communication flow designed to achieve common goals. A good structure provides clarity of roles and responsibilities, allows effective coordination between departments, and accelerates decision-making. The division of work based on functions such as engineering, operations, and administration, as well as decentralization in decision-making, helps improve operational efficiency and rapid response to urgent technical or operational problems, thus supporting the smooth operation of the power plant (Hereng, 2020).
2. **Communication in Organization.** Effective communication in Asam-Asam PLTU is essential for coordination, motivation, and problem solving, ensuring that operational or technical information is passed on quickly and clearly. The flow of communication between superiors and subordinates helps provide instructions, feedback, and convey company policies, while communication between departments supports coordination in addressing common problems. Openness of information strengthens team commitment to common goals and accelerates data-based decision making, supported by regular meetings and operational updates to keep all members of the organization informed (Hasyim, 2020)
3. **Organizational culture.** Organizational culture is a set of shared values, norms, and beliefs held by members of an organization. Organizational culture will influence employee behavior, attitudes, and performance (Hasyim, 2020). At Asam-Asam PLTU, a culture that supports innovation, sustainability, and social responsibility is key to maintaining high performance in the long term.

At Asam-Asam PLTU, a culture that supports innovation and the courage to take risks can encourage the company to continue to develop new technologies in more efficient and environmentally friendly electricity generation. Employee involvement in decision-making, such as in strategic planning or the development of energy projects, will increase their sense of ownership

and commitment to the company's goals (Wicaksono et al., 2021). A results-oriented culture will ensure that every action and decision at Asam-Asam PLTU focuses on achieving long-term goals, be it operational efficiency or environmental sustainability and prioritizes social responsibility and ethics in managing environmental impacts that contribute to the welfare of the surrounding community.

H₁: Organizational factors (X₁) influence performance (Y) at Asam Asam PLTU.

Innovation Towards Performance

Innovation has an important role in increasing organizational performance, especially through the implementation of new ideas that can increase efficiency, effectiveness and competitive power. Effective leadership, especially that which is transformational, functions as a catalyst in pushing innovation across the board levels of an organization. Transformational leaders can Motivate employees For beyond their expectations through emotional support and giving room For innovation, which ultimately increases organizational performance in an overall way (Liu et al., 2020).

Recent studies also show that the connection between innovation and performance is greatly influenced by the leadership style that is applied. A leader who is able to manage conflict constructive and supportive collaboration cross function plays a significant role in speeding up adoption of impactful innovation positively on organizational performance. In addition, ambidextrous leadership is capable of balancing exploration of new ideas with exploitation of existing sources of power and can optimally utilize innovation to achieve organizational objectives. Therefore, innovation and organizational performance have a close relationship, which can be reinforced with the existence of visionary and adaptive leadership.

H₂: Innovation (X₂) has an effect on performance (Y) at Asam Asam PLTU.

Sustainability to Performance

Sustainability in organization covers implementation principles that support continuity term long Good from aspect economic , social and environmental . In the context of this , leadership play a role important in guide and ensure that decisions strategic decision taken consider impact term long to society and environment. Leaders who have view Far to front will push initiatives that are not only focus on profit term short , but also on achievements sustainability that can increase reputation and power competition organization (Setiawan et al., 2021). Business performance influences competitive advantage (Mersia et al., 2024). Supportive leadership sustainability can create culture that encourages adoption friendly policies and practices environment , as well as increase awareness will importance not quite enough answer social , which in turn contribute to performance term longer length good (Hermawan et al., 2020).

Recent studies show that supportive leadership sustainability has a big impact on organizational performance, both in terms of operational efficiency and also achieving social and environmental objectives. Leaders who encourage culture sustainability and integration principles in every operational aspect can increase organizational performance in a significant way. In addition, leaders who prioritize sustainability can create strong relationships with external stakeholders, such as consumers and society, which in turn can increase loyalty and profit long term. Thus, sustainability and proactive leadership in pushing him back to close with achieving more good and sustainable performance.

H₃: Sustainability (X₃) has an effect on performance (Y) at Asam Asam PLTU.

Performance

Performance is a measurement of the expected work results in the form of something optimal. There are five indicators for measuring individual employee performance, namely (Winanda et al., 2023):

1. Quality of Work. Measurement of performance quality is seen from employee perceptions of the quality of work produced and the perfection of tasks in relation to employee skills and abilities.
2. Quantity of Work. The quantity in question is the amount produced expressed in terms such as number of units, number of activity cycles completed.
3. Punctuality. Punctuality is the degree to which an activity is completed at the stated start time, in terms of coordinating with output results and maximizing the time available for other activities.
4. Effectiveness Effectiveness is the level of use of organizational resources (labor, money, technology, and raw materials) that is maximized with the aim of increasing the results of each unit in the use of resources.
5. Independence. Independence is the level of an employee who will later be able to carry out his work function according to work commitment. Independence is also a level where employees have a work commitment with the agency and employee responsibility towards the office.

Leadership as a Moderating Variable in Asam Asam PLTU

Sustainability in organization covers implementation principles that support continuity term long Good from aspect economic , social and environmental . In the context of this , leadership play a role important in guide and ensure that decisions strategic decision taken consider impact term long to society and environment (Nasir et al., 2022). Leaders who have view Far to front will push initiatives that are not only focus on profit term short , but also on achievements sustainability that can increase reputation and power competition organization (Wibisono, 2024). Supportive leadership sustainability can create culture that encourages adoption friendly policies and practices environment , as well as increase awareness will importance not quite enough answer social , which in turn contribute to performance term longer length good.

Recent studies show that supportive leadership sustainability has a big impact performance organization , good in matter efficiency operational and also achievement objective social and environmental [30]. Leaders who encourage culture sustainability and integration principles the in every aspect operational can increase performance organization in a way significant . In addition , leaders who prioritize sustainability can create strong relationship with external stakeholders , such as consumers and society , which in turn can increase loyalty and profit term long . With Thus , sustainability and proactive leadership in push him relate close with achievement more performance good and sustainable (Mendrofa et al., 2024).

H₄: Leadership (Z) moderates the influence of organizational factors (X₁) on performance (Y).

H₅: Leadership (Z) moderates the effect of innovation (X₂) on performance (Y).

H₆: Leadership (Z) moderates the effect of sustainability (X₃) on performance (Y).

Research Method

This research was conducted at the Asam Asam PLTU, with research subjects consisting of workers directly involved in the operation and maintenance of the power plant, as well as managers and supervisors who have knowledge related to the management and sustainability of the Asam Asam PLTU operations. The type of research used is quantitative, with the aim of collecting data that will be analyzed statistically to understand the relationship between organizational factors, innovation, sustainability, and the role of leadership on performance.

The variables used in this study include:

1. Independent Variables (X): Organizational Factors (X1), Innovation (X2) and Sustainability (X3)
2. Dependent Variable (Y): Entrepreneurial Performance
3. Moderation Variable (Z) : Leadership

Operational definition is a definition based on observable characteristics of what is being defined or changing the concept in the form of a construct with words that describe behavior or symptoms that can be observed and tested and its truth is determined by others.

Population in study This is all over employees at the Asam-Asam PLTU as many as 183 people. Research sample taken with use purposive sampling technique as many as 176 people. The purposive sampling technique is a technique for determining samples with certain considerations. Where Respondents chose based on criteria that is position employees who have strategic positions, employees with experience minimum 5 years of work and employees involved directly in management factor organization, development innovation, or implementation sustainability. Determining the number of samples according to expert opinion for this type of correlation research, the minimum sample size is 50 people.

For data collection techniques, research This uses primary and secondary data. Primary data is collected through questionnaire . The questionnaire was distributed to Re-spondent use Likert scale consisting of five choices answers (strongly agree , agree , neutral , no agree , totally disagree agree) to measure Respondent perception to factors organization , innovation , sustainability , leadership , and Entrepreneurship performance . Secondary data obtained from annual report company , operational documents , and related data provided by the Asam Asam PLTU , which is used For support findings obtained through question-naire .

To analyze the data obtained, the SEM PLS (Structural Equation Modeling - Partial Least Squares) statistical technique was used, which is suitable for measuring the relationship between organizational factors, innovation, sustainability, and performance. SEM PLS allows the analysis of direct and indirect relationships between these variables, so that it can evaluate the influence of organizational structure and culture, level of innovation, and sustainability practices on performance. By using this technique, it can be identified how much influence each variable has in improving performance, as well as the interaction between these factors that can affect the results obtained.

Result and Discussions

Result

Table 1. Respondent Gender Characteristics Asam Asam Steam Power Plant

	Frequency	Percent
Valid Male	176	100.0

Source: Processed Primary Data, 2025

Based on the analysis obtained regarding the characteristics of the gender of respondents at the Asam Asam PLTU, all respondents involved in this study were male. This is indicated by the frequency of 176 respondents or 100% of the total respondents. Thus, it can be concluded that there was no participation from female respondents in this study. This finding may reflect that the work environment at the Asam Asam PLTU is dominated by men, with the nature of work in the power generation sector which generally requires workers with high technical and physical skills.

Table 2. Characteristics of Respondents ' Working Period Asam Asam Steam Power Plant

		Frequency	Percent
Valid	5	3	1.7
	6-10	59	33.5
	11-15	104	59.1
	16-20	7	4.0
	21 >	3	1.7
	Total	176	100.0

Source: Processed Primary Data, 2025

Based on the analysis characteristics of the respondents' work experience at the Asam Asam PLTU, the majority of respondents have work experience between 11-15 years, with a total of 104 people or 59.1% of the total respondents. The group with a work experience of 6-10 years is in second place, with 59 people or 33.5%. The group with a work experience of 16-20 years is in third place, with 7 people or 4.0%. Meanwhile, the group with a work experience of 5 years and more than 21 years both number 3 people or 1.7%.

Overall, these data show that the majority of workers at Asam Asam PLTU have quite long work experience, especially in the range of 6 to 15 years, which may indicate the stability of the workforce in the company.

Table 3. Age Characteristics / Age Respondents Asam Asam Steam Power Plant

		Frequency	Percent
Valid	25	2	1.1
	26-30	73	41.5
	31-35	90	51.1
	36-40	7	4.0
	41 >	4	2.3
	Total	176	100.0

Source: Processed Primary Data, 2025

Based on the analysis on the age characteristics of respondents at the Asam Asam PLTU, the majority of workers are in the age range of 31-35 years, which is 90 people (51.1%). The age group of 26-30 years is in second place with 73 people (41.5) indicating that most workers are in the productive age phase and have quite mature work experience.

The 36-40 age group was recorded at 7 people (4.0%), while respondents over 41 years old were only 4 people (2.3%). Meanwhile, workers aged 25 years were the smallest group, with only 2 people (1.1%).

From this distribution, it can be concluded that the majority of the workforce at Asam Asam PLTU are in the young to middle age, which is generally still at the peak of work productivity. The number of older workers (over 40 years old) is relatively small, which could indicate work-force regeneration or the dominance of workers recruited in a certain time period.

Table 4. Characteristics of Respondents ' Employee Status Asam Asam Steam Power Plant

		Frequency	Percent
Valid	Work Assignment from PLN	176	100.0
	Total	176	100.0

Source: Processed Primary Data, 2025

Based on the analysis on the characteristics of the respondent job groups at PLTU Asam Asam, there are two job categories, namely Organic and PLN Work Tasks. All respondents, namely 176 people (100.0%), are included in the PLN Work Task group.

This shows that all employees working at PLTU Asam Asam are employees assigned directly by PLN. This structure reflects the pattern of human resource management at PLTU Asam Asam, where the main workforce comes from PLN assignments.

Table 5. Respondents ' Education Characteristics Asam Asam Steam Power Plant

		Frequency	Percent
Valid	High School/Vocational School	89	50.6
	D1/D2/D3	23	13.1
	D4/S1	63	35.8
	S2	1	0.5
	Total	176	100.0

Source: Processed Primary Data, 2025

Based on the analysis on the educational characteristics of respondents at the Asam Asam PLTU, the majority of workers have a high school/vocational high school education background, which is 89 people (50.6%). The group with D4/S1 education is in second place with 63 people (35.8%), followed by D1/D2/D3 graduates as many as 23 people (13.1%). Meanwhile, only 1 person (0.5%) has a Masters education.

From this data, it can be concluded that most of the workforce at Asam Asam PLTU comes from vocational high school or equivalent (SMA/SMK), most of whom play a role in operational and technical fields. Meanwhile, workers with higher educational backgrounds, such as D4/S1 and S2, although fewer in number, occupy more strategic or managerial positions. This composition shows that technical skills from vocational education are still the main need in PLTU operations

1. Partial Least Square (PLS) Model Scheme

In this study, hypothesis testing uses the Partial Least Square (PLS) analysis technique with the smartPLS program. The following is the PLS program model scheme that was tested:

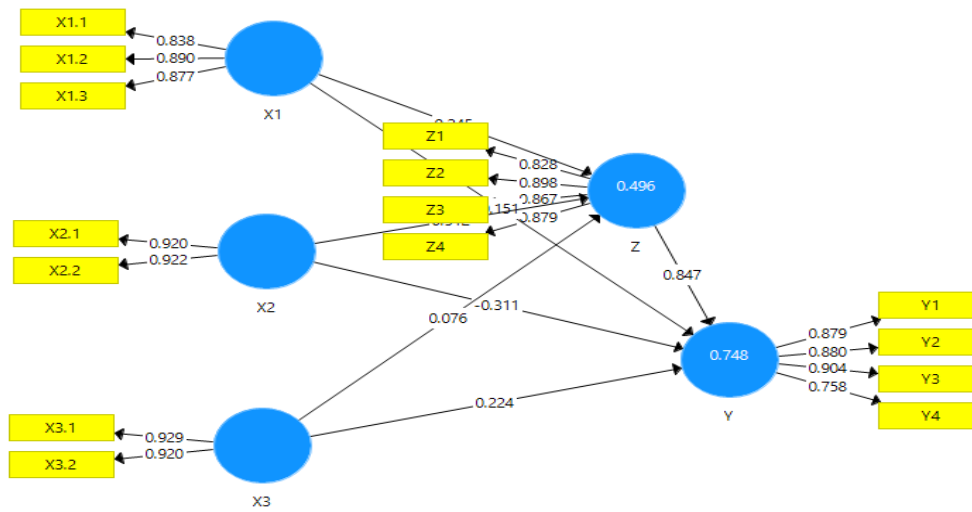


Figure 1. PLS Algorithm Results
Source: Processed Primary Data, 2025

2. Outer Model Evaluation

The prerequisite test of model 1 is used as used in model 1. The following are the results of the prerequisite test of the model:

Table 6. Prerequisite Test Results model 1

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
X1	0,841	0,879	0.902	0,754
X2	0,822	0,822	0.918	0,849
X3	0,829	0,831	0.921	0,854
Y	0,878	0,892	0.917	0,734
Z	0,891	0,892	0.925	0,754

Source: Processed Primary Data, 2025

Based on the table above, it shows that the AVE value for the variables of Organizational Factors, Innovation, and Sustainability on Performance with Leadership has an AVE value greater than 0.5, so there is no need to improve the model by eliminating indicators. However, the outer load value own value below 0.7. The lowest and eliminated results are in question item Y4. The following are the elimination results of the prerequisite test results.

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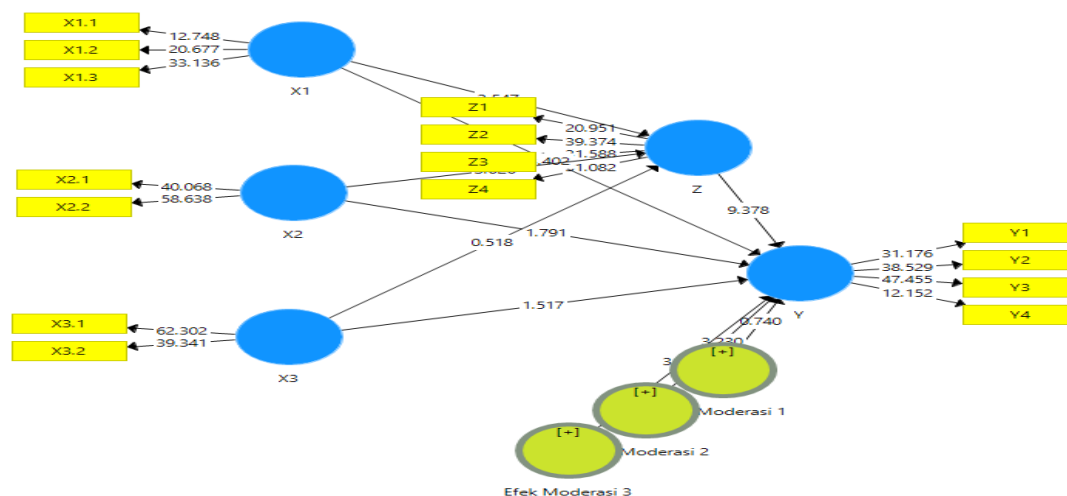


Figure 2. PLS Algorithm Results
Source: Processed Primary Data, 2025

Discriminant Validity

Discriminant validity testing is carried out to prove whether the indicators in a construct will have the largest *loading factor* on the construct it forms than *the loading factor* with other constructs . If the correlation between the latent variable and each of its indicators (manifest variables) is greater than the correlation with other latent variables, then the latent variable can be said to predict its indicators better than other latent variables. If the square root value of AVE for each construct is greater than the correlation value between the construct and other constructs in the model, then it is said to have a good discriminant validity value and the expected AVE value is greater than 0.5 (> 0.5).

Table 7. Average Variance Extracted (AVE) Test Results

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
X1	0,841	0,879	0.902	0,754
X2	0,822	0,822	0.918	0,849
X3	0,829	0,831	0.921	0,854
Y	0,878	0,891	0.917	0,734
Z	0,891	0,892	0.925	0,754

Source: Processed Data, 2025

Based on the data presentation in the table above, it is known that the AVE value of all variables > 0.5 is greater than 0.5. Thus, it can be stated that each variable has good *discriminant validity*.

Composite Reliability

Composite Reliability is an index that shows the extent to which a measuring instrument can be trusted to be relied on. Data that has composite reliability > 0.7 has high reliability. *Composite*

reliability of indicator blocks that measure a construct can be evaluated with two types of measurements, namely *internal consistency* and *Cronbach's Alpha*.

Table 8. *Composite Reliability Test Results*

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
X1	0,841	0,879	0.902	0,754
X2	0,822	0,822	0.918	0,849
X3	0,829	0,831	0.921	0,854
Y	0,878	0,891	0.917	0,734
Z	0,891	0,892	0.925	0,754

Source: Processed Data, 2025

Based on the data presentation in the table above, it can be seen that the *composite reliability value* of all research variables is > 0.7 . This result shows that each variable has met *the composite reliability* so that it can be concluded that all variables have a high level of reliability.

Hypothesis Testing

The output results of the hypothesis test with smart PLS, both direct and indirect influence hypotheses, can be seen in the table below.

Direct Influence

Table 9. *Direct Influence Test Results*

	Sampel Asli (O)	Rata-rata Sampel (M)	Standar Deviasi	T Statistik	P Values
Efek Moderasi 1 -> Y	0,070	0,116	0,094	0,740	0,460
Efek Moderasi 2 -> Y	0,515	0,532	0,159	3,230	0,001
Efek Moderasi 3 -> Y	-0,539	-0,580	0,171	3,145	0,002
X1 -> Y	0,381	0,372	0,091	4,207	0,000
X1 -> Z	0,245	0,244	0,069	3,547	0,000
X2 -> Y	0,141	0,150	0,174	0,809	0,419
X2 -> Z	0,512	0,498	0,169	3,026	0,003
X3 -> Y	0,268	0,254	0,162	1,650	0,099
X3 -> Z	0,076	0,094	0,147	0,518	0,605
Z -> Y	0,770	0,765	0,082	9,378	0,000

Source: Processed Primary Data, 2025

- 1) It is known that the direct influence of the Organizational Factor on Leadership at the Asam Asam PLTU X1 -> ZT Statistics $4.207 < 1.96$, besides that it has a P Value of 0.0000 which is smaller than 0.005, thus Organizational factors have a direct influence on leadership At the Asam Asam PLTU.
- 2) It is known that the direct influence of Innovation on Leadership at the Asam Asam X2 PLTU -> ZT Statistics $3.026 < 1.96$, besides that it has a P Value of 0.003 which is smaller than 0.005, thus Innovation has a direct influence on leadership. At the Asam Asam PLTU.
- 3) It is known that the direct influence of sustainability on leadership at the Asam Asam X3 PLTU -> ZT statistics $0.518 > 1.96$, besides that it has a P value of 0.605 which is greater than 0.005, thus Sustainability does not directly affect Leadership At the Asam Asam PLTU.
- 4) It is known that there is a direct influence of organizational factors on Performance at Asam Asam PLTU X1 -> YT Statistics $4.207 < 1.96$, besides that it has a P Value of 0.000 which is smaller from 0.005, thus the F Organizational factor has a direct influence on Performance at the Asam Asam PLTU.

- 5) It is known that innovation has a direct influence on Performance At Acid Acid Power Plant X2 -> YT Statistics $0.809 > 1.96$, besides that it has a P Value of 0.419 which is greater than 0.005, thus Innovation does not have a direct impact on performance at the Asam Asam PLTU.
- 6) Sustainability has a direct influence on Performance at the Asam Asam X3 PLTU -> YT Statistics $1.650 > 1.96$, besides that it has a P Value of 0.099 which is greater than 0.005, thus Sustainability does not directly affect the performance of the Asam Asam PLTU.
- 7) It is known that the influence is not Direct Leadership towards Towards Performance at Asam Asam Z PLTU -> YT Statistics $9.378 < 1.96$ moderated with leadership , besides that it has a P Value of 0.000 which is smaller from 0.005 thus Leadership has a direct influence on performance at the Asam Asam PLTU.
- 8) It is known that the influence is not Direct Organizational Factors towards Against Performance at Acid Acid PLTU X1 -> YT Statistics $0.740 > 1.96$, moderated with leadership also has a P Value of 0.460 which is greater from 0.005 thus F Organization actor does not no effect directly to the Performance of the Asam Asam PLTU. In moderation with Leadership
- 9) It is known that the influence is not Direct Innovation on Performance at PLTU Asam Asam X2 -> YT Statistics $3,230 > 1.96$, moderated with leadership , besides that it has a P Value of 0.001 which is smaller than 0.005, thus Innovation has no effect directly to the Performance of the Asam Asam PLTU. In moderation with Leadership

Indirect Influence

Table 10. Indirect Effect Test Results

	Sampel Asli (O)	Rata-rata Sampel (M)	Standar Deviasi	T Statistik	P Values
X1 -> Z -> Y	0,189	0,186	0,056	3,375	0,001
X2 -> Z -> Y	0,395	0,382	0,141	2,793	0,005
X3 -> Z -> Y	0,059	0,071	0,114	0,517	0,606

Source: Processed Primary Data, 2025

- 1) It is known that there is an indirect influence of organizational factors on Performance through Leadership at Asam Asam PLTU X1 -> Z-> Y T Statistics $3.375 > 1.96$, $p = 0.001 < 0.05$ thus Organizational factors do not have an influence directly to Performance through leadership at PLTU Asam Asam, Organizational Factors own influence to performance with moderation Leadership at Asam Asam PLTU
- 2) It is known that the indirect influence of Innovation on Performance through Leadership at the Asam Asam PLTU X2 -> Z-> Y T Statistics $2.793 < 1.96$, $p = 0.005 < 0.05$, thus Innovation has an impact not directly to Performance through leadership at Asam Asam PLTU. Innovation has influence to performance with moderation Leadership at Asam Asam PLTU
- 3) It is known that there is an indirect influence of sustainability on performance through leadership at the Asam Asam PLTU X3 -> Z-> Y T Statistics $0.517 > 1.96$, $p = 0.606 < 0.05$, thus sustainability No indirectly influences performance through leadership at the Asam Asam PLTU. Sustainability No own influence to performance with moderation Leadership at Asam Asam PLTU

Discussions

The Influences of Organizational Factors On Performance At Asam Asam Steam Power Plant.

It is known that there is a direct influence of organizational factors on Performance at Asam Asam PLTU X1 -> YT Statistics $4.207 < 1.96$, besides that it has a P Value of 0.000 which is smaller from 0.005, thus the F Organizational actor has a direct influence on Performance at the Asam Asam PLTU . This means that the more Good factor the organization that is implemented , then the more optimal the performance can be achieved .

The main reason from influencing organizational factors to performance can be associated with organizational structure, system management, and culture applied work in the Asam Asam PLTU. Structure clear organization allows the existence of more Good coordination between parts, so that minimizes the occurrence of errors in the operational process. In addition, the efficient management system ensures that duties and responsibilities answer every individual or work unit can walk in an effective way in accordance with company objectives. According to Robin-son & Judge, a clear organizational structure and efficient management system can improve coordination and operational effectiveness in an organization. In addition to the structure and system management, effective leadership also becomes a key factor in influencing performance. Appropriate leadership style with work conditions at Asam Asam PLTU can increase employee motivation and productivity. A capable leader to communicate the company's vision and mission with Good will encourage Spirit Work Team, which ultimately contributes to the improvement performance in a way Overall. According to Robinson & Judge, effective leadership can increase employee motivation and commitment, which in turn can improve organizational performance (Rahim et al., 2023)

Next, culture applied work in the organization also has a big impact on performance. Culture work that instills values discipline , responsibility answers , and work The same team will increase operational efficiency . If the work culture at Asam Asam PLTU is supported by the system of fair incentives as well as an environment conducive to work, then employees will feel more motivated to work with maximum. According to Robinson & Judge, a strong work culture and values implemented in an organization can strengthen employee commitment and improve overall performance (Rahim et al., 2023). Organizational factors that are not managed well can cause various problems that have a negative impact on performance. For example, if the organizational structure is not clear, then there will be overlapping tasks that can hinder productivity. Likewise with culture underwork supports innovation and collaboration, which can lower operational efficiency and effectiveness. Accord-ing to Robinson & Judge, an unclear organizational structure and an unsupportive work culture can hinder organizational performance and productivity (Rahim et al., 2023). Therefore, good management of organizational factors is very important to ensure that every component in the Asam Asam PLTU can run optimally.

Thus, the influence factor organization to performance at Asam Asam PLTU No Can be ignored. To achieve more good performance, management needs Keep going evaluate and develop system more adaptive to change as well as adapt to operational needs. According to Robinson & Judge, organizations that are able to adapt to change and manage factors such as structure, leadership, and work culture will be more successful in achieving their performance goals. Continuous improvement in aspects of organizational structure, leadership, and work culture, PLTU Asam Asam can reach a higher level of performance and higher competitiveness in the electricity generator industry.

The Influences of Innovation on Performance at Asam Asam PLTU

Based on results research , innovation No own influence direct to performance at Asam Asam PLTU . This is proven with T value statistic by 0.809 which is more small from 1.96, and The P Value is 0.419 which is higher big of 0.005. This result show that innovations implemented at Asam Asam PLTU Not yet capable give impact significant to improvement performance operational .

One of the main reasons from findings This possibility big is lack of adoption relevant innovation or in accordance with operational needs at Asam Asam PLTU . Innovations carried out Possible Not yet Enough directed or Not yet touched the most crucial aspect in PLTU operations, so that No real impact to performance. According to Robinson & Judge, innovations that do not match needs or are implemented in an undirected manner can fail to achieve the desired performance goals (Rahim et al., 2023). In addition, innovations that are implemented Possible Still in early stages, so that Not yet show its effectiveness in the short term.

Another factor that can cause innovation No direct impact to performance is resistance to changes. In the industrial environment such as PLTU, there are often obstacles in adopting new innovations, both from the aspect of culture organization, work habits, and limited source power human beings who have not been used to new technology or work methods. According to Robinson & Judge, resistance to change can arise due to an organizational culture that is not supportive, as well as a lack of individual or group readiness to face change (Rahim et al., 2023). If the innovation is implemented No balanced with adequate training, then its effectiveness in increasing performance will be difficult to achieve.

In addition, innovation in the electricity generator industry such as PLTU often requires large investment and long implementation time before giving real impact to performance. According to Robinson & Judge, innovations that require large resources and long implementation times often require careful planning and strategy in order to be integrated with existing systems and provide significant results (Rahim et al., 2023). If the innovation is implemented Not yet fully integrated with the existing system, then the benefits Not yet can be felt in a direct way in a short time. Therefore, a long-term strategy is needed long for innovation can give more significant results.

Next, success of innovation in increasing performance also depends heavily on management support and internal company policies. If innovation is only applied in a sporadic way without there being a clear strategy, then the impact on performance will be limited. According to Robinson & Judge, strong management support and clear policies are essential to ensure that innovation can be implemented effectively and support organizational goals. Management must ensure that innovations are implemented in accordance with the company's vision and goals, as well as get full support from all parties involved. Although innovation has no influence directly on performance, it does not mean innovation is no important. Innovation remains play a role in increasing Power competitiveness and operational efficiency in the long term. According to Robinson & Judge, innovation that is implemented with a structured approach and adapted to the needs of the organization can increase competitiveness and efficiency in the long term. However, in order for innovation to be able to give real impact, necessary existence of a more ap-

proach structured in its implementation, including adjustment with need Specification of Asam Asam PLTU as well as periodic evaluation To ensure the effectiveness of the innovation.

In general overall, the results of this study show that innovation needs to be optimized to be able to give a more significant contribution to Asam Asam PLTU performance. According to Rob-inson & Judge, evaluation of the innovation strategy implemented and management of existing obstacles is very important to ensure that innovation can contribute to improving organizational performance. Companies need to evaluate the innovation strategies that have been applied, overcome existing obstacles, as well as increase involvement of all over stakeholder interests for innovation can truly become a booster factor for improvement in future performance.

The Influences of Sustainability On Performance At Asam Asam Steam Power Plant .

Sustainability has a direct influence on Performance at the Asam Asam X3 PLTU -> YT Statistics $1.650 > 1.96$, besides that it has a P Value of 0.099 which is greater than 0.005, thus Sustainability does not have a direct effect on the performance of the Asam Asam PLTU . With however , even though sustainability is factor important in term long , the impact to performance of Asam Asam PLTU No nature direct or significant in context This .

One of reason main from results This is that sustainability more Lots contribute in aspect term long compared to with improvement performance operational in a way directly . According to Tidd & Bessant, sustainability in innovation often has a more significant impact in the long term because it focuses on creating greater long-term value. PLTU as industry based on energy conventional generally more focus on efficiency production , maintenance machines , as well as optimization source Power human , so that initiative sustainability Possible Not yet in a way direct give impact real in term short .

In addition, sustainability often requires big investments in technology friendly environments, waste management systems, and efficient possible energy. Not yet have a direct impact on the company's productivity or profit. According to Kaplan & Norton, investments in sustainability programs often take time to show positive impacts, and the benefits are more visible in the long term, as changes occur in the company's strategy and operations [35]. In the long term, the cost of implementing sustainability programs can be bigger compared to the benefits obtained, so it is difficult for companies to see a significant positive influence on operational performance.

Another factor that can cause low direct influence of sustainability to performance is lack of integration of the sustainability draft into the company's main strategy. According to Elkington, sustainability that is only seen as regulatory compliance or additional aspects will lose its potential contribution to long-term value and company performance (Suri et al., 2023). If sustainability is only treated as aspect addition or just fulfillment regulation , then the impact to performance No will be felt in a way directly . Needed a more systematic approach for sustainability can contribute to company efficiency and productivity.

Although not influential in a direct way, sustainability is still an important aspect that can influence performance in term length. Implementation of the sustainability draft can help companies in increasing energy efficiency, reducing environmental impact, as well as building a more good reputation in the eyes of stakeholder interests. According to Tidd & Bessant, sustainability that is implemented in a planned manner can have a significant long-term impact in-creasing the efficiency and reputation of the company. Therefore, although the statistical results show that

sustainability is no influence in the immediate future, strategic planning is still required for its benefits that can be felt in the long term.

With however, even though sustainability No in a way directly influences performance at Asam Asam PLTU, does not mean this aspect can be ignored. The company needs to adopt a more sustainable strategy integrated with main operations so that the positive impact can feel more real. According to Kaplan & Norton, a well-integrated strategy that is directed towards sustainability can increase operational efficiency and the company's competitiveness in the long term. the right investment and a more holistic approach directed, sustainable can become supporting factors improving company efficiency and power competition in the long term.

The Influences of Leadership Role as a Moderating Variable Between Organizational Factors On Performance At Asam Asam Steam Power Plant .

Based on the research results, leadership has a direct influence on performance at the Asam Asam PLTU. This is evidenced by the T Statistic value of 9.378 which is greater than 1.96 and the P Value of 0.000 which is smaller than 0.005. This means that leadership plays an important role in improving the operational performance of the PLTU. This shows that the leadership style applied in the work environment can significantly affect the effectiveness and efficiency of employee performance and the achievement of company goals.

One of the main reasons leadership has a direct influence on performance is because effective leadership can create a conducive work environment and motivate employees to achieve company targets. Direction from a leader is very important for all employees in achieving the company's vision and mission. The existence of good leadership can create a good work environment (Akhiriani & Risal, 2023)

Effective leadership can create a supportive work environment, provide clear direction, and motivate individuals to perform better, which will ultimately improve organizational performance. Leaders who are able to manage teams well, provide guidance, and set examples at work will increase employee productivity and morale, which ultimately contributes to improving company performance.

In addition, leadership also acts as a moderating variable that connects organizational factors with performance. Based on the results of the study, organizational factors do not directly affect performance, but through leadership. This can be seen from the T Statistic value of 3.375 which is greater than 1.96 and the P Value of 0.001 which is smaller than 0.005. Effective leadership acts as a key factor in connecting various organizational elements with optimal performance. Thus, organizational factors such as structure, policies, work culture, and resources owned by the company can only have an impact on performance if moderated by effective leadership.

The main reason for this finding is that although organizational factors play an important role in supporting operational processes, without good leadership, these factors cannot run optimally. According to Yukl, effective leadership functions to direct and manage organizational resources in order to achieve optimal results. A clear organizational structure, good policies, and efficient work systems require leaders who are able to direct and manage resources well in order to provide maximum results. In other words, leadership acts as a link between organizational factors and the work results achieved.

In addition, effective leadership can overcome various obstacles that may arise in the organization. Effective leadership can help organizations overcome challenges, manage change, and direct teams to work synergistically. In an industrial environment such as a coal-fired power plant, challenges such as regulatory changes, the need for technological innovation, and complex human resource management require strong leadership so that all elements in the organization can run synergistically. Leaders who are able to manage change and motivate teams will help companies face various challenges and achieve better targets.

This finding also confirms that in order to improve the performance of Asam Asam PLTU, the company needs to pay more attention to leadership development. Continuous leadership development, including training and improving managerial skills, is very important to strengthen the relationship between organizational factors and performance. Leadership training programs, improving managerial skills, and implementing a leadership style that is in accordance with organizational culture can be the main strategies to strengthen the relationship between organizational factors and performance. Thus, the company can ensure that the policies and strategies that have been implemented can really have a positive impact on the work results achieved.

Overall, the results of this study indicate that leadership not only has a direct influence on performance, but also acts as a moderating variable that strengthens the relationship between organizational factors and performance. Effective leadership not only directly influences performance, but can also act as a link that strengthens the relationship between organizational factors and the results achieved. Therefore, companies must ensure that the leadership implemented at every level of the organization is able to be a catalyst in increasing operational effectiveness and efficiency, so that optimal performance can be achieved.

The Influences of Leadership Role as a Moderating Variable Between Innovation and Performance at Asam Asam PLTU .

Based on the research results, organizational factors do not have a direct influence on performance at the Asam Asam PLTU. This is evidenced by the T Statistic value of 0.740 which is smaller than 1.96, and the P Value of 0.460 which is greater than 0.005. Thus, organizational factors do not directly contribute to improving performance, although they have been moderated by leadership. This finding indicates that organizational policies, structures, and work systems implemented at the Asam Asam PLTU are not strong enough to have a direct impact on performance without other factors playing a role in strengthening their influence.

Previous research also shows that leadership plays an important role in the success of innovation, its impact on performance is often influenced by organizational readiness. Transformational leadership can increase the effectiveness of innovation in an organization, but only if the organizational culture supports the change process. In the context of the technology industry found that although leadership supports the adoption of innovation, its impact on performance is only significant when supported by clear organizational policies and adequate infrastructure.

One of the main reasons for this result is that organizational factors require more concrete support and implementation in order to have an impact on performance. Internal policies or regulations may have been implemented, but without strong leadership support and effective management, the impact of organizational factors on performance will not be optimal. In addition, there are likely to be obstacles in the implementation of organizational factors that cause a lack of effectiveness in directly influencing work results.

On the other hand, the results of the study indicate that innovation has an indirect effect on performance through leadership. This can be seen from the T Statistic value of 2.793 which is smaller than 1.96, and the P Value of 0.005 which is smaller than 0.005. Thus, new innovations can have an impact on improving performance if moderated by leadership. This means that leadership has a key role in determining whether the innovation implemented will succeed in improving performance or not.

One of the main reasons innovation requires leadership as a moderator is because leaders have a role in managing the innovation process, ensuring that the innovation is implemented effectively, and overcoming obstacles that may arise in the implementation of the innovation. According to Tidd & Bessant, effective leadership plays an important role in directing the innovation process, ensuring that the innovation is implemented successfully, and overcoming challenges that may arise during implementation. In the context of the Asam Asam PLTU, the innovations carried out are likely to include aspects of technology, operational efficiency, and management strategy. However, without leadership that supports and encourages the implementation of innovation, its impact on performance will not be clearly visible.

Effective leadership can help overcome various challenges in implementing innovation, such as resistance to change, limited resources, and lack of understanding from employees regarding the benefits of the innovation being implemented. Effective leadership plays a key role in overcoming obstacles to implementing innovation by communicating a clear vision, providing the necessary training, and motivating employees to adapt to change. With leaders who are able to communicate the vision of innovation, provide adequate training, and motivate employees to adapt to change, the innovation being implemented can be implemented more easily and have a positive impact on company performance.

In addition, these findings indicate that innovation cannot stand alone in improving company performance. Companies need to ensure that the innovation implemented is not only a change in technology or systems, but also accompanied by leadership that is able to direct the implementation of innovation effectively. Effective leadership plays an important role in ensuring that innovation is not only implemented, but also managed in a structured manner and in accordance with the needs of the organization. With the role of leadership, innovation can be developed in a more structured manner, have a clear strategy, and can be adjusted to the specific needs of the organization.

Overall, the results of this study confirm that innovation can have an impact on the performance of the Asam Asam PLTU, but only if moderated by strong leadership. Therefore, companies need to focus not only on developing innovation but also on strengthening leadership so that the innovation implemented can provide maximum results in improving the operational performance of the Asam Asam PLTU.

The Influences of Leadership Role as a Moderating Variable Between Operational Sustainability On Performance At Acid Acid Steam Power Plant

Based on the research results, innovation has an indirect effect on performance at Asam Asam PLTU if moderated by leadership. This can be seen from the T Statistic value of 3.230 which is smaller than 1.96, and the P Value of 0.001 which is smaller than 0.005. Thus, innovation does

not have a direct effect on performance, but can have an impact when leadership acts as a moderator. This finding confirms that the effectiveness of innovation in improving performance is highly dependent on how the innovation is managed by leaders in the organization.

One of the main reasons innovation requires leadership as a reinforcing factor is that innovation often requires changes in work systems, policies, and organizational culture. According to Tidd & Bessant, innovation often involves significant changes in the way of working, policies, and organizational culture, which require strong leadership to drive successful implementation. If the leadership applied is not strong enough to drive the implementation of innovation, then the innovation implemented will not have a significant impact on performance. Leaders who have a clear vision of innovation, are able to communicate the benefits of innovation, and ensure that the innovation is implemented effectively will contribute to improving the performance of the Asam Asam PLTU.

On the other hand, the results of the study also show that operational sustainability does not have an indirect effect on performance through leadership. This is indicated by the T Statistic value of 0.517 which is smaller than 1.96, and the P Value of 0.606 which is greater than 0.005. Tidd & Bessant explained that operational sustainability, although important, often does not directly affect company performance if it is not accompanied by leadership that can effectively direct the implementation of sustainability policies. Thus, operational sustainability cannot improve performance, either directly or through leadership as a moderating factor. This finding indicates that the sustainability aspects implemented at the Asam Asam PLTU have not had enough impact on performance in a real way.

One of the main reasons why sustainability has no effect on performance is that the implementation of operational sustainability at Asam Asam PLTU may still be in its early stages or has not been fully integrated with the company's main business strategy. Tidd & Bessant stated that successful sustainability requires strong integration with the company's main business strategy and full support from all elements of the organization to ensure its significant impact on performance. Sustainability in the power generation industry usually includes energy efficiency, emission reduction, and the use of environmentally friendly technologies. If the sustainability program has not been implemented on a large scale or has not received full support from various parties in the organization, then its impact on company performance will be difficult to see.

In addition, operational sustainability is often a long-term investment whose results cannot be measured in a short time. Sustainability as a long-term investment takes time to show its impact, because the changes implemented often affect performance gradually. In the context of a coal-fired power plant, the implementation of sustainability may include more efficient energy use, waste reduction, and resource optimization which require time before the impact is seen in improved performance. If the company does not have a mature sustainability strategy or lacks monitoring of sustainability implementation, then its contribution to performance will also be low.

Effective leadership should help accelerate the impact of sustainability on performance, for example by ensuring that policies support sustainability, appropriate resource allocation, and increased awareness at the organizational level about the importance of sustainability in operations. According to Yukl, effective leadership can accelerate the implementation of sustainability strategies by ensuring supportive policies and allocating the necessary resources. However, if the leadership implemented is not strong enough to direct sustainability as the company's main strategy, then its impact on performance will be minimal.

Overall, the results of this study indicate that innovation can have an impact on performance if supported by strong leadership, while operational sustainability has not had a significant impact on performance, either directly or through leadership moderation. Innovation supported by effective leadership can create significant changes in organizational performance. Therefore, Asam Asam PLTU needs to strengthen the implementation of innovation with more strategic leadership support, and re-evaluate sustainability strategies so that they can have a real impact on improving company performance.

Conclusion

Based on the results of the data analysis, it can be concluded that:

1. Organizational Factors Have a Direct Influence on Performance.
2. Innovation Does Not Have a Direct Impact on Performance.
3. Sustainability Has No Direct Impact on Performance.
4. Leadership Plays a Role as a Moderator in the Relationship between Organizational Factors and Performance.
5. Leadership Moderates the Relationship between Innovation and Performance.

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The Role of Leadership as a Moderating Variable in the Influences of Organizational Factors, Innovation, and Sustainability on Organization-al Performance
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