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Operational Risk Analysis of kWh Addition Services Using the RCA (Root Cause Analysis) Method at PT XYZ

Annisa Maudi Syafitri[1]*, Dira Ernawati[2]
[1–2] Industrial Engineering, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, Indonesia
Email: 21032010191@student.upnjatim.ac.id[1], dira.ti@upnjatim.ac.id [2]

*Author Correspondence: 21032010191@student.upnjatim.ac.id**

***Abstract**: Demand for additional electric power increases as electricity demand increases, but the process is often hampered by obstacles in the operational workflow. The main objective of this research is to analyze operational risks in kWh addition services using the Root Cause Analysis (RCA) method using the 5 Why technique and fishbone diagram. The RCA method equipped with a fishbone diagram will produce a mapping of the causes of operational risk obstacles in the PT XYZ kWh addition service in a structured manner. In the process, the author identifies and analyzes the various risks faced, and proposes improvements aimed at improving service quality. Based on the results of the research analysis, there are two operational risks related to kWh addition, namely: the migration process of postpaid kWh meters to prepaid meters and the use of electricity by customers who exceed the contracted power. The conclusion shows that most of the operational risks come from customer behavior. Proposed improvements include increasing the frequency of inspections, proactive planning for power additions, and transparency of information to customers. The results of this report are expected to make a positive contribution to operational risk management at PT XYZ and improve customer satisfaction.*

***Keywords**: 5 Why Technique, Fishbone Diagram, Operational Risk, Root Cause Analysis*

1. INTRODUCTION

PT XYZ is one of operational units that has a strategic role in serving the community's electricity needs, especially for the process of adding kWh of electricity. As the demand for electricity increases, the demand for additional power has increased significantly. However, in the operation of this kWh addition service, there are a number of challenges that hinder the process, one of which is an obstacle to the workflow. (Mufassaroh et al., 2023) said this obstacle caused delays in the service process of adding kWh, which had an impact on customer satisfaction and PLN's overall operational efficiency. Based on initial observations, delays mainly occur in customers. These risks arise due to technical and administrative bottlenecks, such as slow data validation and technician scheduling processes, as well as resource allocation imbalances. This not only extends service completion time but also increases operational burden for the company, especially when service demand continues to increase.

This study uses the Root Cause Analysis (RCA) and diagrams fishbone to identify the main cause of operational risks of additional kWh services at PT XYZ. RCA was chosen because it was effective in systematically digging into the root of the problem with a 5 approach Why (Ateng et al., 2021), while fishbone provides a visual structure for grouping causative factors in categories such as human, method, and environment. The combination of the two is

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necessary to analyze the problem holistically, ensure no aspects are overlooked, and produce the right solution (Haq & Purba, 2020). This method contributes significantly to internship research reports because it provides in-depth insights for continuous operational improvement and is relevant to real needs in the field.

In the fast-paced modern era, several operational risks can hinder the productivity of people and businesses that rely heavily on reliable electricity services. Therefore, risk analysis with the RCA method in this kWh addition service is very relevant. Thus, the main purpose of this report is to provide an in-depth understanding of the causes of obstacles in the process of adding kWh at PT XYZ. By identifying the root cause of the problem Bottlenecks, this report will contribute to improving operational efficiency at PT PLN, especially in the West Surabaya area. The benefit for practical application in the community is the acceleration of more reliable kWh addition service times, which will ultimately increase customer satisfaction, support community productivity, and meet the increasing demand for electrical energy in the region.

2. LITERATURE REVIEW

Risk management is the process of managing risks that may occur within an organization or company. Risk management aims to minimize the impact of risks, so that it can maintain business stability and sustainability. According to (Sari et al., 2022) In his journal, risk management is carried out by: identifying risks that may occur, measuring and analyzing risks, monitoring risks periodically, controlling risks, making efforts to avoid or minimize risks. Risk management can help companies to: protect assets, minimize losses, take advantage of new opportunities, minimize costs, make cost estimation easier (Satriawan, 2021).

Risk management begins with the identification stage, which is to uncover various potential problems that can occur. The next step is to analyze the risk to assess the severity of the impact as well as the frequency of its possibility. After that, a risk evaluation is carried out to determine handling priorities, where the risk with the most significant impact will be the main focus. The final stage is risk control, which involves implementing specific measures to reduce, avoid, or divert those risks (Widyaningsih & Ashlihah, 2024).

Risk management is basically done through a process-process, one of the important ones is risk identification. Risk identification is carried out to identify what risks are faced by an organization. According to (Nilasari, 2020) Basel II (the institution that regulates international banking) defines operational risk as risks arising from internal process failures (incomplete or incorrect documents, transaction errors, inadequate supervision, and inadequate reporting), failure to manage people (employees), work accidents, dependency with certain employees, lack of employee integrity, system risks, and external risks. Risks related to events that originate from outside the organization. These events usually have a high impact but are low in frequency. These external risks such as robbery, natural disasters, terrorist attacks, and theft (Kasidi, 2010).

Operational risk is the risk of loss that occurs due to the failure or inability of internal processes, systems, policies, or external factors that interfere with business operations. Operational risks can be in the form of: employee errors, physical events that can trigger operational risks, incomplete documentation, transaction errors, inadequate supervision, inadequate reporting, and other external issues (Agustian et al., 2021).

Operational risk is one of the main types of risks faced by businesses and organizations. To manage operational risks, companies can conduct operational risk management (ORM). ORM involves the process of identifying, assessing, and mitigating risks to reduce the likelihood and impact of losses (Rafiqi & Wahid, 2024).

Root cause analysis (RCA) is an in-depth investigation of the root cause of a problem, complaint, non-conformity, inability to meet requirements, or undesirable conditions is usually an important step in the corrective action process (Sidikiyah, 2023). RCA (Root Cause Analysis) is a structured approach used to identify the factors that influence one or more events. In its application, the RCA method often uses the 5 Why To make it easier to dig into the root cause of the problem in depth, by asking the question "why" 5 times (Widyastuti, 2021). Data on the delay in adding KWh obtained from the results of data collection in the company to Input main in this method. Meanwhile, Output What is expected is the identification of the root of the problem related to the addition of KWh at PT XYZ.

RCA has a four-step process that includes (Hezbollah et al., 2023):

1. Data collection Without complete information and understanding of the event, the causal factors and root causes associated with the event cannot be identified. Most of the time spent in analyzing an event will be spent in data collection.
2. Diagramming the causal factors. It starts with a fishbone chart that is modified each time more relevant facts come to light. Causal factors are all the things that contributed (human error and component failure) to the event, which if eliminated, would have prevented its occurrence or reduced its severity. In many traditional analyses, all attention will be devoted to the most visible causal factors.
3. Root cause identification. This step involves using a decision tree to identify the underlying reason or reasons for each causal factor. The structure of the diagram demonstrates the reasoning process of the researchers by helping them answer questions about why certain causal factors exist or occur. Root cause identification helps

investigators determine the reasons why the event occurred so that the issues surrounding the event can be addressed.

4. Recommendation Search and implementation. The next step is the search for recommendations. After the identification of the root cause for a particular causal factor, achievable recommendations to prevent recurrence are made.

After conducting an analysis on the use of the RCA method, an analysis was carried out using fishbone. Fishbone diagrams, also known as fishbone diagrams or Ishikawa diagrams, are important tools used in the Root Cause Analysis (RCA) to identify the root cause of a problem. By using fishbone Diagrams, teams can brainstorm to identify the various possible causes of one particular effect or problem. This helps in separating the root cause and allows the team to formulate more effective solutions (Winada et al., 2023).

3. METHODS

The problem in this study is the identification of operational risks of kWh addition services at PT XYZ. The research instruments used are interviews and observations. Interviews were conducted with questions and answers with the workforce in the kWh addition service process to get an in-depth understanding of the obstacles, causes of delays, and perspectives of the staff on the bottlenecks that occur. The data analysis techniques used in this solution are Root cause analysis (RCA) method and fishbone diagram. The RCA method equipped with a fishbone diagram will result in a mapping of the causes of operational risk bottlenecks in kWh addition services at the company in a structured manner. With this, the report not only explains the cause of the problem but also offers practical solutions to overcome operational barriers, improve service efficiency, and reduce customer waiting time. The integration of RCA and fishbone ensures that each root cause is visualized in detail and the recommended solutions will be more effectively implemented by the companystrategies in the Engineering Department of PT XYZ. The primary data in this study is data obtained from project management operational engineering.

4. RESULTS

Data analysis with the Root cause analysis (RCA) approach was carried out to identify solutions to the obstacles to the kWh addition process faced by PT XYZ. This process involves an in-depth assessment of the 2 obstacle events that have been analyzed previously. The stages of applying the RCA method use the 5 Why technique, which is by asking questions starting with “why?” up to five times repeatedly to explore the root causes of problems in depth. The results of the root cause identification based on the RCA method are presented in the following figure:

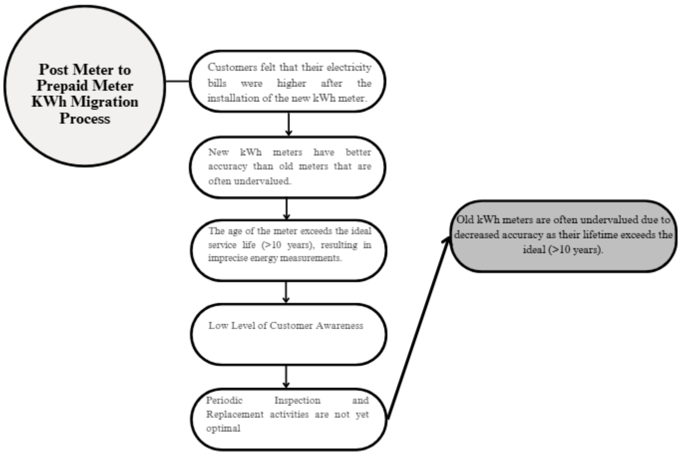

Figure 1 5 Why Results Based on the Post Meter to Prepaid Meter KWh Migration Process

The analysis results show that the post-KWh meter migration process to prepaid meters highlights customer complaints regarding the increase in electricity bills which were noticeably higher after installing the new meters. This is due to the better accuracy of new KWh meters compared to old meters, which often produce undervalued readings. This decrease in accuracy is triggered by the lifetime of the KWh meter which has exceeded its ideal age, which is more than 10 years, resulting in inaccurate energy measurements. This factor is exacerbated by the lack of optimal inspection and periodic replacement activities, which should be a preventive measure to maintain meter accuracy. On the other hand, the low level of customer awareness regarding the importance of checking and replacing KWh meters is also a major challenge, reinforcing the root of the problem that the low level of customer awareness is due to a lack of understanding of the benefits and mechanisms of the prepaid system.

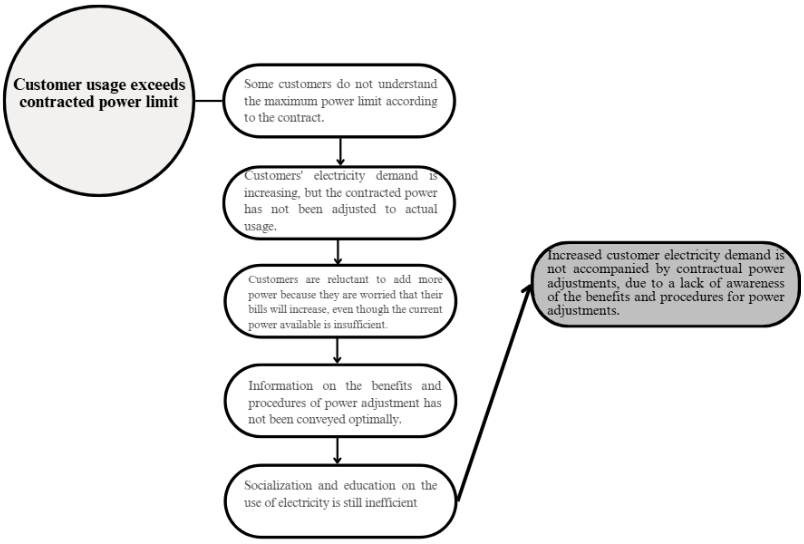

Figure 2 5 Why Results Based on Customer Usage Exceeding Contract Power Limit

The analysis showed that the main problem with customers' usage exceeding the contractual power limit was caused by an increase in electricity demand that was not accompanied by contractual power adjustments. This stems from customers' lack of understanding of the maximum contracted power limit, which is exacerbated by concerns about potential bill increases when making power adjustments. On the other hand, customers' demand for more power continues to increase in line with technological developments and lifestyle changes, but information on the benefits and procedures for power adjustment has not been optimally conveyed. The lack of strategic and efficient socialization and education efforts on electricity usage and power adjustment mechanisms creates a gap between actual demand and contracted power. Therefore, strategic solutions should include intensive education, easy-to-understand information delivery, and promotion of the benefits of power adjustment to encourage customer awareness and compliance with power contract regulations.

Furthermore, to be able to make it easier to find what actions to take to overcome the cause of the disruption, it can be done by identifying the root cause of the problem using a fishbone diagram. By using a fishbone diagram, all aspects that may cause obstacles to the kWh addition process can be identified.

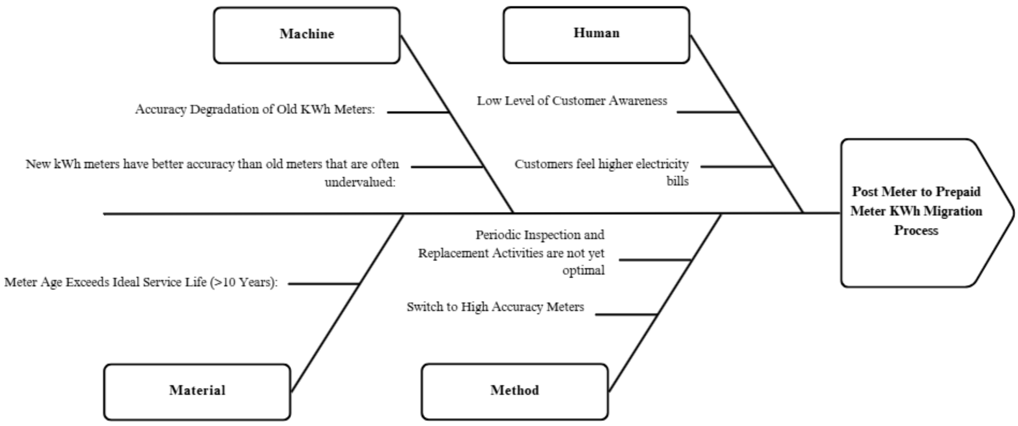

Figure 3: Fishbone Diagram of Post to Prepaid Meter kWh Migration Process

From the results of the fishbone diagram, it can be seen that the obstacles affecting the kWh addition process show a complex interaction between human factors, methods, materials, and machines. Human factors include the low level of customer awareness regarding the importance of replacing old KWh meters and the misperception of increased electricity bills due to the better accuracy of new meters. In terms of methods, suboptimal periodic inspection and replacement is a procedural weakness that allows old KWh meters, which are past their ideal service life, to remain in use. Material factors highlight the decline in quality and accuracy of old KWh meters caused by degradation over time. Meanwhile, on the machinery aspect, the significant difference in accuracy levels between the new, more precise meters and the old, undervalued meters is the main cause of the change in energy metering results. The combination of all these factors makes it clear that the root of the problem lies in the lack of systematic management of the KWh meter lifecycle as well as the lack of education to customers regarding the impact of new technologies on energy metering.

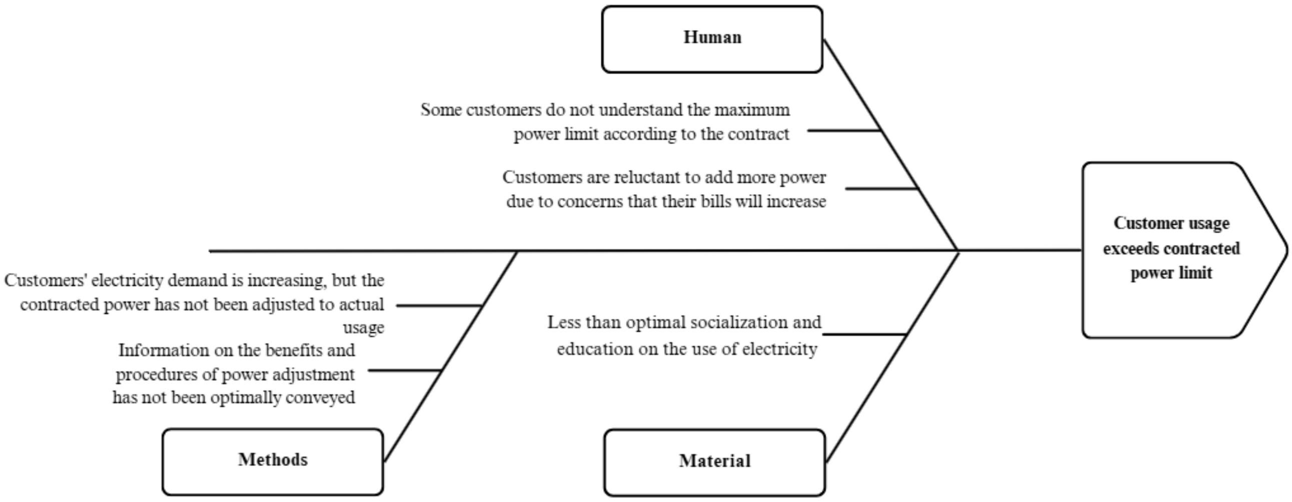

Figure 4 Fishbone Diagram of Customer Usage Exceeding the Contract Power Limit

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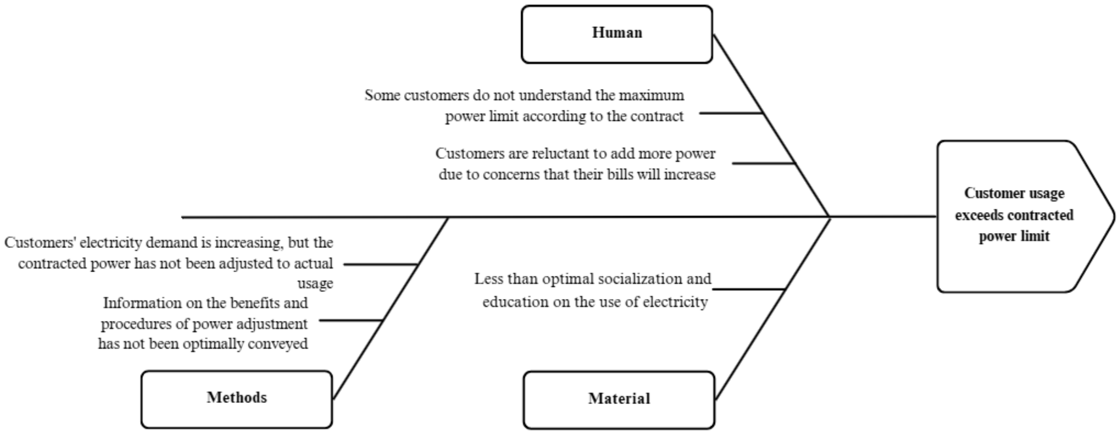

Figure 5 Fishbone Diagram of Customer Usage Exceeding the Contract Power Limit

From the results of the fishbone diagram, it can be seen that the main problem, namely customer electricity usage that exceeds the contract power limit, is influenced by four main factors: humans, methods, materials, and machines. From the human side, customers' lack of understanding of the maximum power limit and the benefits of power adjustment is caused by suboptimal education. On the method aspect, the power adjustment procedure has not been designed in a simple or communicative manner, so customers are reluctant to follow up. From a material point of view, the socialization materials used were not relevant, attractive enough, or effective in reaching customers' information needs. Meanwhile, on the machine factor, the use of supporting technologies such as digital applications or data-based communication platforms has not been optimized to provide real-time and efficient information to customers. The combination of these four factors suggests the need for a systematic approach to increase awareness, ease of process, and relevance of information to encourage customer compliance with power contracts.

Table 1 Recapitulation of Operational Risk Root Cause using the RCA Method

No.	Forms of Operational Risk	Proposed Improvements
1.	The process of migrating post kWh meters to prepaid meters	• Customer Education and Outreach: Improve educational programs for customers regarding the differences in accuracy between old KWh meters and prepaid meters, as well as their impact on electricity bills. This can help reduce misunderstandings and increase customer trust. • Optimization of Periodic Inspection and Replacement: Increase the frequency and quality of inspections of old KWh meters to ensure replacements are carried out on time according to their ideal service life.
2.	Customer Usage Exceeds Contract Power Limit	• Proactive Planning Process: Conduct regular load analysis to identify customers with power capacity approaching limits and provide proactive solutions, such as recommendations for additional power before disruptions occur. • Coordination with Customers: Provide transparent information to customers about the importance of increasing power when capacity reaches limits, along with procedural guidance to simplify the process.

5. CONCLUSION AND SUGGESTIONS

Conclusion

Based on the root cause analysis of risks in the service process of adding kWh at PT XYZ, several improvement proposals were produced that aimed at improving the quality of service. The operational risk analysis of the kWh addition service at PT XYZ resulted in recommendations for improvement in the form of customer education to increase understanding and trust in the migration of prepaid KWh meters, as well as optimization of periodic inspections to ensure timely replacement. In addition, proactive load planning and transparent communication to customers regarding power additions are recommended to prevent disruptions due to near-limit power capacity. The implementation of these measures is expected to improve operational efficiency and customer satisfaction

Suggestions

Based on the results of the analysis, further research is recommended to evaluate the effectiveness of the implementation of improvement recommendations in improving the quality of kWh addition services at PT XYZ. This research can be focused on measuring the impact of customer education on the acceptance of prepaid kWh meter migration, analyzing the success of periodic inspections in preventing delays in replacement, and assessing proactive load planning and transparent communication in preventing power disruptions. Quantitative and qualitative approaches can be used to provide a comprehensive view of the benefits of improvement measures on operational efficiency and customer satisfaction.

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