Risk Analysis of Material Inspection Failure during Goods Receiving at PLTD Batu Ampar Using FMEA

Final Project

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Statement of Authenticity of Final Project

I, the undersigned, certify that the contents of part or all of my Final Project entitled: "Risk Analysis of Material Inspection Failure during Goods Receiving at PLTD Batu Ampar using FMEA" is my **own work, completed without the use of materials that are not permitted,** and **is not the work of other parties which I acknowledge as my own work.** All references cited or referred to have been written in full in the bibliography. If it turns out that my statement is not true, I am willing to accept sanctions in accordance with applicable regulations.

Batam, 05 July 2026

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Approval sheet

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Risk Analysis of Material Inspection Failure during Goods Receiving at PLTD Batu Ampar Using FMEA

Abstract

The material receiving inspection procedure at PLTD Batu Ampar plays a vital role in ensuring warehouse operational reliability by verifying that incoming items meet required quality standards before storage and distribution, since failures in this process may lead to inaccurate inventories, operational delays, use of defective supplies, and disruptions to power plant operations. To address these risks, this study applied the Failure Mode and Effects Analysis (FMEA) method to identify potential failure modes, evaluate operational risks, and propose corrective actions. Using qualitative descriptive techniques through direct observation, staff interviews, and operational record analysis, each failure mode was assessed based on Severity (S), Occurrence (O), and Detection (D) values to calculate the Risk Priority Number (RPN). Out of seven identified failure modes, three were prioritized for improvement due to their operational significance: Material Damage Not Detected (RPN = 270), Damaged Material Continues to be Used (RPN = 192), and Delay in System Update (RPN = 120). Recommended improvements included strengthening inspection procedures, physically separating rejected goods, and establishing monitoring records for materials awaiting Purchase Order (PO) numbers before SAP inventory updates. Implementation of these measures successfully reduced RPN values to 108, 48, and 36 respectively, demonstrating that FMEA is an effective tool for identifying risks, prioritizing corrective actions, and enhancing the reliability of material receiving inspections. Ultimately, these improvements contribute to better inventory accuracy, reduced operational disruptions, and stronger warehouse performance in supporting power plant operations.

Keywords : FMEA, Material Receiving, Inspection Process, Risk Assessment, RPN

Foreword

The author would like to express sincere gratitude to God Almighty for His guidance, blessings, and strength, which have made it possible to complete this proposal entitled "Risk Analysis of Material Inspection Failure during Goods Receiving at PLTD Batu Ampar Using FMEA." This proposal is prepared not only as a requirement for completing the final project but also as an effort to contribute to a deeper understanding of risk management practices in industrial inspection processes, particularly within the power generation sector.

The author would also like to express sincere appreciation to PLTD Batu Ampar for providing the opportunity to conduct observations and gain valuable insights from real field practices. Special thanks are extended to academic supervisors and colleagues for their continuous guidance, support, and constructive feedback throughout the preparation of this proposal. Their contributions have been invaluable in improving both the quality and clarity of this work.

The author realizes that this proposal is still far from perfect; therefore, constructive criticism and suggestions are highly appreciated for further improvement. It is hoped that this research will provide useful contributions both academically and practically, especially in supporting the improvement of material inspection procedures and strengthening risk management practices in power plant operations.

Batam, 15 Juni 2026

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Risk Analysis of Material Inspection Failure during Goods Receiving at PLTD Batu Ampar Using FMEA

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Abstrak

Proses inspeksi penerimaan material di PLTD Batu Ampar berperan penting dalam menjaga keandalan operasional gudang. Kegagalan pada proses inspeksi material dapat menyebabkan ketidakakuratan persediaan, keterlambatan operasional, dan penggunaan material yang rusak. Penelitian ini bertujuan untuk mengidentifikasi dan menganalisis potensi kegagalan menggunakan metode Failure Mode and Effects Analysis (FMEA). Analisis dilakukan berdasarkan penilaian Severity (S), Occurrence (O), dan Detection (D) untuk menentukan nilai Risk Priority Number (RPN) sebagai dasar penentuan prioritas risiko. Hasil penelitian mengidentifikasi tujuh potensi mode kegagalan, dengan tingkat risiko tertinggi yaitu Material Damage Not Detected (RPN = 270), Damaged Material Continues to be Used (RPN = 192), dan Delay in System Update (RPN = 120). Implementasi usulan perbaikan berhasil menurunkan nilai RPN menjadi 108**,** 48, dan 36 secara berturut-turut. Hasil penelitian menunjukkan bahwa metode FMEA efektif dalam mengidentifikasi risiko operasional, menentukan prioritas perbaikan, serta meningkatkan keandalan proses inspeksi penerimaan material di PLTD Batu Ampar.

Kata kunci: FMEA, Inspeksi Material, Risk Priority Number (RPN), Analisis Risiko

Abstract

PLTD Batu Ampar's material receiving inspection procedure is crucial to maintaining the dependability of warehouse operations. Inaccurate inventories, operational delays, and the usage of faulty materials are all possible outcomes of material inspection failures. This study uses the Failure Mode and Effects Analysis (FMEA) method to find and examine possible failure modes. To determine the Risk Priority Number (RPN) for risk prioritizing, the Severity (S), Occurrence (O), and Detection (D) ratings were used in the analysis. Seven possible failure modes were found, with Material Damage Not Detected (RPN = 270), Damaged Material Continues to be Used (RPN = 192), and Delay in System Update (RPN = 120) being the greatest risks.The RPN values were lowered to 108, 48, and 36, respectively, by the suggested modifications. These results show that FMEA is useful for identifying operational risks, setting objectives for improvement, and enhancing the dependability of PLTD Batu Ampar's material receiving inspection procedure

Keywords: FMEA, Material Inspection, Risk Priority Number (RPN), Risk Analysis

1. Introduction

The material receiving and inspection process plays a critical role in industrial operations, particularly in power generation facilities where system reliability and operational continuity depend heavily on the quality and accuracy of incoming materials. Material inspection activities function as an essential control mechanism to ensure that all received materials comply with technical specifications, operational requirements, and safety standards before being utilized in maintenance and operational activities. Previous studies have shown that failures in material inspection processes may lead to equipment malfunction, increased maintenance costs, operational disruption, and safety risks. [1] [2]

The Failure Mode and Effects Analysis (FMEA) method has been widely implemented as a systematic approach to identify potential failures, evaluate risk levels, and determine appropriate corrective actions. Several researchers reported that FMEA is effective in identifying operational risks, prioritizing critical failures, and supporting continuous improvement processes in industrial environments.[3], [4]In addition, operational risks are frequently associated with human error, inadequate inspection procedures, and insufficient verification mechanisms during the material receiving process.[5]

In the context of material inspection systems, various studies have highlighted that operational risks commonly arise from incomplete documentation, inaccurate data entry, inadequate inspection methods, and discrepancies between physical materials and inventory records.[2], [6] These conditions not only increase the probability of operational errors but also reduce equipment reliability, inventory accuracy, and overall operational efficiency. Furthermore, research conducted in industrial warehouse operations indicates that high-risk failures are often related to insufficient inspection controls, human factors, and ineffective documentation systems.[7]

To ensure that material inspection processes meet operational and quality requirements, systematic risk assessment methods are increasingly adopted in industrial environments. The Failure Mode and Effects Analysis (FMEA) approach provides a structured framework for identifying potential failure modes, evaluating their Severity (S), Occurrence (O), and Detection (D) values, and calculating the Risk Priority Number (RPN) to prioritize corrective actions. The application of this method enables organizations to identify critical risks and improve operational reliability through preventive measures.[8], [9], [10]

To address these issues, several researchers have emphasized the importance of integrating risk assessment methods into inspection and quality control processes. Risk-based approaches, including failure mode analysis and corrective action implementation, have been proven effective in reducing operational risks and improving process reliability.[11], [12], [13] This approach is consistent with modern risk management principles, which prioritize preventive actions and systematic process improvement to minimize operational failures.[14]

However, in many industrial practices, the application of risk assessment methods is often limited to identifying and evaluating risks without being followed by practical corrective actions and continuous improvement implementation. As a result, identified risks remain unresolved, and operational reliability continues to be affected.[4] This indicates a gap between risk analysis activities and their practical implementation, particularly in material inspection and warehouse management systems..

Based on field observations conducted at PLTD Batu Ampar, several potential failures were identified during the material receiving and inspection process. These include delays in system updates, incorrect SAP data entry, material damage not detected during inspection, document mismatches, damaged material continuing to be used, delays in material delivery, and discrepancies between ordered and received material specifications. In addition, inspection activities remain vulnerable to human error, procedural limitations, and inconsistencies between physical inventory and system records. These conditions increase operational risks and may negatively affect equipment reliability and warehouse performance.

Therefore, this study aims to analyze the risk of material inspection failures during the goods receiving process at PLTD Batu Ampar using the Failure Mode and Effects Analysis (FMEA) method. The proposed approach integrates failure identification, risk assessment, and improvement recommendations to enhance material inspection reliability and operational performance. The contribution of this study lies in bridging the gap between FMEA-based risk analysis and its practical implementation in material inspection activities, thereby supporting safer, more reliable, and sustainable power plant operations.

2. Research Methodology

a. Research Approach

This study employed a qualitative approach using a case study method conducted at PLTD Batu Ampar. The approach was used to evaluate the existing material inspection process during goods receiving activities and to identify potential failures that may affect operational reliability and material quality assurance. The analysis was carried out using the Failure Mode and Effects Analysis (FMEA) method as the basis for determining risk levels, prioritizing potential failures, and developing appropriate improvement recommendations. [2], [3]

b. Object of the Study

The object of this study was the material inspection process during goods receiving activities at PLTD Batu Ampar. The observed process included document verification, physical inspection of incoming materials, SAP system recording, and material reservation activities. These activities play an important role in ensuring that received materials meet operational requirements and quality standards before being used in power plant operations.

c. Data Collection Method

Data collection was conducted using observation, interviews, and documentation methods. Observation was carried out to directly examine the material receiving and inspection process. Interviews were conducted with warehouse personnel and employees involved in material inspection activities to obtain information regarding operational procedures and potential failures. Documentation methods were used to collect supporting data, including standard operating procedures, inspection records, material receiving documents, and SAP transaction records.

d. Material Inspection Process Description

The material inspection process at PLTD Batu Ampar begins with receiving incoming materials from suppliers, followed by document verification to ensure conformity between purchase orders, delivery notes, and received materials. Subsequently, physical inspection activities are performed to verify the quantity, specifications, and condition of materials. After inspection, the received materials are recorded in the SAP system and categorized according to operational requirements. Finally, material reservation activities are conducted to allocate materials for maintenance and operational purposes.

Figure 1 illustrates the workflow of the material inspection process during goods receiving activities at PLTD Batu Ampar.

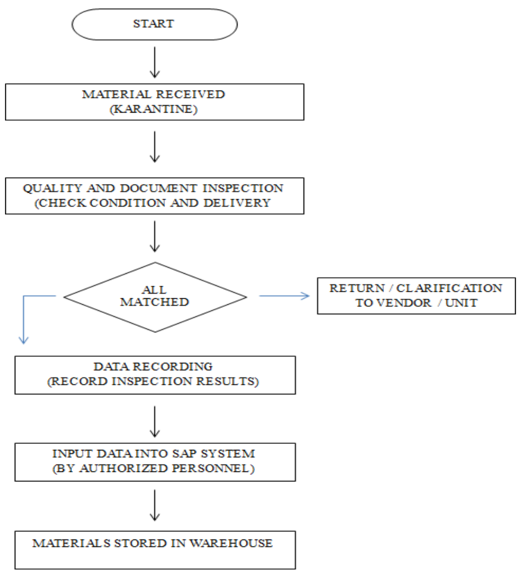

Figure 1. process Description Flow Chart

e. Failure Analysis Using FMEA

The Failure Mode and Effects Analysis (FMEA) method was applied to identify potential failures, determine their causes and effects, evaluate risk levels, and establish improvement priorities. The FMEA analysis consisted of several stages, including process identification, failure mode identification, cause analysis, effect analysis, risk assessment, and development of corrective actions. [2]

The stages of the FMEA analysis conducted in this study are as follows:

- Identification of the material inspection process.
- Identification of potential failure modes.
- Identification of the causes and effects of failures.
- Determination of Severity (S), Occurrence (O), and Detection (D) values.
- Calculation of the Risk Priority Number (RPN).
- Ranking of failure modes based on RPN values.
- Development of improvement recommendations for high-priority risks.

To support the identification of root causes, a Fishbone Diagram was utilized to classify contributing factors, including human, method, material, machine, measurement, and environmental factors.

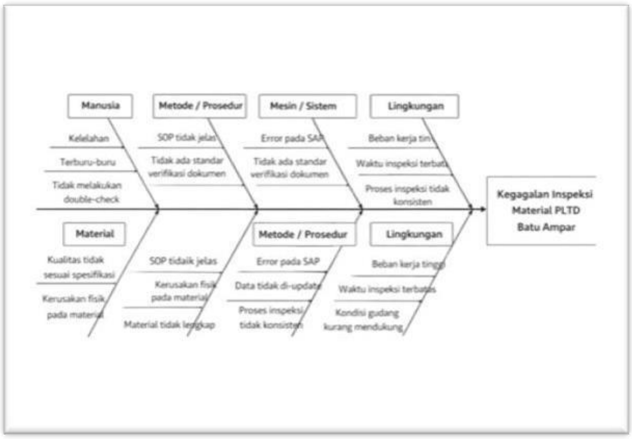

Figure 2. Fishbone Diagram of Material

Inspection Failure

Figure 2 explains the fishbone analysis that PLTD Batu Ampar performed to determine the underlying reasons for material inspection failures. Five categories human, methods and procedures, machines and systems, materials, and environmental factors were used to group the identified causes. According to the analysis, operational dependability is impacted by poor inspection processes, human error, system constraints, material conditions, and environmental factors that lead to material inspection process failures.

f. FMEA Parameters and Risk Assessment

The Failure Mode and Effects Analysis (FMEA) method was used to assess the risk level of each identified failure mode. The assessment was conducted using three parameters, namely Severity (S), Occurrence (O), and Detection (D). The Risk Priority Number (RPN) was calculated by multiplying these three parameters using the following equation [2], [3] :

$$RPN = S \times O \times D$$

The resulting RPN values were used to determine the priority level of each failure mode and to develop appropriate improvement recommendations. The assessment criteria for Severity, Occurrence, Detection, and risk classification are presented in the following tables.

Table 1. Severity Rating Criteria

Score	Impact Clasification	Description
1	Insignificant	The failure has no measurable impact on the inspection process or operational activities.
2	Minimal	The failure causes negligible disruption and does not affect operational performance.
3	Minor	The failure results in limited operational impact and can be managed without significant intervention.
4	Marginal	The failure affects part of the inspection process and requires corrective action.
5	Moderate	The failure has a noticeable impact on process effectiveness and operational performance.
6	Substantial	The failure significantly affects operational activities and material management procedures.
7	Major	The failure causes serious disruption to operational continuity and process reliability.
8	Severe	The failure has severe consequences that may affect equipment performance and operational efficiency.
9	Critical	The failure creates critical operational consequences and requires immediate corrective action.
10	Extreme	The failure results in extremely serious consequences that may cause major operational disruption.

Table 2 Occurrence Rating Criteria

Score	Frequency Classification	Description
1	Exceptional	The failure is extremely unlikely to occur.
2	Very Remote	The failure occurs only under exceptional circumstances.
3	Remote	The failure is unlikely and rarely observed.
4	Low	The failure occurs infrequently during operational activities.
5	Moderate	The failure occurs occasionally under normal conditions.
6	Considerable	The failure occurs with moderate frequency during operations.
7	High	The failure occurs repeatedly during operational activities.
8	Very High	The failure occurs frequently and requires continuous monitoring.
9	Near Certain	The failure occurs very frequently despite existing controls.
10	Certain	The failure is expected to occur consistently unless

		corrective actions are implemented.

Table 3. Detection Rating Criteria

Score	Detectability Classification	Description
1	Almost Certain Detection	The failure can be identified with a very high degree of certainty before causing any impact.
2	Very High Detection Capability	The failure is highly likely to be detected through existing controls.
3	High Detection Capability	The failure can generally be detected through routine inspection procedures.
4	Adequate Detection Capability	The failure is likely to be detected before causing significant consequences.
5	Moderate Detection Capability	The failure may or may not be detected during standard inspection activities.
6	Limited Detection Capability	The failure is difficult to identify without additional verification.
7	Low Detection Capability	The probability of detecting the failure before its impact is relatively low.
8	Very Low Detection Capability	The failure is unlikely to be detected using current inspection procedures.
9	Remote Detection Capability	The failure is rarely identified before operational consequences occur.
10	No Detection Capability	The failure cannot be detected prior to causing operational consequences.

g. Failure Mode Identification

The identification of failure modes was conducted through direct observation, interviews with warehouse personnel, and analysis of operational documentation related to material receiving activities at PLTD Batu Ampar. The identification process focused on detecting potential failures that may occur during document verification, physical inspection, SAP system recording, and material reservation activities. Each identified failure mode was analyzed to determine its potential causes and effects on operational performance, material quality assurance, and system reliability. The identified failure modes used in this study are presented in Table

Table 4. FMEA Evaluation of Failure Modes at PLTD Batu Ampar

No	Failure Mode	Severity (S)	Occurrence (O)	Detection (D)	RPN
1.	Delay in system update	6	5	4	120
2.	Incorrect data entry in SAP	5	6	5	150
3.	Material damage not detected	9	5	6	270
4.	Document mismatch	3	4	5	60
5.	Damaged material continues to be used	8	4	6	192
6.	Delay in material delivery	6	5	5	150
7.	Ordered material does not match specifications	4	4	5	80

h. Improvement Planning and Evaluation

Improvement recommendations were developed based on the priority level of each failure mode determined by the Risk Priority Number (RPN). Failure modes with higher RPN values were prioritized for corrective action implementation to reduce operational risks and improve the effectiveness of the material inspection process. The proposed improvements focused on enhancing inspection procedures, improving documentation accuracy, strengthening material verification processes, and minimizing the possibility of human error. The effectiveness of the proposed improvements was evaluated by comparing the initial RPN values with the revised RPN values after implementing the recommended corrective actions [8]. This evaluation was conducted to assess the impact of the improvements on reducing the overall risk level of the material inspection process.

3. Results and discussion

a. Failure Mode and Effects Analysis (FMEA) Results

The FMEA analysis identified seven potential failure modes in the material receiving and inspection process at PLTD Batu Ampar. The failure modes were assessed using Severity (S), Occurrence (O), and Detection (D), and the Risk Priority Number (RPN) was calculated to determine the relative risk level of each failure mode.

The highest RPN was obtained by Material Damage Not Detected, with an RPN of 270, followed by Damaged Material Continues to be Used, with an RPN of 192. Incorrect Data Entry in SAP and Delay in Material Delivery each obtained an RPN of 150, while Delay in System Update obtained an RPN of 120. The remaining failure modes, Ordered Material Does Not Match Specifications and Document Mismatch, obtained RPN values of 80 and 60, respectively.

The RPN results were used as the primary basis for establishing improvement priorities. However, the selection of failure modes for improvement also considered their relevance to the observed material receiving and inspection process during the internship period. Therefore, three failure modes were selected for improvement: Material Damage Not Detected, Damaged Material Continues to be Used, and Delay in System Update. The first two represented the highest RPN values, while Delay in System Update was selected because it was directly observed during the internship and could affect the availability of material information in SAP and subsequent material ordering activities.

Table 5. FMEA Evaluation of Failure Modes at PLTD Batu Ampar

No	Failure Mode	Severity (S)	Occurence (O)	Detection (D)	RPN
1.	Delay in system update	6	5	4	120
2.	Incorrect data entry in SAP	5	6	5	150
3.	Material damage not detected	9	5	6	270
4.	Document mismatch	3	4	5	60
5.	Damaged material continues to be used	8	4	6	192
6.	Delay in material delivery	6	5	5	150
7.	Ordered material does not match specifications	4	4	5	80

The material receipt inspection process has seven possible failure modes, according to the FMEA review. The highest Risk Priority Number among them was Material Damage Not Detected (RPN = 270), which was followed by Damaged Material Continues to be Used (RPN = 192), Incorrect Data Entry in SAP (RPN = 150), Delay in Material Delivery (RPN = 150), Delay in System Update (RPN = 120), Ordered Material Does Not Match Specifications (RPN = 80), and Document Mismatch (RPN = 60). Material Damage Not Detected, Damaged Material Continues to be Used, and Delay in System Update were chosen for improvement based on both the RPN values and operational significance; the other four failure scenarios were kept as possible operational hazards and are listed in Appendix A.

b. Risk Priority Analysis

Seven possible failure modes during the material receiving inspection procedure were found by the FMEA analysis. The Severity (S), Occurrence (O), and Detection (D) criteria were used to assess these failure modes and determine their corresponding Risk Priority Number (RPN) values. Table 6 displays the evaluation's findings.

Material Damage Not Detected had the highest RPN value of 270 out of the seven failure modes that were found, followed by Damaged Material Continues to be Used (RPN value of 192) and Delay in System Update (RPN value of 120). Because they posed the biggest operational risks and might have the biggest effects on warehouse operations and service continuity, these three failure modes were chosen as the main area of improvement.

Table 6. Risk Priority Ranking

Rank	Failure Mode	RPN	Risk Category
1	Material damage not detected	270	High
2	Damaged material continues to be used	192	High
3	Incorrect data entry in SAP	150	Moderate
4	Delay in material delivery	150	Moderate
5	Delay in system update	120	Moderate
6	Ordered material does not match specifications	80	Low
7	Document mismatch	60	Low

Only the three highest-priority failure modes were chosen for improvement within the parameters of this study based on the risk ranking shown in Table 6. Their RPN values, operational significance, and applicability to the material inspection activities seen during the internship time were taken into consideration while making the selection. The next section presents the implementation of improvement steps for each chosen failure mode.

Delay in System Update was chosen for improvement because the failure mode was directly seen throughout the internship period and had a major operational impact on inventory availability, even though it had a lower RPN value than Incorrect Data Entry in SAP and Delay in Material Delivery. Because the Finance Department had not yet issued the necessary Purchase Order (PO) number, materials that had already been physically received could not be documented in SAP. As a result, materials that were physically present in the warehouse could not be requested by operational partners. As a result, this failure mode was thought to be more pertinent for improvement within the parameters of this investigation.

c. Improvement Implementation

Three failure modes were chosen for improvement based on the FMEA results: Material Damage Not Detected, Damaged Material Continues to Be Used, and Delay in System Update. These failure modes were chosen because, throughout the internship, they were found to be the most operationally important risks. To lessen the possibility and impact of operational failures, the suggested improvement activities concentrated on bolstering inspection protocols, enhancing inventory monitoring, and strengthening rejected-material control.

Table 7. Improvement Implementation for Material Damage Not Detected

Supporting Evidence (Impact)	After Improvement
	
Improvement Action: Strengthen the incoming material inspection process by implementing a standardized inspection checklist, performing double verification before material acceptance, and improving inspection documentation to ensure damaged materials are identified before entering warehouse inventory.	

By standardizing inspection procedures and enhancing documentation accuracy, the suggested enhancement seeks to increase the efficacy of the incoming material inspection procedure. A defective kWh meter that passed the receiving check during the internship period eventually failed during operation, highlighting the significance of enhancing inspection protocols. It is anticipated that putting these changes into practice will increase the overall dependability of material inspection and lessen the likelihood that damaged goods will find their way into warehouse inventories.

Table 8 Improvement Implementation for Damaged Material Continues to be Used

<table>
<tr><td>Initial Condition</td><td>After Improvement</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Improvement Action: Establish a designated reject-material area, apply clear identification labels to rejected materials, and physically separate rejected materials from acceptable inventory to prevent unintended use during warehouse operations.</td></tr>
</table>

By physically segregating defective materials from approved inventory and using distinctive identifying labels, the suggested solution aims to tighten rejected-material control. These steps enhance warehouse material traceability and lessen the chance that rejected items would be inadvertently chosen for operational usage.

Table 9 Improvement Implementation for Delay in System Update

Initial Condition	After Improvement

Improvement Action: Implement a monitoring record for materials awaiting Purchase Order (PO) numbers before SAP inventory updates, allowing warehouse personnel to monitor pending materials and improve coordination with the Finance Department.

For materials that have been physically received but cannot yet be entered in SAP because the necessary Purchase Order (PO) number has not been issued, the suggested monitoring record enhances inventory visibility. This enhancement is anticipated to eliminate differences between physical inventory and SAP records, decrease delays in inventory updates, and enhance cooperation between warehouse and finance staff.

d. Evaluation of Improvement Effectiveness

After putting the suggested corrective measures into practice, the Severity (S), Occurrence (O), and Detection (D) ratings for the three chosen failure types were reevaluated to see how effective the modifications were. Based on the anticipated impact of each change in lowering the probability of failure incidence and improving the capacity to identify problems prior to impacting warehouse operations, the reassessment was carried out. Tables 10–12 compare the FMEA findings before and after the suggested changes.

Table 10. FMEA Reassessment for Material Damage not Detected

Before	After
S: 9	S: 9
O: 5	O: 3
D: 6	D: 4
RPN: 270	RPN: 108

Because the operational repercussions of installing defective materials could still result in equipment failure and service disruption, the severity rating stayed the same. However, the Occurrence rating dropped from 5 to 3 since it is anticipated that the use of double verification and standardized inspection techniques will lessen the possibility that damaged products will pass the receiving inspection. Because the inspection checklist and better documentation increase the likelihood of detecting damaged products before they are accepted into warehouse inventory, the detection grade also dropped from 6 to 4. As a result, there was a notable decrease in operational risk as the RPN value dropped from 270 to 108.

Table 11. FMEA Reassessment for Material Reject Continues to be Used

Before	After
S: 8	S: 8
O: 4	O: 2
D: 6	D: 3
RPN: 192	RPN: 48

Because the use of rejected materials could still lead to operational failures if the items were placed incorrectly, the Severity rating stayed the same. After a defined reject-material area and unambiguous identification labels were implemented, the Occurrence rating dropped from 4 to 2, which lessens the likelihood that rejected items will be inadvertently chosen for operational use. Additionally, the physical segregation of rejected products enhances their visibility during warehouse operations, which is why the detection rating dropped from 6 to 3. Consequently, the RPN score dropped from 192 to 48, indicating that the suggested remedial measures were successful.

Table 12. FMEA Reassessment for Delay in System Update

Before	After
S: 6	S: 6
O: 5	O: 2
D: 4	D: 3
RPN: 120	RPN: 36

Because delays in updating inventory records may still have an impact on warehouse operations and material availability when they happen, the severity rating stayed the same. However, the establishment of a monitoring record for commodities awaiting Purchase Order (PO) numbers makes it easier for warehouse staff to keep an eye on pending inventory updates and enhances collaboration with the Finance Department, which is why the Occurrence rating dropped from 5 to 2. Additionally, the Detection rating dropped from 4 to 3 since routine monitoring now makes it easier to identify and follow up on pending system changes. As a result, the RPN value dropped from 120 to 36, showing a significant improvement in warehouse operational reliability and inventory management.

All things considered, the reassessment findings show that the suggested enhancements successfully decreased the operational risks connected to the three chosen failure types. The Occurrence and Detection ratings dropped after the suggested remedial actions were put into place, but the Severity ratings stayed the same because the possible effects of the failures were still substantial. These results show that the suggested changes are anticipated to improve inventory correctness, strengthen the efficacy of the material receiving inspection procedure, and boost the operational dependability of warehouse operations at PLTD Batu Ampar.

4. Conclusion

In order to determine and assess operational risks in the material receiving inspection procedure at PLTD Batu Ampar, this study used the Failure Mode and Effects Analysis (FMEA) approach. Material Damage Not Detected (RPN = 270), Damaged Material Continues to be Used (RPN = 192), and Delay in System Update (RPN = 120) were chosen as the top failure categories requiring improvement out of the seven possible failure modes found in the analysis.

The RPN values decreased to 108, 48, and 36, respectively, as a result of the suggested modifications, suggesting a notable decrease in operational risk. These results show that FMEA is a useful technique for determining operational risks, setting priorities for corrective measures, and enhancing the dependability of PLTD Batu Ampar's material receiving inspection procedure.

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