

Application of Risk Management in Development New Mechanical Testing Laboratory in Indonesia

Farid Nur Iman^{1*}, Lily Lestari Christalina¹, Rhian Indradewa¹, Edi Hamdi¹, Tantri Yanuar Rahmat Syah¹

¹Department Management, Faculty Economic and Business, Esa Unggul University, Jakarta – Indonesia

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*Corresponding author: Farid Nur Iman

Department Management, Faculty Economic and Business, Esa Unggul University, Jakarta – Indonesia

Abstract

Original Research Article

The need for mechanical testing in Indonesia is increasing along with the development of the manufacturing industry. Manufacturing companies require mechanical testing to ensure the quality of their products are safe, strong and durable. Business development must be planned so that the business can continue to run and compete with competitors. One of the important things that must be considered is risk management, so that every company can find out what factors must be considered in the fields of operations, marketing, human capital and finance so that they can continue to develop their business and minimize risks in the future. PT. Premium Testing Lab (PTL) is a startup company that is established to provide solution for mechanical testing for manufacturing industry. Management of PT. PTL determines the principles and commitments adopted in risk management management. The risk management principles applied by PTL are based on ISO 31000:2018.

Keywords: Mechanical testing, laboratory, risk management, startup.

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1. INTRODUCTION

Every *consumer* wants the products they use to be safe and durable. Trust is a foundation in a business process. A transaction between two or more parties will occur if both parties trust each other (Anwar & Adidarma, 2016). Trust as a consumer of a manufacturing company on the quality of their products must be proven by the existence of a test certificate for the product. Certificates of product quality from manufacturers do not only come from internal companies, but must also be proven by testing at external test centers.

PT Premium Testing Lab (PTL) is a startup company that provide solutions for mechanical testing. Mechanical *testing* is required for almost all industry segments, such as automotive, plastics, rubber, food, composites, packaging, textile, steel, and medical products industries (Subhan *et al.*, 2022). Each company has a strategy in developing its company and competing with its competitors, as well as PT Premium Testing Lab, where PTL chooses a market penetration and differentiation strategy to be able to conquer the competition in the mechanical testing market.

Establishing a business cannot be denied has various risks that may occur. So management needs to

take risks to assess the business and as a form of anticipating the risks that threaten the business (Larasati *et al.*, 2020). The development of risk management is currently starting to collaborate with the field of information systems (IS) to make it easier for management to prioritize risk, so that risk control becomes more efficient both in terms of time and budget. (Gunawan & Suryadi, 2021).

PTL's risk management framework refers to ISO 31000:2018. Based on this framework, the risk management carried out includes the integration process, designing, implementing, evaluating, and improving processes. The processes within this framework will support the implementation of risk management in the company so that it can run effectively. Successful implementation of the framework requires the engagement and awareness of stakeholders. This enables organizations to explicitly address uncertainty in decision-making, while also ensuring that any new or subsequent uncertainty can be taken into account as it arises (ISO, 2018).

2. MATERIALS AND METHODS

Every organization must face various kinds of factors, both internal and external that affect uncertainty in achieving goals, which is called risk. Organizations

must manage the risks they may face in a logical, systematic, structured, and well-documented manner. As described in AS/NZS 4360 in 2004 that risk is something that has multiple impacts on an object. The definition of risk itself is a combination of probability (probability or likelihood) and the impact of severity (severity or consequence) on an event. The greater the likelihood of an event occurring, the greater the impact that is likely to cause a lot of risk, therefore the event can be assessed as a fairly high risk (Agustinus *et al.*, 2017). Risk is generally defined as uncertainty that has a lot of potential so that there are variations that can result in profits and losses. To ensure that failures or losses do not occur, it is necessary to carry out risk management (Alfian *et al.*, 2020).

Given the importance of implementing risk management in companies, this study will analyze the application of risk management in mechanical test centers / laboratories, especially PT. PTL, these problems include: (a) How to design a risk management model at PT. PTL by utilizing the ISO 31000 framework; (b) How to identify the risks that may occur at PTL; (c) How to conduct an assessment of the identified risks at PT. PTL; (d) How to determine the appropriate risk management actions against the identified risks in PT PTL.

This study used descriptive qualitative method which provides a practical description of implementation of risk management process. Researchers research literature and literature review to collect information relevant to the topic or problem that is the subject of research. This study aims to analyze the application of risk management management based on ISO 31000, by identifying and assessing risk in PT. PTL by utilizing the model that has been designed, as well as determining the appropriate risk management action proposals against the risks identified in the case study at the company PT. PTL.

3. DISCUSSION

A. Scope, Context, and Criteria

The scope of application of risk management at PTL is carried out based on the company's business objectives in business management. The risk assessment is limited to the top ten risks that disrupt business operations. The context of the application of risk management includes the internal context and the external context. The risk study is focused only in the context of marketing, operational, human resources, and financial at PT. PTL which is in the manufacturing industry. The Risk Criteria include the Risk Possibility Criteria and Impact Criteria.

Table 1: Risk Probability Criteria

Index	Probability	Percentage (%)
1	Barely happened - Rare	(0% < p ≤ 10%)
2	Rarely happens - Unlikely	(11% < p ≤ 30%)
3	It might happen - Possible	(31% < p ≤ 60%)
4	Most likely happen - Likely	(61% < p ≤ 90%)
5	Almost certain to happen - Almost Certain	(91% < p ≤ 100%)

Source: Authors

The probability (possibility) of risk is the magnitude of the opportunity for the risk to occur in the future (until the end of the year). The size of the

probability is expressed as a number between 1-5 where 1 almost does not happen and 5 is almost certain.

Table 2: Risk Impact Criteria (Qualitative)

No	Impact	Impact On Reputation	Impact on Operational Continuity	Impact on Organizational Strategic Goals
1	<i>Insignificant</i>	No impact	No disturbance	Performance targets and targets can still be achieved 100%
2	<i>Minor</i>	Relatively small impact on internal company	There is a disturbance but it has no impact on operations	Achieved targets and performance targets 91% - 99%
3	<i>Moderate</i>	Impact on Manufacturing industry in Cikarang	There are disturbances that have an impact on operations	Achieved targets and performance targets 71% - 90%
4	<i>Major</i>	Impact on Manufacturing industry in West Java	There is a large disruption, loss of operational capability	Achieved targets and performance targets 51% - 70%
5	<i>Catastrophic</i>	Impact on National Manufacturing industry	Severe disturbance, unable to operate	Performance goals and targets <50%

Source: Authors

B. Risk Assessment

Risk assessment is the whole process from risk identification, risk analysis and risk evaluation.

Risk Analysis

The purpose of risk analysis is to understand the nature and characteristics of risks including risk ratings. During this process, the probability and impact

of each risk is estimated in order to decide on the priority of the risk. The following are the results of the

risk analysis that has been made:

Table 3: Risk Identification

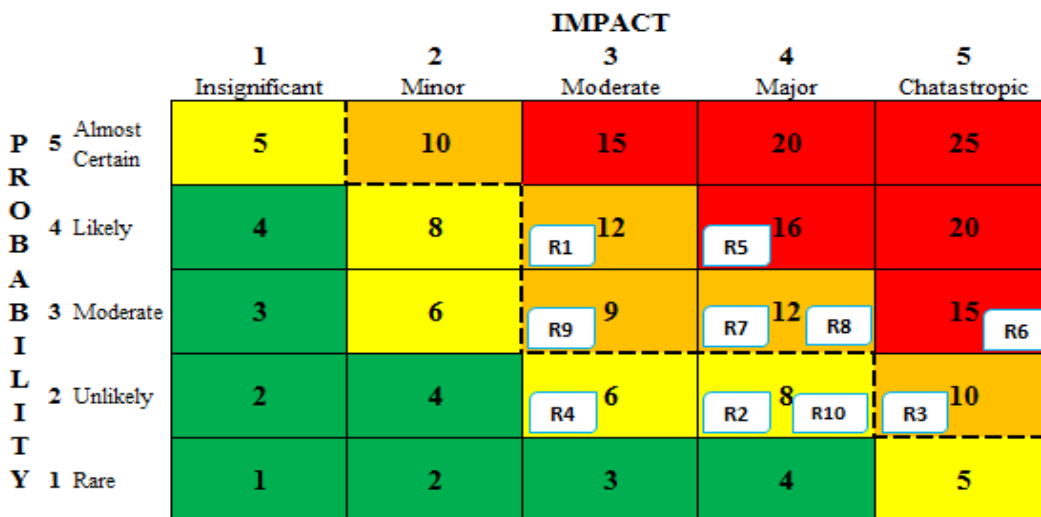
No.	Risk Event	Inherent		
		Probability	Impact	RPN
R1	Lesser known PTL brand	4	3	12
R2	The emergence of similar competitors	2	4	8
R3	Case of fire	2	5	10
R4	Power outage / blackout	2	3	6
R5	Accumulation of untested specimens occurs	3	5	15
R6	Test machine malfunction	3	5	15
R7	The PTL view app encountered a system error	3	4	12
R8	Analyst's limited knowledge of test applications	3	4	12
R9	High employee turnover	3	3	9
R10	The target payback period is not reached	2	4	8

Source: Authors

Risk analysis provides input for risk evaluation, provides a decision whether a risk needs treatment and how to treat it, as well as the most appropriate risk treatment strategy and method based on the Risk Priority Number (RPN).

Risk Evaluation

After conducting a risk analysis, the next step is to evaluate the risk. Risk evaluation is done by making an inherent risk map. The following is a map of the inherent risks of the Premium Testing Lab.



Picture 1: Map of Inherent Risk

Source: Authors

Establishing Risk Position and Risk Appetite

The risk position in the risk map is divided into 4 levels: Low, Moderate, High, and Extreme, these levels are shown in red, orange, yellow, and green. The yellow area is an area of risk management appetite. Risks that are beyond management's risk appetite

cannot be tolerated and must be addressed immediately. To simplify the risk management strategy, the risk map is divided into 4 quadrants (quadrants 1-4). The results of the risk measurement are included in the following risk position table:

Table 4: List of Risk Positions

Risk Position	Risk Response	Risk Action
<i>Extreme</i>	Risk not accepted	Caution, Immediate handling
<i>High</i>	Risk not accepted	Standby, Deal Immediately
<i>Moderate</i>	Risk not accepted	Alert, Need to be handled
<i>Low</i>	Risk accepted	Monitored, and evaluated

Source: Authors

Risk appetite becomes the basis for determining Risk tolerance, namely the quantitative limit of the Level of Likelihood of Occurrence and the Level of Acceptable Risk Impact, as stated in the Risk Criteria. PT PTL applies risk appetite by calculating the RPN value 8 or Moderate position.

C. Risk Treatment

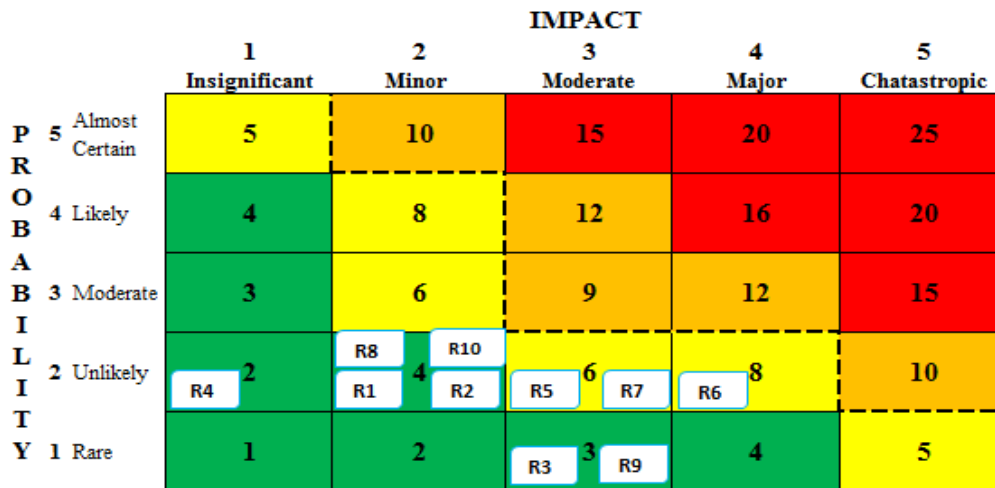
Risk treatment includes the stage of assessing risk treatment, deciding whether the level of risk can be tolerated, if it cannot be tolerated then a new risk treatment will be made, and an assessment of the effectiveness of the treatment is carried out. Risk treatments that deal with negative consequences are sometimes referred to as risk mitigation, risk elimination, risk prevention and risk reduction.

Table 5: Risk Treatment

No.	Risk Treatment	Residual		
		Proba bility	Impact	RPN
R1	Carry out massive marketing activities, such as direct visits; seminars, webinars, and telemarketing	2	2	4
R2	Develop the value proposition of PT. PTL, and improve Dynamic capabilities	2	2	4
R3	Prepare fire extinguishers, provide fire simulation training to all employees and socialize K3	1	3	3
R4	Prepare the generator engine for backup power at any time when needed	2	1	2
R5	Created SOPs, test timelines, and Service Blueprints in service operations	2	3	6
R6	Created SOPs for machine operations, made periodic maintenance services, made preventive maintenance schedules	2	4	8
R7	Perform routine maintenance, prepare system database backups	2	3	6
R8	Conduct regular training for analysts and sales	2	2	4
R9	Employee performance evaluation is routinely carried out, providing rewards, and promotions	1	3	3
R10	Evaluation of sales targets and cost efficiency for all activities	2	2	4

Source: Authors

After the risk is given a treatment, the risk of experiencing changes can be concluded in the following residual risk map table.



Picture 2: Residual Risk Map

Source: Authors

D. Communication and Consultation

Forms of communication and consultation include: a. Periodic meetings; b. Incidental meeting;c.

Focused Group Discussion; and d. Risk management forum. Communication and consultation is carried out based on the risk escalation table as follows:

Table 6: Escalation Level

<i>Risk Score</i>	<i>Escalation Level</i>
13 – 25	Round of Directors
9 – 12	Management Committee reporting to Board
5 – 8	Directorate/Departement
1 – 4	Team but monitored at Directorate level

Source: Authors

E. Monitoring and Review

Monitoring and review is part of the risk management process plan that involves inspection and supervision. This stage is carried out periodically. The results of the monitoring and review are then recorded and reported and used as input for the review of the risk management framework.

The form of monitoring and review consists of: On-going monitoring, Periodic monitoring, Review, and Risk Management Audit

F. Recording and Reporting

At the last stage in the application of risk management, namely the storage and reporting of the risks that occur

G. Cost of Risk Management

From the application of risk management, it is necessary to have costs in handling it and its impact. Some routine costs such as asset maintenance, maintenance, procurement of generator engines have been included in the operational budget. The costs related to the implementation of risk management are as follows:

Table 7: Risk Management Costs

No	Types of Fees
1	Light Fire Extinguisher (Powder)
2	Pest Control Training (2x a year) Pest control training
3	Insurance for damage / loss of assets
4	Industrial Relations Costs

Source: Authors

4. CONCLUSION

Risk management that has been implemented by the Mechanical Test Laboratory of PT. PTL based on the description above, it can be concluded that there are (10) top ten risks that have the potential to disrupt the company's operations. These risks are determined based on the context of marketing, operations, human resources, and finance, each of which has a different level of risk. After carrying out a risk assessment, based on the Risk Priority Number (RPN), which became the main focus of management including (R5) accumulation of untested specimens with an RPN value of 16, and (R6) Damage to the test machine with an RPN value of 15, these two risk events became the main focus because it is in the red zone with Extreme risk positions. Treatment for Extreme risk positions from PT. PTL is in a position where the risk is unacceptable and the risk action must be handled immediately.

Risk Treatment is carried out after the assessment stage, namely identification, analysis and risk evaluation. Risk treatment includes a selection of several risk treatment options to be applied. Some risks that require special attention are predetermined. The goal is that the risk can go down to a lower level. Risk treatment for (R5) accumulation of specimens that have not been tested is by making SOPs, testing timelines, and Blue Print Services in service operations, so that

queues and accumulation of specimens that have not been tested can be decomposed and served properly, with the treatment, the the risk position can be reduced by an RPN value of 6, while for (R6) the damage to the test machine after treatment is carried out to reduce the risk level by making SOPs for machine operations, making periodic maintenance services, making preventive maintenance schedules, after treatment, the RPN value becomes 8. So with this risk management effort, it will reduce the risk level from the previous Extreme position to Moderate which is already under the risk appetite of PT. PTL.

In addition to the two events above, there are still 5 (five) other risks that are still in the High position, this High position is a risk response from PT. PTL determined that the risk was unacceptable and must be handled immediately, as for the 5 risks, including: Unknown PTL brand, PTL view application experienced a system error, Limited knowledge of analysts on test applications with an RPN value of 12, Fire occurrences with an RPN value of 10, and high employee turnover with an RPN value of 9. Therefore, PT. PTL makes treatment for the high risk so that it can reduce the risk level position to Low, with an RPN below number 4, the low risk position indicates that the risk is acceptable, but continuous and periodic monitoring and evaluation must still be carried out, so that other risks do not arise. The following is a description of the implementation of Risk Management

at the company PT. Premium Testing Lab. (PT. PTL) based on ISO:31000.

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