

Failure mode and effect analysis (FMEA) for mitigation of operational risk

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Abstract

One of the failures in starting a business is failure in poor operational management. Operational risk is caused by internal process failures, human errors, system failures or external problems that affect operational activities. This study aims to measure the operational risk of PT. Unilever Tbk. before and during the Covid 19 pandemic. The method used is qualitative, with data collection techniques used, namely observation and documentation techniques. The results of this study show that there are differences in the level of RPN on internal and external failures. If before the pandemic, operational risk – external was the lowest risk crisis, during the Covid 19 pandemic, operational risk – internal was the lowest risk crisis. Lack of working capital and increased spending caused by the pandemic. Investors are less interested in consumer stocks and the provision of a new normal kit increases the company's expenses without being accompanied by income. Operational-external risk also increases due to the risk of late arrival of raw materials and disruption to the supply chain network, especially at suppliers.

Keywords: Operational risk; risk identification; risk analysis; FMEA

INTRODUCTION

One of the failures in pioneering business is failure in poor operational management. Operational risk is the risk resulting from internal process failure, human error, system failure, or external problems that affect operational activities, (Lestari, 2019). Such as lack of competence in management, operational activities are less effective, not exactly the management systems and strategies applied, and various other constraints are commonly caused by external factors. Though competence is the main capital that must be owned by every type of business, When the competence possessed is lacking or not appropriate, it can hamper the company's performance and result in failure to achieve the company's goals. Then the accuracy in designing and arranging the framework in each business department in terms of time and business capital used must be calculated complexly so that the output produced is appropriate and the workmanship is efficient, (Rosih et al., 2015).

Similarly, the systems and strategies implemented need to be adjusted based on business needs, business culture, and of course in accordance with the company's vision and mission. Then the threat that comes from outside must be carefully predicted by each line of management to avoid obstacles that can interfere with the achievement of company goals. Barriers emanating from the company's internal and external must be identifiable, measured, managed, and evaluated over time, (ERM, 2004). Because these obstacles are dynamic, following changes in time and management processes that are applied, they need to be monitored and evaluated over time. This is commonly referred to as operational risk management. Risk management is a very important process in a company. As already explained, the risks are dynamic. It could be that risks identified as low impact risks may turn into high-impact risks, (Pangestuti et al., 2020). With this management, it is expected that the risks that have been identified can be controlled properly and will not cause losses for the company, (Sirait & Susanty, 2016).

Moreover, since the outbreak, not a few companies that experienced a decrease in turnover even threatened to go out of business. Based on the results of the BPS survey, 12-13 December 2020, as many as 6.78% of companies stopped operations due to the pandemic. The pandemic also had a serious impact on Unilever. Quoting Kontan.co.id (2020/12/02), there are several employees of Unilever's TBB engineering department confirmed positive Covid-19. This resulted in the temporary closure of the factory and led to employees being laid off. The presence of Covid-19 also increases uncertainty over Unilever's operating environment and has so far affected its financial position and operating results. But in addition, Unilever's shares coded UNVR have decreased by 30.95 % since the beginning of 2021. This is due to changes in the interest of investors who are less interested in consumer stocks.

Of all these problems, this study aims to analyze operational risks at PT. Unilever Tbk. before and during COVID-19 with the failure mode and effects analysis (FMEA) method, in order to know the differences that occur among them. Analysis of modes and failure effects, or FMEA, is a common engineering technique used to identify and eliminate failures, problems, errors, and so on from systems, designs, processes, and/or services before they reach customers, (Stamatis, 2019). FMEA's primary concern is to proactively assess the risks of potential failure modes so that appropriate corrective action can be taken before failure occurs. The origins of FMEA techniques began in the early 1960s, first developed by the aerospace industry with clear reliability requirements and safety, (Ozkok, 2014; Segismundo & Miguel, 2008). Later, the manufacturing industry adopted FMEA techniques as a means of improving quality and risk assessment. FMEA has become one of the most widely used safety and reliability analysis tools in general, thanks to numerous standardization efforts such as military standard (MILSTD) 1629A, international organization for standardization (ISO) series 9000, and society of automotive engineers (SAE) standards J1739 199407. FMEA engineering is widely used in a variety of industries, including automotive, mechanical, chemical, electronics, and medicine, (Liu et al., 2012; Wang et al., 2019).

Risk

Risk is the uncertain possibility of an unexpected and unwanted adverse event that could threaten the achievement of a goal. The impact or influence that can occur as a result of an ongoing activity process or a future event is referred to as risk, (Segismundo & Miguel, 2008). Risk is associated with the

opportunity of an unexpected adverse event. Risk itself can cause losses. The characteristic of its own risk is uncertainty and contains an element of loss, (Stamatis, 2019).

Operational risk

Operational Risk is a risk caused by internal problems caused by poor management control systems implemented by the company's internal parties, (M.Hanafi, 2014). Operational risk occurs due to failure of a system, technology, human resources, and other factors that do not function according to procedure. Operational risks are closely related to the realization of the process of operational activities of a company and can be experienced by any type of business, (Lestari, 2019). Risk management is the completeness of risk management and control techniques that include tools, systems or methods, management processes and organizations held for the health of the company in order to meet the company's strategic plan. According to (Pangestuti, 2018) Risk management is a systematic risk management process. According to (M.Hanafi, 2014) Risk Management is a field of science that studies the way an organization manages existing risks with the principle of systematic and thorough management. So, risk management is a systematic process of identifying, assessing, measuring, determining attitudes, finding solutions, and monitoring or monitoring the company's operational risks.

Risk management process

The process of risk management goes through several stages, where according to (M.Hanafi, 2014) These stages are:

The discovery, identification, and interpretation of risks that may affect the project or its outcome is known as risk identification. Setting up risk registers can be used to find risks using a variety of techniques;

Following the identification of hazards, risk analysis evaluates the likelihood and effects of each risk.

We have a good understanding of the risk and how it can affect the project's goals;

Evaluation or risk rating, i.e., assessing or categorizing risk by determining its magnitude, is a combination of probability and consequence. We can decide whether we can accept, manage or divert risk;

A risk response plan is another name for addressing risk. We can determine the highest degree of risk and devise a strategy for resolving or modifying these risks to attain a risk level that is acceptable. How can we develop risk mitigation strategies, prevention plans, and emergency plans to reduce the chance of negative risks and improve existing opportunities?; and

Risk monitoring is the process by which we obtain a list of project risks and use them to monitor, track, and review existing risks.

The following is an image of the stages of risk management.



Figure 1. Stages of Risk Management

(M.Hanafi, 2014) delivered risk management objectives include the following:
Prior to the occurrence of peril: as a countermeasure to reduce losses, anxiety, and as fulfillment of obligations to third parties by implementing SOPs and the use of work safety tools; and
After the occurrence of peril: to save business operations to continue by pursuing new strategies after the occurrence of peril, trying to keep business income flowing and business growth continues and maintains social responsibility by the company.

METHOD

This research uses a qualitative approach because the obstacles that occur need to be observed by identifying, tracing, analyzing, managing and controlling, and communicating and evaluating risks. Qualitative methods are research methods that refer to aspects of a deep understanding of a problem. Qualitative methods highlight the disclosure of the meaning and experience of the research subject to phenomena that cannot be measured. According to (Sugiyono, 2015) qualitative research is research to find out the perceived events of the research subject such as motivation, behavior, perception, and other behaviors as a whole and descriptive in special situations using various natural techniques.

The type of data used in this study is qualitative data collected based on observational data and documentation data. Documentation in this study uses risk management data of PT. Unilever Tbk. While the observation data is based on the process of the company's operational activities. The data used in the study is classified into two: primary data and secondary data. Primary data is data that is directly related to data management, while secondary data is supporting data that is not directly involved in data management. Data sources include PT. Unilever Tbk. annual reports and risk management reports, as well as other related literature studies. Data management is done by making risk analysis, risk evaluation and risk handling. The data collection techniques used are observation and documentation techniques.

RESULTS AND DISCUSSIONS

Risk identification

The first step is to identify the risk. Based on the data obtained, there are risk indicators that exist in Unilever consisting of process failures, failures derived from internal sources, failures derived from external sources, and failures derived from human error.

Operational risk analysis with FMEA Method

The next stage of analysis is followed by the assessment of Severity, Occurrence, and Detection to obtain the Risk Priority Number.

Table 1. Operational risk analysis before a pandemic using the fmea method

No.	Description of Risk	Possible Effect	S	Possible Mode	O	Controls Exercised	D	RP N
Process								
1.	Scarcity of raw materials	The delay in the production process. Raw material prices rise, which increases production costs.	9	a scarcity of raw materials on the market	9	Contracting the purchase price with the supplier/using substitute raw materials	8	648
2.	Damage to machinery and production equipment	Production was hampered.	9	Lack of maintenance and checking on machinery and production equipment	8	Carry out routine maintenance and upkeep on machinery and equipment.	8	576
3.	Products produced are defective or not	Reduced output that can be	8	Raw materials used to be damaged by human error or	8	Conducting QCs on raw materials,	8	512

No.	Description of Risk	Possible Effect	S	Possible Mode	O	Controls Exercised	D	RP N
	in accordance with the company's standardization	marketed and causes losses		damage to machinery/production equipment.		assigning experts as supervision		
Internal								
4.	Conflict between employees	The delay in the continuity of the production process	7	Jealousy between employees, communication misunderstandings in the production process	7	Holding gatherings that can strengthen teamwork/individuals	7	434
5.	Poor relations between companies and unions	There are demos or strikes.	6	Miscommunication, the existence of new policies that are not in accordance with the company's mission vision	7	Make good communication a priority.	7	294
6.	In the field of information technology, system disruption, security systems, and infrastructure are all important considerations.	Communication breakdowns between companies and the supply chain	9	Trouble with the system, data hacking	8	Perform system maintenance regularly.	8	576
7.	Nonconformity of company policy with its practices.	Conflict within the company environment	8	There was a violation of the policy, but there was no reprimand.	8	Establishing firm sanctions	8	512
External								
8.	Changes in currency rates	affects the purchase price of raw materials, production costs, and export/import activities. It affects the purchase price of raw materials and production costs.	8	Economic instability & inflation.	7	Provide reserve funds according to the currency used.	8	448
9.	Fluctuations in raw material prices		7	Change in exchange rates, scarcity of raw materials	8	Contract the purchase price	8	448
10.	Legal and regulatory policies that affect operational activities	Hindering operational activities and causing losses	5	There are new laws and regulations.	6	Comply with all applicable laws and regulations and avoid violating them.	8	240

No.	Description of Risk	Possible Effect	S	Possible Mode	O	Controls Exercised	D	RPN
11.	Failure to connect well with suppliers	Hindering productivity & causing losses	8	Miscommunication, a breach of the employment contract of one of the parties	8	Make timely payments, communicate, and cooperate well.	8	512
Human Error								
12.	Inappropriate employee competence	The production process is less effective and efficient.	7	Job placements are less appropriate, employees are incompetent.	7	Providing job training, evaluating employee performance	7	434
13.	Errors in recording and administrative processes	Financial statements are not balanced.	8	Employees are less conscientious.	8	Auditing	7	448
14.	Work accidents in the production process	Loss	8	Lack of conscientiousness, poor K3LH	8	Apply sops correctly, be disciplined, and use work safety tools effectively.	8	512

Table 2. Analysis of changes in operational risks during pandemics using fmea methods

No.	Description of Risk	Possible Effect	S	Possible Mode	O	Controls Exercised	D	RPN
Process								
1.	Raw materials contaminated with viruses	Operational activities were hampered, raw materials were damaged, and output was contaminated.	9	Lack of implementation of health protocols	8	Sterilize raw materials, machinery and equipment, and rooms.	8	576
2.	Contaminated output	Loss	9	Lack of implementation of health protocols	8	Sterilize raw materials, machinery, equipment, production rooms.	8	576
Internal								
3.	Lack of available working capital	Inhibition of the purchase of raw materials & continuity of the production process	6	Falling investor interest & the stock price are overvalued.	8	Doing stock splits, selling less productive fixed assets	7	336
4.	Increased spending	Reduced profit margins	6	Outbreaks, disinfectant purchases, operating costs rise.	8	Draw up an effective operating cost budget.	6	288
External								
5.	Late arrival of raw materials	Inhibiting the production process	7	large-scale social restrictions, restrictions on community activities, and restrictions on access to the region.	7	Using alternative lanes such as passing tolls	7	434
6.	Disruptions in supply chain networks	The process of distribution of raw materials and	6	There is a scarcity of raw materials, large-scale social	7	Using substitute raw materials,	7	294

No.	Description of Risk	Possible Effect	S	Possible Mode	O	Controls Exercised	D	RPN
	(especially suppliers)	production are hampered.		restrictions, and restrictions on community activities.		looking for other suppliers		
Human Error								
7.	Employees exposed to Covid-19	Due to a lack of employees, the amount of output produced is reduced.	7	Lack of adherence to health protocols implemented	9	Equip employees with new normal kits, and implement strict health protocols.	8	504
8.	Stress	Employee performance declines	7	Fear & anxiety about self-health	6	Maintaining physical & mental health	6	252

From the results of the study above, it can be known that the Risk Priority Number is sorted as follows:

Table 3. Rpn ranking of operational risks before pandemic using fmea

No.	Risk	RPN	Average
Operational Risks – Processes			
1.	Scarcity of raw materials	648	578,67
2.	Damage to machinery and production equipment	576	
3.	Products produced are defective or not in accordance with the company's standardization.	512	
Operational Risk - Human Error			
4.	Work accidents in the production process	512	464,67
5.	Errors in recording and administrative processes	448	
6.	Inappropriate employee competence	434	
Operational Risk - Internal			
7.	In the field of information technology, system disruption, security systems, and infrastructure are all important considerations.	576	454
8.	Nonconformity of company policy with its practices.	512	
9.	Conflict between employees	434	
10.	Poor relations between companies and unions	294	
Operational Risk - External			
11.	Failure to connect well with suppliers	512	412
12.	Changes in currency rates	448	
13.	Fluctuations in raw material prices	448	
14.	Legal and regulatory policies that affect operational activities	240	

It is known that the operational risk that has the highest RPN level is Operational Risk – Process with an average value of 578.67. There is a risk of raw material scarcity, damage to machinery and production equipment, and products produced that are defective or do not meet standards. by Operational Risk – Human Error, which has an average RPN value of 464.67, with work accidents in the production process as the highest risk. Then Operational Risk – Internal, which has an average RPN of 454 with system interference, system security, and infrastructure IT as the highest risks. Last Operational Risk – External, which has an average RPN value of 412, with failure to relate well to the supplier as the highest risk. Furthermore, there are operational risks after a pandemic in order based on RPN as follows: from human error.

Table 4. Rpn ranking of operational risks after pandemic using fmea

No.	Risk	RPN	Average
Operational Risks – Processes			
1.	Raw materials contaminated with viruses	576	576
2.	Contaminated output	576	
Operational Risk - Human Error			
3.	Employees exposed to Covid-19	504	378
4.	Stress	252	
Operational Risk - External			
5.	Late arrival of raw materials	434	364
6.	Disruptions in supply chain networks (especially suppliers)	294	
Operational Risk - Internal			
7.	Lack of available working capital	336	312
8.	Increased spending	288	

Since the Covid 19 pandemic hit, there have been additional risks that have been identified. First, there is the risk of raw materials and output contaminated with viruses at Operational Risk – Process. Operational Risk – The process becomes the highest risk due to its impact that can spread transmission of the virus and damage to raw materials. But before a pandemic, this risk is also the highest risk. So, it needs to be handled intensely and immediately and the risk should always be monitored because the priorities may have shifted. Furthermore, there is the risk of human error, which is the second highest risk and is caused by the transmission of the virus to employees and psychological problems. Pandemics put pressure on fear, anxiety over financial needs, and cause boredom.

Then the pandemic hit. RPN's operational-external risk increased. This is due to regional and clock restrictions such as PSBB & PPKM making the process of distribution of raw materials hampered. In contrast to previous risks, Operational – Internal Risks have an impact on the company's finances and this results in the production process being slightly hampered. But still, all the risks arising since the pandemic require companies to add focus to operational risks. Because if not, then the company could face new problems that cause greater losses.

CONCLUSION

Based on the results of operational risk identification at PT. Unilever Tbk has 4 types, namely operational risks stemming from process failures, internal failures, external failures, and human error failures. Before the pandemic, Operational Risk – Process became a crisis risk with an average RPN value of 578.67 and had three risks, including the risk of scarcity of raw materials, damage to machinery and production equipment, and production that was defective or not in accordance with standards. Then follows Operational Risk-Human Error, which has an average RPN value of 464.67 and has three risks, with work accidents as the highest risk. Operational Risk – Internal has an average RPN value of 454 and has four identified risks. These risks include system disruption, system security and infrastructure in IT, nonconformity of company policy with its practices, conflicts between employees, and poor relations between companies and unions. Lastly, there is Operational Risk – External, which has an average value of RPN of 412 and has four risks, with failure to relate well to suppliers as the highest risk.

After a pandemic, two risks are identified in each indicator. As before, process failure and human error have the highest RPN values with values of 576 and 378, respectively. Operational Risk – In the process, there is a risk of raw materials and output contaminated with the virus. The cause is the lack of health protocols implemented to make raw materials contaminated and eventually damaged so that they cannot be used and cause losses for the company. Likewise, the output contaminated by the virus cannot be circulated in the market. The right solution to these risks is to sterilize raw materials when they arrive, to sterilize machinery and equipment in the production room, and to discipline employees according to health protocols. Then the next crisis risk is operational risk – human error. Pandemics have caused stress to most people. Their health fears, financial anxiety, and boredom when required to adapt to new

conditions cause stress. The most effective solution today is to invite all employees to maintain mental and physical health, adhere to health protocols, maintain health and hygiene and avoid crowding.

Furthermore, there is a difference in RPN levels in internal and external failures. If operational risk-external was the lowest risk crisis prior to the pandemic, operational risk-internal became the lowest risk crisis after the pandemic, with an average RPN of 312. The lack of working capital and increased spending is due to the pandemic. Investors are known to have less interest in consumer stocks, and the provision of new normal kits increases the company's expenses without accompanying income. Then Operational Risk – External has an average value of RPN of 364 with the risk of late arrival of raw materials and disruption to the supply chain network, especially in suppliers. The main causes are restrictions on access to the region and the imposition of large-scale social restrictions and restrictions on community activities during the covid 19 pandemic make the process of distribution of raw materials hampered. The solution is to take alternative lanes such as using toll road access or finding new suppliers in the same area as the production site.

For future research, it is expected to add liquidity risk analysis and credit risk. The goal is to find out the level of ROA, profitability, and financial performance of the company and is also expected to add risk management and monitoring.

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