Supply Chain Risk Analysis In Wholesale Pharmaceutical Trading Companies Using The House of Risk (HOR) Method

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Abstract

The Pharmaceutical Wholesaler is a legally established company authorized to procure, store, and distribute medicines in large quantities. Numerous issues within Pharmaceutical Wholesalers and their impact on business continuity highlight the need for a structured risk management system to identify and mitigate potential risks in the future. Structured risk management is a crucial component for ensuring the operational sustainability of Pharmaceutical Wholesalers, aiming to identify, analyze, and mitigate risks that may disrupt the supply chain process. This study employs the House of Risk (HOR) method to analyze risks using the SCOR (Supply Chain Operation Reference) framework, which includes the processes of Plan, Source, Make, Deliver, and Return. HOR Stage 1 identifies risk events (RE) and risk agents (RA) and calculates the Aggregate Risk Potential (ARP) value to prioritize risk agents. HOR Stage 2 designs mitigation strategies by considering the effectiveness of preventive actions and the difficulty of implementation. Based on the analysis in HOR Stage 1 through interviews and discussions, scoring was conducted for each risk event, identifying 44 risk events and 13 risk agents. Using a Pareto diagram, 7 major risk causes were identified as priorities for prevention. HOR Stage 2 evaluation resulted in nine preventive actions, with five prioritized actions recommended to control potential risks. These include forming a dedicated monitoring and updating team, developing a clear SOP-based work system, creating supplier diversification strategies, providing regular training, and conducting regular audits or evaluations.

Keywords: *House of risk; Pharmaceutical industry; Risk management; Risk mitigation; Wholesale trading*

1. Introduction

Supply chain management is an integrative method or approach to managing the flow of products, information, and money in an integrated manner involving parties from upstream to downstream consisting of suppliers, factories, distribution networks, and logistics services [1]. Currently, the function of supply chain management for companies is very important because it creates efficiency and effectiveness in the business process activities carried out by a company. Supply chain management integrates business processes between interconnected networks with suppliers, manufacturers, distribution centers, and retailers to improve the flow of goods, services, and information from suppliers to end customers, with the aim of reducing the cost of the entire system and maintaining service levels [2]. In Supply Chain Management there are several risks that need to be managed and addressed so that the supply chain runs smoothly and efficiently. Some of the main risks in Supply Chain Management include demand risks such as fluctuations in demand for products or services can cause an imbalance in inventory and demand, which can lead to overstock or understock. In addition, supply risks such as shortages of raw materials, production disruptions, and other logistics problems can cause disruptions in production and delivery. Quality risks such as products or raw materials from suppliers can disrupt the supply chain and affect the company's reputation. There are many other risks so it is very important to study further regarding supply chain management.

Companies have a vital role in Supply Chain Management and contribute significantly to keeping the supply chain running smoothly, efficiently, and effectively, but errors can occur due to uncertainty in the future. The uncertainty that may occur in the future is called risk [3]. Risk is defined as uncertainty and causes the distribution of various outcomes with various possibilities. In addition, risk is considered a loss caused by an event or several events that can hinder the achievement of company goals [4]. Therefore, a process is needed to reduce the risk of an entity to an acceptable level by using measurement, management, and monitoring that is in line with strategic objectives, which is called risk management [5], [6].

PBF (Pharmaceutical Wholesaler) is a legal entity that has a permit to procure, store, and distribute drugs and drug ingredients in large quantities and in accordance with laws and regulations. PBF is regulated and formed in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 1148 / Menkes / Per / VI / 2011. There is also the term PBF branch, which is a PBF branch that has obtained a permit to procure, store, and distribute drugs and drug ingredients in large quantities, in accordance with laws and regulations. The following is the flow of the drug distribution system regulated in the Regulation of the Head of the Food and Drug Supervisory Agency (BPOM) Number 25 of 2017.

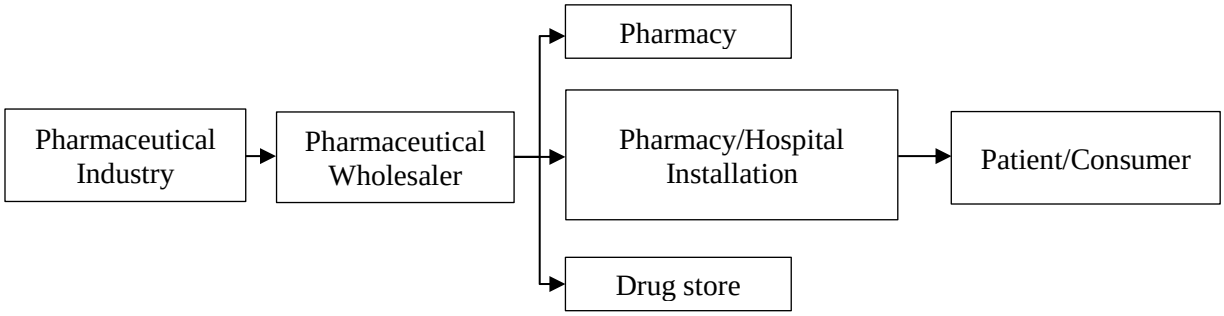

Figure 1. Ideal Drug Distribution System (BPOM Regulation Number 25 of 2017)

In the implementation of drug distribution carried out by PBF, there are still several problems found. Referring to the CDOB Certification Information System (Good Drug Distribution Practices) issued by BPOM, the following is data on PBF permit revocations from 2017 to 2024:

Table 1. PBF Permit Revocation Data for the 2017-2024 period

No	Year	Number of Companies
1	2017	62
2	2018	40
3	2019	210
4	2020	3
5	2021	7
6	2022	23
7	2023	20
8	2024	18

Based on data on PBF permit revocations from the period 2017-2024, it shows that within a period of 8 years (January 1, 2017 - March 28, 2024), there were 334 PBF companies whose permits were revoked/canceled due to various causes. For example, there are still PBFs that do not meet the quality requirements in procuring, storing, and distributing drugs by the provisions of Good Drug Distribution Practices set by BPOM. In this case, the company must be able to evaluate the cause of the permit revocation by BPOM. One way that companies can avoid permit revocation is to carry out risk management in the company that is currently running [7]. Good preparation and risk management are needed so that the PBF business that is running runs smoothly. Several PBF companies currently do not have structured risk management to identify and mitigate the risks that occur. One way to do this is by using the House of Risk method so that the risks that may arise along with their causes can be identified

to simultaneously find ways to mitigate these risks to improve operational quality and open up opportunities to detect profitable business opportunities for the Company [8]. Based on the problems that have been described, researchers can compile aims to identify the risks that occur in the drug procurement process at PBF PT X using the SCOR method approach. Analyze the identified risks so that an assessment can be made of the possibility of the risk occurring and the impact if the risk occurs using the HOR method stage 1. Evaluate the risk by compiling the best preventive action recommendations based on the level of difficulty faced using the HOR method stage 2.

2. Method

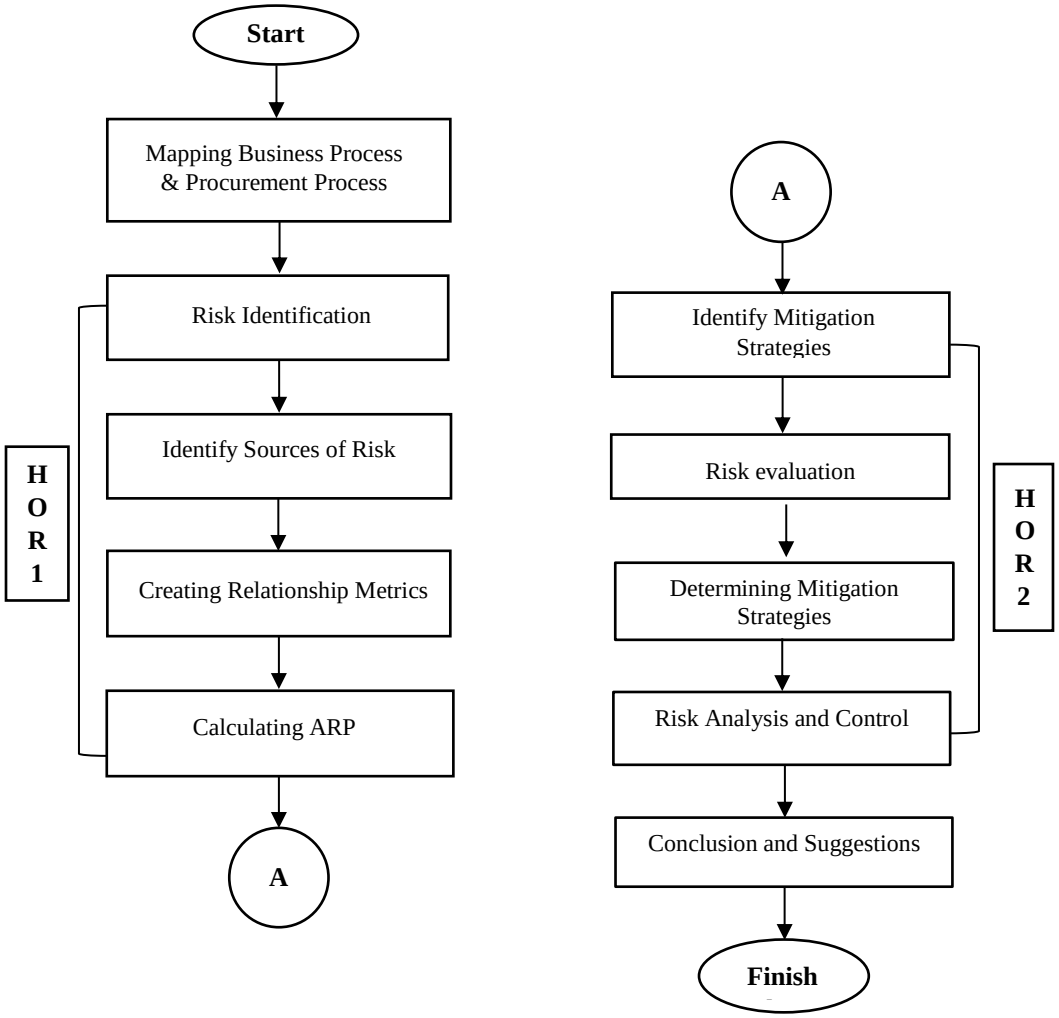

Figure 2. Flow chart

This study uses the House of Risk (HOR) method to analyze risks in the drug supply chain of a Pharmaceutical Wholesaler Company. The process begins with mapping the business based on the SCOR (Plan, Source, Make, Deliver, Return) model and the CDOB Technical Guidelines, followed by direct observation and in-depth interviews with experienced respondents from various divisions. Risks are identified through abnormal events and analyzed with a matrix of relationships between risk events and risk agents, using scores and calculations of Aggregate Risk Potential (ARP) values to determine risk priorities. Risk mitigation strategies are prepared based on the results of analysis and focus group discussions (FGDs), with short-term and long-term mitigation plans. Risk monitoring is carried out periodically through a special team, which is tasked with evaluating the effectiveness of mitigation

strategies and reporting them to top management. The results of the study are in the form of risk priorities and mitigation recommendations to improve risk management in the drug supply chain [9], [10].

3. Results and Discussion

3.1. Results

The ARP value results are sorted from the highest value to the lowest value as shown in the Table 2.

Table 2. ARP Rankings

Kode	Risk Agent	ARP	Cum%	Rk
A03	Lack of monitoring of BPOM regulatory updates	1.827	22,31%	1
A01	Ambiguity/changes in forecasting	1.110	35,87%	2
A12	Management, Control & Planning Customer Delivery is not running well	868	46,47%	3
A09	Problematic negotiations or ethical issues	612	53,94%	4
A11	Lack of packaging inspection control	609	61,38%	5
A06	Human Error	555	68,16%	6
A02	Lack of diversification in supplier base	528	74,61%	7
A13	Control & Management in receiving is not running	496	80,67%	8
A04	Sudden request from customer	450	86,16%	9
A07	Supplier delivery monitoring is not going well	405	91,11%	10
A05	Storage that does not comply with SOP	375	95,69%	11
A10	Lack of supplier performance control	189	98,00%	12
A08	Market price fluctuations	164	100,00%	13

After the ARP value of each risk agent is obtained, the next step is to construct a Pareto diagram [11]. Risk agents with the highest ARP value are placed on the left side of the bar chart, followed by smaller values. This bar chart is equipped with a graph of the percentage of accumulated ARP, as shown in Figure 3.

Figure 3. Pareto Diagram of ARP against Risk Agents

Pareto diagram analysis aims to prioritize risk agents with significant impact on project risk. Only major risk agents are addressed to ensure effective handling, given resource constraints. Further results discuss Pareto analysis and preventive actions (PA) to prevent risks. HOR 2 analysis is used to determine PA priorities at PT X. Discussions involve senior management and experts with at least 10

years of experience. The results of the analysis show that 20% of risks contribute 80% of significant impacts, so that mitigation priorities are focused on risk agents with a cumulative value of up to 80% for efficiency and loss reduction.

Based on the agreement of the discussion results, there are 7 risk agents that have a cumulative impact percentage of up to 80% which is measured cumulatively and is considered to have the greatest potential risk impact, as shown in the following Pareto diagram Figure 4.

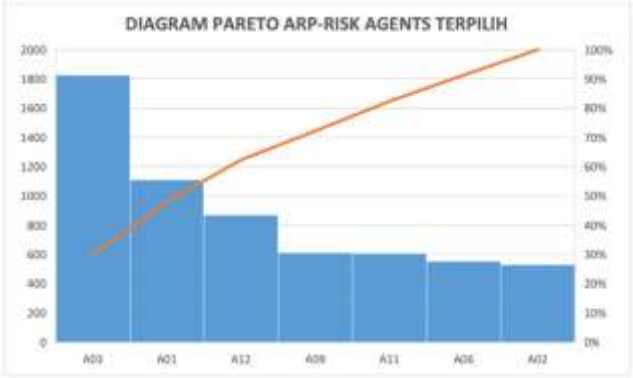

Figure 4. ARP Pareto Diagram of Selected Risk Agents

Based on the results of the Pareto diagram, here is a list of 7 Risk Agents selected because they have great potential to cause risk impacts. This selection also considers the allocation of relevant human resources to handle the risk triggers, so that implementation can run effectively and efficiently according to management's direction. The results of the selected risk agents along with the ARP value can be seen in Table 3.

Table 3. Risk Agent for HOR 2

Kode	Risk Agent	ARP	Cum%	Rank
A03	Lack of monitoring of BPOM regulatory updates	1.827	22,31%	1
A01	Ambiguity/changes in forecasting	1.110	35,87%	2
A12	Management, Control & Planning Customer Delivery is not running well	868	46,47%	3
A09	Problematic negotiations or ethical issues	612	53,94%	4
A11	Lack of packaging inspection control	609	61,38%	5
A06	Human Error	555	68,16%	6
A02	Lack of diversification in supplier base	528	74,61%	7

After the data is processed, the next step is to enter it into the HOR 2 matrix. The results are displayed in the following table, which presents the scores from the correlation table between preventive actions and risk agents, as well as the level of difficulty of each preventive action. The following diagram is used to analyze the correlation between risk agents and preventive actions.

Figure 5. Diagram Pareto Preventive Action

Pareto analysis is used to identify preventive actions that are the main priority, so that the company can determine the preventive actions that must be taken immediately to reduce risk. This is done by considering the effectiveness, available resources, and the level of difficulty in implementing prevention, because not all preventive actions need to be done. Based on the diagram above, this study sets the ETDk value limit above 80% as a priority criterion for implementing preventive actions or mitigation strategies. The results of the analysis show that there are 5 preventive actions that are the company's priorities, as listed in the following preventive action priority order Table 4.

Table 4. Priority Order of Preventive Action

Kode	Countermeasures	TEk	Dk	ETDk	Rk	Cumm(%)
PA1	Forming a Special Team for Monitoring and Updating	46377	4	11.594	1	21,06%
PA4	Developing a Clear SOP-Based Work System	33426	4	8.357	2	36,24%
PA6	Developing a Supplier Diversification Strategy	34686	5	6.937	3	48,84%
PA3	Providing Regular Training	17811	3	5.937	4	59,62%
PA5	Conducting Routine Audits or Evaluations	23508	4	5.877	5	70,30%
PA9	Strengthening Risk Management	28269	5	5.654	6	80,57%
PA2	Using Digital Systems for Automation and Tracking	23589	5	4.718	7	89,14%
PA7	Improving Inter-Departmental Communication Systems	12381	4	3.095	8	94,76%
PA8	Improving Quality Control System	14418	5	2.884	9	100,00%

3.2. Discussion

The scope of this research object is the procurement and management of drug products run by PT X. Risk assessment activities in drug procurement and management activities are taken from the perspective and point of view of several staff who have held top-level management and middle-level management positions who have more than 10 years of experience working at PT X. To analyze the

risks that exist at PT X, several risk analyses were carried out starting from risk identification, risk analysis, and risk evaluation.

Table 5. Priority Order of Preventive Action

No	Department	Position/Title	Length of Service (years)
1	Director	Director	> 15
2	Procurement	Manager	> 10
3	Procurement	Pharmacist in Charge of Medication	> 10
4	Warehouse and Logistik	Manager	> 10

The purpose of conducting a risk analysis in the procurement and management activities of drug products run by PT X is not only to determine the risks that usually occur in the process but also to analyze the triggers that cause these risks to occur (risk agents). By knowing the risk agents as the source of risk triggers, preventive actions can be designed to prevent or reduce the possibility of risk agents appearing. In an effort to carry out these preventive actions, various resources are needed, such as manpower, costs, and time. Therefore, it is important to design a structured method in risk assessment so that the results obtained can be maximized by utilizing available resources efficiently.

The return process is carried out when customers receive damaged goods, goods that do not match the order, or have passed their expiration date. Returned goods are managed in accordance with applicable regulations, especially in terms of pharmaceutical waste management. For example, goods that are not suitable for consumption will be processed or destroyed in an environmentally friendly manner and in accordance with the rules. All return processes are supported by complete documentation, such as return notes and damage reports, to ensure transparency and facilitate process evaluation. Information from these returns is also used to improve operational systems and reduce similar incidents in the future.

A total of 44 risk events were identified using the SCOR method approach. Identification was carried out by exploring the risks that occur in each stage of the activity process whose activity flow can be grouped according to the business process flow in SCOR. In the early stages of data collection, an in-depth identification of business processes in each department was carried out. This process aims to understand the workflow and specific functions in each section so that potential risks can be analyzed comprehensively. In this analysis, not only are risks identified at each stage of the business process, but the root causes of these risks are also sought. This step is an important basis for designing effective risk mitigation.

The plan/planning stage is a strategic step to ensure the availability of goods according to customer needs, such as pharmacies, hospitals, and government agencies. Planning begins with preparing a goods requirement plan based on careful demand analysis. The goal is to ensure that goods are available on time, in sufficient quantities, and according to specifications. In addition, inventory planning is carried out to avoid overstock which can increase storage costs or stockouts that can disrupt customer service. A warehouse management system is used to monitor stock in real-time, determine minimum and maximum levels, and manage stock replenishment efficiently. This process helps maintain a balance between operational efficiency and customer satisfaction.

At the source/procurement stage, goods are ordered from suppliers who have been selected based on certain criteria, such as product quality, delivery timeliness, and flexibility. This process includes price negotiation, determining product specifications, and confirming the availability of goods according to customer needs. Supplier performance is evaluated periodically to ensure they meet established standards. This evaluation includes assessing the quality of goods received, delivery timeliness, and the supplier's ability to respond to urgent needs. Suppliers who are considered strategic receive coaching and training to be able to meet higher standards so that a mutually beneficial working relationship can be established in the long term.

The make stage involves managing goods after they are received from suppliers. The goods are thoroughly inspected to ensure that their quality and quantity are in accordance with the specified standards. If any discrepancies are found, the goods can be returned or adjusted, such as repackaging, relabeling, or kitting (making special packages) to meet the specific needs of the customer. Furthermore,

the goods are stored in the warehouse with appropriate storage conditions in mind. For products that require controlled temperatures, such as vaccines and certain medicines, special facilities are used to ensure product stability during storage. This stage is very important to maintain the quality of the goods before they are distributed to customers. The delivery stage begins with preparation for shipping, which includes the process of picking, packing, and final checking of the goods. Picking is carried out carefully to ensure that the goods to be sent are in accordance with the customer's order. Packing is designed to protect goods during shipping, especially products that are sensitive to shocks or temperatures. After all preparations are complete, shipping is carried out according to the planned schedule. A tracking system is used to monitor the shipping status in real-time so that customers can know the position of their goods. Shipping documentation is also managed neatly to facilitate the handover of goods, including shipping notes and proof of receipt of goods.

Then the last is the return stage when the customer receives goods that are damaged, do not match the order, or have passed the expiration date. Returned goods are managed in accordance with applicable regulations, especially in terms of pharmaceutical waste management. For example, goods that are not suitable for consumption will be processed or destroyed in an environmentally friendly manner and in accordance with the rules. All return processes are supported by complete documentation, such as return notes and damage reports, to ensure transparency and facilitate process evaluation. Information from this return is also used to improve operational systems and reduce similar incidents in the future. After identifying risk events, the identification of risk agents can be determined afterward which are the sources or triggers of the risk events. Risk agents not only cause the emergence of one risk event but can also cause several other risk events to emerge. Likewise, one risk event can be caused by several related risk agents. From the identification results, there are 13 risk agents that are related to each other with the 44 risk events that have been previously identified.

The first stage of the HOR method is used to obtain the ARP (Aggregate Risk Priority) value of each risk agent. This value functions to determine the priority of handling the most urgent risk agent. Before the ARP value can be calculated, it is necessary to weigh or assess each risk event and risk agent. The ARP value is calculated by multiplying the severity level of the risk event by the occurrence (frequency of occurrence) of the risk agent. Given that one risk event can be influenced by several risk agents, and one risk agent can trigger several risk events, weighting is also needed to assess the extent of the correlation between risk events and risk agents. Discussions and interviews were conducted to conduct the assessment/weighting. Respondents were staff who had held top-level management and middle-level management positions and had more than 10 years of experience working at PT X (Table 5). The weighting results obtained through interviews and discussions, as presented in Table 6, were processed and calculated in the HOR matrix stage 1 to determine the ARP (Aggregate Risk Priority) value of each risk agent. The calculated ARP values were then sorted from highest to lowest, with the results presented in Table. After that, the ARP values were accumulated in percentage form for further analysis. This step aims to present risk agents based on ARP values in the form of a Pareto diagram. The use of the Pareto diagram aims to facilitate decision-making regarding which risk agents need to be anticipated as a priority. This is done by considering limited resources but still producing effective efforts to reduce potential risks during the project. The Pareto diagram, named after Italian economist Vilfredo Pareto, demonstrates the principle that most of the impact of a problem can be addressed with a small amount of effort. This statistic is commonly known as the 80-20 principle, where 20% of the effort usually produces 80% of the results (although this percentage is not always exact). The resulting plot of the ARP values and the cumulative impact of each risk agent can be found in Table 2. The Pareto diagram generated from the plot shows that several risk agents have a significant contribution to the total risk potential (shown as a cumulative percentage). The selection of the number of risk agents to be addressed needs to be done objectively, so further discussion is needed.

Table 6. Correlation Value of Risk Event and Risk Agent

CODE	RISK EVENT	CODE	RISK AGENT	Rj
E01	Error in demand forecasting	A01	Uncertainty/changes in forecasting	3
E01	Error in demand forecasting	A03	Lack of monitoring on BPOM regulation updates	3
E02	Potential delay in supplier delivery	A02	Lack of diversification in supplier base	3
E03	Overbudget in distribution project	A01	Uncertainty/changes in forecasting	3
E04	Drug stock not aligned with market demand	A01	Uncertainty/changes in forecasting	9

E05	Inability to provide product on time	A02	Lack of diversification in supplier base	3
E06	Potential non-compliance with regulations	A03	Lack of monitoring on BPOM regulation updates	3
E07	Stockout	A01	Uncertainty/changes in forecasting	9
E08	Overstock	A01	Uncertainty/changes in forecasting	9
E09	Sudden change in procurement planning	A04	Sudden customer demand	9
E10	Potential product damage	A05	Improper storage according to SOP	9
E11	Potential product expiration	A01	Uncertainty/changes in forecasting	3
E11	Potential product expiration	A05	Improper storage according to SOP	3
E12	Stock mismatch with inventory system	A06	Human error	3
E13	Non-compliance with storage regulations	A03	Lack of monitoring on BPOM regulation updates	9
E14	Delay in product delivery from supplier	A07	Poor supplier delivery monitoring	9
E15	Procurement of low-quality products	A02	Lack of diversification in supplier base	1
E15	Procurement of low-quality products	A08	Market price fluctuations	3
E16	Purchase price exceeds budget	A08	Market price fluctuations	9
E17	Non-compliance with procurement regulations	A03	Lack of monitoring on BPOM regulation updates	9
E18	Error in product ordering	A06	Human error	9
E19	Disruption in supplier relationship	A09	Problematic negotiation or ethical issues	9
E20	Procurement of counterfeit products	A02	Lack of diversification in supplier base	1
E21	Procurement with unfavorable payment terms	A08	Market price fluctuations	1
E21	Procurement with unfavorable payment terms	A09	Problematic negotiation or ethical issues	3
E22	Poor supplier performance	A02	Lack of diversification in supplier base	1
E23	Supplier bankruptcy/withdrawal	A02	Lack of diversification in supplier base	1
E24	Communication gap with supplier	A09	Problematic negotiation or ethical issues	9
E25	Dependence on a single supplier	A02	Lack of diversification in supplier base	3
E25	Dependence on a single supplier	A10	Lack of supplier performance control	1
E26	Inconsistent product quality	A10	Lack of supplier performance control	3
E27	Defective product passes inspection	A11	Lack of packaging inspection control	3
E28	Damaged box/packaging	A11	Lack of packaging inspection control	9
E29	Incomplete or inaccurate delivery documents	A06	Human error	3
E30	Goods not ready on delivery schedule	A12	Poor customer delivery management, control & planning	3
E31	Delay in shipment readiness	A12	Poor customer delivery management, control & planning	3
E32	Delay in delivery to customer	A12	Poor customer delivery management, control & planning	9
E33	Product does not match order	A12	Poor customer delivery management, control & planning	3
E34	Product damage during shipment	A12	Poor customer delivery management, control & planning	1
E35	Non-compliance with delivery regulations	A03	Lack of monitoring on BPOM regulation updates	3
E36	Delay in return process	A13	Poor receiving control & management	3
E37	Error in return documentation	A13	Poor receiving control & management	9
E38	Returned goods in damaged condition	A13	Poor receiving control & management	3
E39	Return rejection by supplier or customer	A13	Poor receiving control & management	1
E40	Excess stock from returned goods	A13	Poor receiving control & management	3
E41	Non-compliance with drug return regulations	A03	Lack of monitoring on BPOM regulation updates	3
E42	Incomplete return documents	A13	Poor receiving control & management	3
E43	Delay in return approval process	A13	Poor receiving control & management	3
E44	Mismatch between returned goods and documents	A13	Poor receiving control & management	9

This second discussion involved the same staff as the previous discussion to ensure consistency of perspective and consider the preventive measures to be taken. The selected risk agents will later be used in the calculation of HOR stage 2, with the determination of preventive actions first to reduce the possibility of the risk agent as the cause of the risk event. The list of seven selected risk agents can be seen in Table. In this second discussion, the main focus is to identify preventive actions for the seven

risk agents that have been selected to be handled. Before identifying preventive actions, a more detailed explanation is given regarding each risk agent to ensure that the identification process can be carried out in a focused and effective manner. Risk Agent A03, namely the lack of monitoring of BPOM regulatory updates, can cause serious problems such as product recalls, loss of licenses, suspensions, and even company closures due to minimal resources or systems that are not updated regularly to detect regulatory changes. Risk Agent A01, related to the ambiguity or changes in forecasting, can cause overstock or stockouts that affect product availability, especially due to sudden changes in forecasting data or assumptions. Risk Agent A12, which relates to poor management, control, and planning of customer deliveries, can result in late deliveries, customer dissatisfaction, or SLA violations due to a lack of coordination or adequate logistics management tools. Furthermore, Risk Agent A09, namely problematic negotiations or ethical issues, can affect business relationships and lead to additional costs or mistrust due to lack of transparency or ethical violations.

Risk Agent A11, related to lack of packaging inspection control, can result in products being shipped that do not meet quality standards or are damaged during delivery, potentially increasing customer complaints, product returns, and bad reputation. Risk Agent A06, namely human error, often occurs due to incorrect recording, mis shipment, or mishandling of products caused by inadequate training or high workloads, resulting in inefficiencies and the potential for significant losses. Finally, Risk Agent A02, which relates to the lack of diversification in the supplier base, increases dependence on certain suppliers and increases the risk of supply disruptions if problems occur at key suppliers, such as delays, product nonconformities, or other operational obstacles. Based on the discussion of these seven risk agents, a re-correlation was carried out between these risk agents and nine preventive actions by considering the level of difficulty of their implementation. The correlation results are presented in Table, followed by Pareto selection, which resulted in five preventive actions that can be implemented as shown in Table. The process of determining these preventive actions is explained in more detail in the next subsection.

The Pareto diagram produces five main preventive actions as mitigation strategies to minimize the main causes of risk in the company. These steps are expected to help the company manage risk while increasing the productivity of available resources. The following are action plans designed to maximize company activities as part of the managerial implications that serve as a guide in decision making and management actions. First, the formation of a special team for monitoring and updating is a strategic step in managing risk in the Pharmaceutical Wholesaler (PBF) company. This team is responsible for monitoring and updating BPOM regulations periodically, ensuring that all documents and operational procedures are in accordance with regulatory changes, and increasing forecasting accuracy with a data-based approach. In addition, this team will integrate technology such as ERP or SCM software to improve control in shipping, with the aim of reducing discrepancies in management and planning of shipping goods. This team will also be equipped with cross-functional members who have expertise in pharmaceutical regulations, data analysis, and supply chain management, and supported by clear SOPs and periodic monitoring systems [12], [13].

Second, the development of a work system based on SOPs (Standard Operating Procedures) is carried out to improve operational efficiency and consistency. This SOP covers various aspects, such as goods delivery management, packaging inspection control, and reducing human error through systematic step-by-step guidance. In developing the SOP, the company will involve a cross-functional team to ensure its relevance and applicability, provide training to staff, and monitor its implementation periodically through internal audits. Technology integration is also used to facilitate the implementation of SOPs and improve staff compliance with procedures.

Third, a supplier diversification strategy is developed to reduce dependence on one supplier and improve supply chain reliability. The company will identify and collaborate with alternative suppliers, negotiate flexible contracts, and ensure delivery stability even if there is a problem with one of the suppliers. This diversification is carried out by adding suppliers from different regions or locations, conducting regular performance evaluations, and using supply chain management software to monitor and manage relationships with suppliers. Fourth, the company provides regular training programs for employees to improve technical skills, understanding of SOPs, and awareness of the importance of quality and compliance with regulations. This training includes materials on BPOM regulations,

business ethics, packaging inspection control, and human error reduction techniques. The training is carried out periodically by involving internal and external experts, accompanied by evaluations to ensure employee understanding and application of training results in daily activities.

Fifth, the company will conduct regular audits or evaluations to review the effectiveness of operational processes, such as quality inspections, shipping management, and regulatory compliance. This audit aims to proactively identify potential risks, ensure compliance with BPOM regulations, and provide insights for continuous improvement. Audits will be conducted on a scheduled basis, involving internal and third-party teams, with detailed checklists covering various critical areas. The audit results are used to update operational procedures, improve work efficiency, and maintain accountability across all process lines. Through the implementation of these five preventive actions, the company is expected to be able to manage risks more effectively, improve operational efficiency, and maintain the sustainability of its business.

4. Conclusion

The conclusion of the research conducted at PT X, as a Pharmaceutical Wholesaler (PBF) company that focuses on the pharmaceutical supply chain and its distribution, includes three main points. First, the identification of risk events in the procurement of goods and materials business process using the SCOR method resulted in 44 risk events located in the Procurement and Warehouse-Logistics Department. Second, the analysis of risk triggers (risk agents) through discussions and interviews resulted in 13 risk agents, where 7 main risk agents were prioritized for mitigation based on the Pareto diagram, namely lack of BPOM regulatory monitoring, unclear forecasting, ineffective control in shipping to customers, negotiation or ethical issues, lack of packaging inspection, human error, and lack of supplier base diversification. Third, the second stage of the HOR analysis resulted in 5 priority preventive actions, namely forming a special team for regulatory monitoring, developing a clear SOP-based work system, developing a supplier diversification strategy, providing routine training, and conducting periodic audits or evaluations, all of which aim to minimize the potential for risk agents to emerge effectively.

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