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Analysis Risk Mitigation of Delay in Delivery Using House of Risk Method(Case: Air Cargo Transportation)

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ABSTRACT: Logistics Service Provider Companies are responsible for ensuring the delivery of goods using land modes, sea modes and air modes on time. However, in reality there are many problems and obstacles faced in order to guarantee one of these important key performance indicators. This research uses the house of risk method to identify the causes of the risk of delays and design mitigation strategies that can be done to overcome this problem by conducting interviews and filling out house of risk questionnaires with respondents who understand the problem. In this research, 13 risk events and 19 risk agents were found, and 9 priority risk agents were foundto cause the problem. After that, activities were carried out to design mitigation strategies that could be carried out and 8 preventive actions were identified and the sequence that must be carried out to overcome the risk of delays.

KEYWORDS: Delayed, Risk, Air Cargo, House of Risk, Mitigation Strategy

1. INTRODUCTION

Every business activity in the field of logistics services certainly has risks that can occur, such as delays in deliveryof good, loss of goods in the transit process, damage to goods when they reach consumers, and target errors in delivery (Chopra & Meindl, 2010). [1]

Delay is defined as the time difference between the scheduled departure or arrival time and the actual departure or arrival time. Delay is a situation where part of the implementation time cannot be used according to plan, so that it can result in several other activities being delayed or even unable to be completed according to the previously planned time (Evrianto, 2005). [2]

Risk is a threat that will definitely occur to speed up the smooth running of a company's activities or stop something that has been done (Alijoyo, 2021). [3]

The risk that occurs is a factor that must be minimized because it can threaten smooth operations and cause unnecessary losses in the business process of goods delivery activities carried out by the company. One of the important points that needs to be considered in the goods delivery business process in the field of logistics servicesis the supply chain management (SCM) aspect of the company.

Supply chain management (SCM)/supply chain management is an integrated and synergistic method, tool or approach based on collaboration and coordination to be able to manage existing networks in companies (suppliers, factories, distributors, shops or retailers), as well as supporting companies such as logistics services) which jointlywork together to create and distribute products well into the hands of consumers (Pujawan & Mahendrawati, 2017). [4]

Supply Chain Management is a cross-functional enterprise system, which utilizes information technology to support and manage various relationships between several key business processes within the company and with suppliers, customers and business partners (O'Brien et al., 2008). [5]

One of the companies operating in the field of logistics services is company X, where every day they are requiredto carry out goods delivery activities quickly and precisely. Goods are sent via land, sea and air based on requestsfrom regular customers who have collaborated and from other customers who use the company's services. One ofthe regular customers who has worked with this company is a large telecommunications company in Indonesia.

In the activity of delivering goods belonging to regular customers, the target is that the goods sent can arrive at their destination with a delivery time limit of two days for delivery to several cities in Indonesia, therefore the delivery is sent by air. Cargo is goods transported

by airplane. (not the same as baggage) and is subject to paymentof shipping costs determined by the carrier, which are recorded in the AWB (Rizaldy & Rifni, 2013) [6]. Currently, delays in delivering goods using air cargo are 3% and generally occur for deliveries to the Sorong area of West Papua.

The aim of this research is to determine risk events and risk agents as causes of delivery delays by using the houseof risk technique. In addition, mitigation strategies are designed to identify preventive actions and the sequence of actions that must be taken to overcome the risk of delays (Purnomo et al., 2021). [7]

From this data the author took samples of activities that had been running to review them in terms of the risk of delays and the timeliness of these activities. The activity that will be used as the object is "Delivery of goods usingair cargo to Sorong, West Papua". Based on research "House of risk: a model for proactive supply chain risk management" (Pujawan & Geraldin, 2009). [8]

2. LITERATURE REVIEW

Supply Chain management

Supply chain management is a method, tool or approach that is integrated and synergized with each other on the basis of collaboration and coordination to be able to manage the existing network in a company (suppliers, factories, distributors, shops or retailers, as well as supporting service companies such as services logistics) who collaborate together to create and distribute products to consumers well (Pujawan & Mahendrawati, 2017).[4]

The aim of conducting supply chain management is to manage the flow of materials along the supply chain to meet customer needs and provide minimum product costs. Additionally, the goal of supply chain management isto ensure that a product is at the right place and time to meet customer needs. thereby minimizing overall costs (Rizqiah, 2017). [9]

Logistic

Logistics is the part of the supply chain management process that plans, realizes and controls the efficiency and effectiveness of the flow and storage of goods, services and information between each point of consumption to meet customer needs. (Hayati, 2014) [10]

One example of an activity related to logistics is the delivery of goods. Delivery of goods is an effort made to convey goods from one part to another which can make things easier for consumers. In fact, we often encounter indirect deliveries in everyday life, due to the fact that most manufacturers themselves are unable to handle delivery problems without help from delivery service providers.

To overcome this problem, producers certainly need qualified business partners to handle delivery distributionwell so that the products and services provided can be quickly enjoyed by consumers (Dewi et. al., 2020). [11]

Risk Management

Risk is a number of factors that can influence the achievement of a goal, resulting in undesirable consequences. Risk is also a consequence of achieving a goal (Alijoyo, 2021). [3]

Risk is also described as a form of change in circumstances or consequences such as pure risk, control risk, and opportunity risk. The definition of risk management is a science that studies how an organization can systematically implement steps in mapping various existing problems by providing various management approaches (Fahmi, 2010). [12]

In other words, risk management can be interpreted as a logical and systematic process of identifying, analyzing,evaluating, monitoring and communicating risks that may occur related to all activities that can occur in a company.

This is done to minimize the possibility of losses that may occur. happen. happens in a company. The purpose ofrisk management is as a tool to determine the feasibility of an activity in a company that meets standards in the management organizational structure, level of technology used, human resource capabilities, company financial condition, production process, and risk level. marketing in business (Park, 2010).[13]

The SCOR model can provide guidance in supply chain risk management, through the following stages:

1. Risk Identification, the risk identification stage includes identifying various types of risks, such as: supply risk, operational risk, demand risk, security risk, regulatory risk, environmental risk, and others. Methods thatcan be used to identify risks include observing historical trends, researching industry trends, expert opinions, supply chain mapping, assessment surveys, and information audits.
2. Risk Assessment, the risk assessment stage includes activities to assess and evaluate risks, select risk management strategies, and establish risk plans. The goal of this activity is to provide management with an understanding of where the greatest risks may occur.

3. Risk Mitigation: The risk mitigation stage includes risk control and monitoring activities, as well as taking mitigation steps, reducing the impact of the risk and reducing the possibility of the risk occurring.

A risk can be mitigated by reducing the impact/minimizing the possibility of the risk occurring. For risks that havea large impact, the risk mitigation plan must be evaluated first, with more thorough preparation (Zaroni, 2017). [14]

House of Risk

House of Risk is an innovative research model that functions to identify and measure potential risks in a supply chain. The House of Risk method modifies the Failure Mode and Effects Analysis (FMEA) model and adapts it to the House of Quality (HOQ) model to be able to prioritize which risk agents should be prioritized for treatmentfirst and choose what actions are most effective in mitigating potential risks. generated in a supply chain activity.(Pujawan & Geraldin, 2009). [8]

The House of Quality (HOQ) method was adapted to find out and determine which risk agents will be prioritizedso that appropriate prevention or mitigation measures can be given. Each known risk agent will be given a rankingaccording to its Aggregate Risk Potential (ARPj) calculation value.

The House of Risk method itself is divided into two stages, namely House of Risk (HOR) stage 1 and House of Risk stage 2. House of Risk stage 1 is used to identify risks with the help of the SCOR analysis tool so that priorityrisk agents can be found for subsequent preventative action. Meanwhile, House of Risk stage 2 is used to prioritizemitigation actions that are considered most effective but still take into consideration reasonable costs and resources (Pujawan & Geraldin, 2009).[8]

House of Risk 1

In the House of Risk method stage 1, a risk identification activity is carried out related to determining priority riskagents who will then be given appropriate prevention/mitigation actions. Several stages that must be carried out in House of Risk stage 1:

Table 1: Matrix HOR 1

Business processes	Risk event (E_i)	Risk agents (A_j) A_1	A_2	A_3	A_4	A_5	A_6	A_7	Severity of risk event i (S_i)
Plan	E_1	R_{11}	R_{12}	R_{13}					S_1
	E_2	R_{21}	R_{22}						S_2
Source	E_3	R_{31}							S_3
	E_4	R_{41}							S_4
Make	E_5								S_5
	E_6								S_6
Deliver	E_7								S_7
	E_8								S_8
Return	E_9								S_9
Occurrence of agent j		O_1	O_2	O_3	O_4	O_5	O_6	O_7	
Aggregate risk potential j		ARP_1	ARP_2	ARP_3	ARP_4	ARP_5	ARP_6	ARP_7	
Priority rank of agent j									

1. The supply chain activity mapping process uses the Supply Chain Operations Reference (SCOR) method which aims to map the activities that occur in a supply chain so as to make it easier to straighten out each business process in the supply chain, which can be seen in Table 1 in the Business process mapping section.are: plan, source, make, deliver, and return.
2. Identify risk events that occur in business processes in a supply chain. In Table 1 risk events can be seen onthe left side of the table and are denoted by Logo (Ei).
3. Assess the impact (severity) of the risk event. In Table 1 the severity can be seen on the right side of the table and is denoted by the Logo (Si). The severity assessment scale can be measured on a scale of 1-10.
4. Identify risk agents that occur in business processes in a supply chain. In Table 1 risk agents can be seen atthe top of the table and are denoted by Logo (Aj).
5. Conduct an assessment of the probability (occurrence) that occurs with the risk agent. In Table 1 the occurrence can be seen at the bottom of the table and is denoted by the Logo (Oj). The occurrence assessmentscale can be measured using a scale 1-10.
6. Assess the correlation or relationship between the risk agent (Aj) and the risk event (Ei). In Table 1, the correlation assessment can be seen on the left side of the table and is denoted by the logo (R1). The correlation value is determined using a Correlation assessment scale of 0,1,3,9.
7. Calculating Aggregate Risk Potential (ARPj). Aggregate Risk Potential is a calculation of the potential risks that are likely to occur in an event. Aggregate Risk Potential (ARPj) is obtained by calculating the severity value (Si) and occurrence value (Oj) resulting from the risk agent (Aj) with the risk event (Ei). The calculation formula (ARPj) is:

$$ARP_j = O_j \sum S_i \, R_{ij}$$

8. After obtaining the Value (ARPj), action is taken to assign risk agent levels according to the calculationresults from highest to lowest.

House of Risk 2

In the House of Risk method stage 2, after obtaining a priority risk agent, activities are carried out to determine what preventive actions or mitigation strategies are appropriate for each risk and look for priority mitigation actions that must be taken. In this case, consideration is also needed regarding aspects of the differences in effectiveness of each mitigation action activity, the resources involved, the actions, and the levelof difficulty in implementing the recommended risk mitigation. The act of selecting a good risk mitigation strategy, and in accordance with the company's capabilities, will make it easier for the company to reduce thepossibility of a risk occurring effectively. Several stages that must be carried out in House of Risk stage 2 are:

Table 2: Matrix HOR 2

To be treated risk agent (A_j)	Preventive action (PA_k)					Aggregate risk potentials (ARP_j)
	PA_1	PA_2	PA_3	PA_4	PA_5	
A_1	E_{11}					ARP1
A_2						ARP2
A_3						ARP3
A_4						ARP4
Total effectiveness of action k	TE_1	TE_2	TE_3	TE_4	TE_5	
Degree of difficulty performing action k	D_1	D_2	D_3	D_4	D_5	
Effectiveness to difficulty ratio	ETD_1	ETD_2	ETD_3	ETD_4	ETD_5	
Rank of priority	R_1	R_2	R_3	R_4	R_5	

1. After assigning levels and carrying out a Pareto analysis related to levels in House of Risk stage 1, the priority ranking of risk agents is obtained according to their respective ARPj values. In Figure 2.6 the risk agents who have been given a ranking can be seen on the left side of the table and are denoted by Logo (Aj).
2. Identify actions or preventive actions that are considered the best and most appropriate to prevent risk agentsthat have been previously ranked. In Figure 2.6, preventive actions can be seen at the top of the table and are denoted by the Logo. (PAk).
3. Assess the correlation or relationship between each preventive action (PAk) and each risk agent (Aj). This relationship is determined using the same correlation scale as in the House of Risk Model stage 1, namely with a measurement scale of 0, 1, 3, 9. In Figure 2.6, the level of action effectiveness can be seen in the middle of the table and is denoted by the Logo (Ejk)
4. Calculate the Total Effectiveness (TEk) value Total Effectiveness Value is an assessment related to the magnitude of the influence of preventive action with the value of existing potential risks. Total Effectiveness Value. The formula for calculating Total Effectiveness (TEk) is: $TE_k = \sum ARP_j \, E_{jk}$
5. Carry out an assessment regarding the level of difficulty in implementing preventive/mitigation measures (Dk). In Figure 2.6, the level of difficulty in implementing preventive/mitigation measures can be seen at the bottom of the table and is denoted by the logo (Dk), the assessment scale for the level of difficulty in implementing the implementation of prevention/mitigation measures can be measured on a scale 3, 4, 5.
6. Calculate the Effectiveness to Difficulty ratio (ETD) value. The formula for calculating the Effectiveness toDifficulty ratio (ETD) value is: $ETD_k = \frac{TE_k}{D_k}$
7. After obtaining the effectiveness to difficulty ratio (ETDk) calculation, a ranking (Rk) is determined. The ranking will be sorted starting from the highest effectiveness to difficulty ratio (ETDk) value to the lowest effectiveness to difficulty ratio (ETDk) value.

Pareto Diagram

The Pareto diagram is a diagram developed by an Italian economist named Vilfredo Pareto in the 19th century. According to (Heizer & Render, 2014) [15], the Pareto diagram is a method used to manage errors, problems or defects with the aim of helping focus attention on problem solving efforts.

On the Pareto diagram, a chart is depicted that classifies the various categories that occur which are arranged according to their ranking from the largest to the smallest from left to right. The Pareto diagram will make it easierto find the most important problems to

overcome.

In the research "House of risk: a model for proactive supply chain risk management" (Pujawan & Geraldin, 2009),[8], it is suggested that the risk evaluation stage be assisted by using the help of Pareto diagram analysis with the 80:20 concepts, where by prioritizing 80% of risks by The highest ARP value is expected to solve the entire problem.

Probability Impact Matrix

The probability impact matrix is a qualitative method that can be used as a benchmark for risk assessment. This assessment method provides support for further quantitative investigation. There are two risk components whichare variables in the Probability Impact Matrix, namely, impact (severity) and probability of occurrence (occurrence). (Dumbravă & Vladut-Severian, 2013). [16]

The final results of the questionnaire will be the basis for determining the average value of the severity and occurrence criteria that have been determined. The results of the questionnaire will be rounded up if there is a decimal value in accordance with the scale provisions of the Probability Impact Matrix (see Table 3):

Table 3: Probability Impact Matrix

Probability	Higher					
	High					
	Middle					
	Low					
	Lower					
		Lower	Low	Middle	High	Higher
		Impact				

Each level in the matrix has a different range for assessing probability and impact. The following is an example of the risk assessment levels shown in Table 4:

Table 4: Skala Probability Impact Matrix

Level	*Severity*	*Occurrence*
Lower	1 - 4	1 - 4
Low	5	5
Middle	6	6
High	7	7
Higher	8 - 10	8 - 10

RESEARCH METHODLOGY

When scholars need to investigate a complex phenomenon, a mixed-methods approach is often employed (Fetterset al., 2013 [17]; Johnson & Onwuegbuzie, 2004) [18], as it provides fundamental insights into a wide range of phenomena that cannot be fully understood with a single approach (Venkatesh et al., 2013). However, integratingqualitative and quantitative data in a meaningful way remains elusive and requires further refinement (Guettermanet al., 2015) [19] because each approach has unique features and ways to tackle different issues.

Mayring (2001) [20] distinguishes four different ways of combining qualitative and quantitative data. Qualitativedata is collected with the main purpose to prepare the following quantitative data collection. The purposes are first, to inform the design of a standardised questionnaire used in a representative survey and second, to inform the design of house of risk a delay delivery.

The type of research is by using a mixed method, namely by combining quantitative research and qualitative research, with the following pattern:

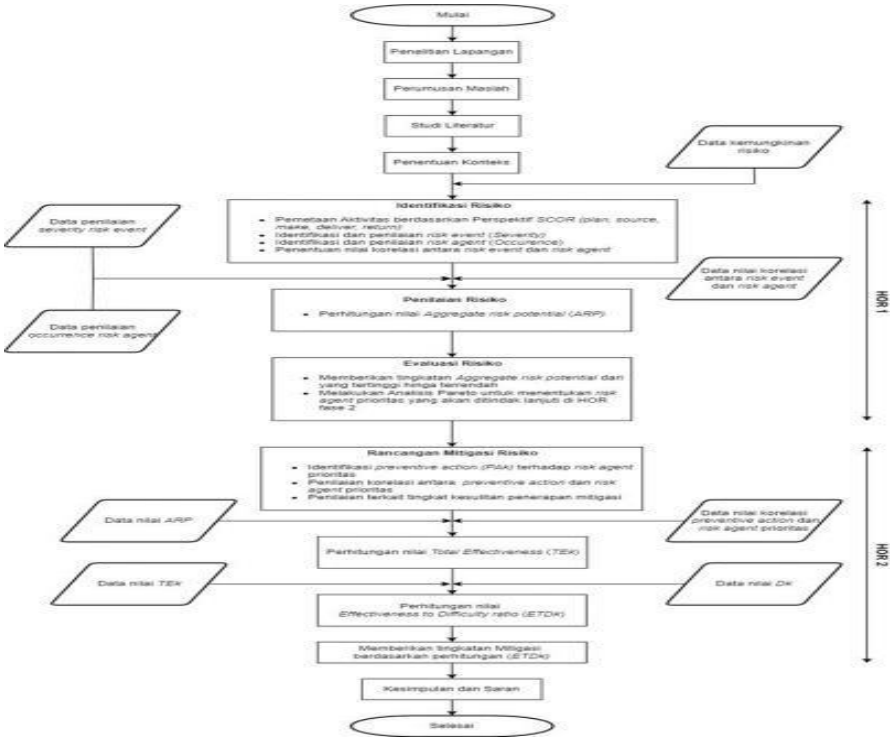
1. Quantitative methods play a role in obtaining quantitative data on variables that can be measured directly.
2. Qualitative methods play a role in deepening and complementing quantitative data through interviews.

Based on Figure 1 which is attached below, this research uses the House of Risk method stage 1 (Risk identification, Risk Analysis, Risk Evaluation) and House of Risk stage 2 (Determining risk mitigation strategies).

RESULT AND FINDING

Identification of risk event

In this study a risk event is defined as a risk event that may result in a delay in the process of sending goods usingair cargo to Sorong, West Papua in X company. The capture of risk events is carried out by conducting field observations, interviews and conducting assessments related to the severity/impact of the risk. the event using a questionnaire given to respondents. Based on the risk event identification process there are 13 risk events.



Picture 1. Research Design

Table *5*. Severity of the ris event

Business Process	Sub Process	Risk Event	Code	Severity
Plan	Pre Chart Title pickup do gin Warehouse	There was an error in making a travel document for picking up goods to the original warehouse	E1	6
	The arrival of the freight truck at the origin warehouse	The freight truck is late to the origin warehouse	E2	8
	Release of goods from the Origin Warehouse	The activity of loading goods at the Origin warehouse to the freight truck is not on schedule	E3	8
Source	Procurement of freelance workers for activities in the transit warehouse	Procurement of freelance daily workers is not as expected	E4	7
	Airline baggage slot reservation	Didn't get the fastest luggage slot for destination	E5	9
		Error in filling in the description of the goods sent at AWB	E6	10
Make	The process of loading and unloading of goods at the transit warehouse	The loading and unloading of goods at the transit warehouse exceeds the estimated time	E7	8
	Wrapping, Marking, Labeling Process in transit warehouse	The process of Wrapping, Marking, Labeling exceeds the estimated time	E8	7
Deliver	Delivery of goods from the transit warehouse to Soekarno Hatta airport	Fregiht Truck delays from the transit warehouse to the airport	E9	3
	Delivery of goods from Soekarno Hatta Airport to Sorong airport (SOQ)	Goods cannot be put in the baggage of the aircraft	E10	9
		The plane to the Sorong location in West Papua experienced a flight delay	E11	8
	Delivery of goods from Sorong Airport (SOQ) to the final warehouse	Delay in delivery of goods from the destination airport to the final warehouse	E12	6
Return	Return of receipt of goods from the final warehouse	Delay in sending proof of receipt of goods from the final warehouse	E13	3

Identification of risk agent

Risk agents are things or causes of risk events. In this study the risk agent is defined as a factor causing the occurrence of risk of risk events which can result in delays in the process of sending goods using air cargo to Sorong West Papua in X company. Arresting risk agents is carried out by conducting field observations, interviews and conducting assessments related to the level of occurrence/probability the occurrence of causal factors from the risk agent using a questionnaire given to the respondents.

Identification of correlation between risk agents and risk events.

The relationship between the risk agents and risk events were identified and a value of 0, 1, 3, or 9 was assigned in each combination. We obtain, for example, a value of 9 between A1 (There was a misunderstanding in preparing the document for picking up goods) and E1 (There was an error in making a travel document for picking up goodsto the original warehouse), indicating that the error in making a travel document for picking up goods to the original warehouse caused by misunderstanding in preparing the document for picking up goods. The relationshipsbetween each risk agent and each risk event are shown in HOR1 in Table 3.

Table 6. Occurrence of risk agent

Code	Risk Agent	Occurrence
A1	There was a misunderstanding in preparing the document for picking up goods	3
A2	The fleet available for pick-up activities is limited	2
A3	The pick-up schedule given by the original warehouse is not on schedule	5
A4	Difficulty in finding of daily workers	3
A5	The fastest airplane baggage slot for the Sorong area West Papua is full	7
A6	Inaccuracy in inputting AWB	2
A7	Limited loading and unloading equipment at the transit warehouse	3
A8	Too many items shipped	6
A9	Slow freelance daily workers in Wrapping, Marking, Labeling activities	3
A10	Transit warehouses are not enough to accommodate all goods	5
A11	Activities in the transit warehouse are not properly monitored	2
A12	Fleet available for shipping activities is limited	3
A13	Traffic congestion	2
A14	There was a queue of goods at the Regulated Agent Warehouse	7
A15	Aircraft baggage is offloaded so you have to wait for the next flight	6
A16	Aircraft delay caused by several factors	7
A17	late in providing information to the partner agent that the goods had arrived at Sorong airport	2
A18	The agent in Sorong was late delivering to the final warehouse	3
A19	The proof of receipt was lost by an agent in Sorong, West Papua	2

Aggregate Risk Potential

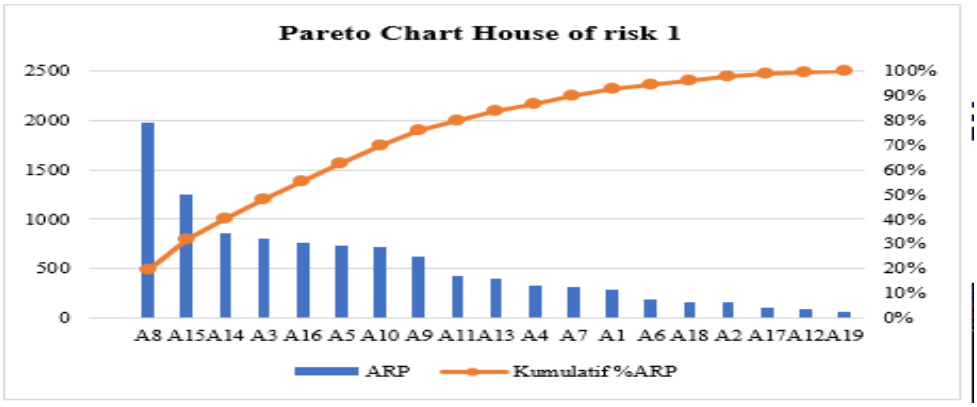
With the three inputs above, we can calculate the aggregate risk potentials of each risk agent. As an illustration, consider risk agent 1 (There was a misunderstanding in preparing the document for picking up goods). The likelihood of this agent occurring is 3 in the 1-10 scale. This risk agent has a high correlation (scored 9) with onerisk events, each with degree of severity of 6, a moderate correlation with two risk event with an associated severity of 8 and 6. Hence, the ARP of this risk agent is calculated as follows:

ARP1 = 6[(9x6) + (3x8) + (3x6)] = 288 As can be seen from Table 3, the calculated values range from 54 to 1980. The Pareto diagram of the aggregate risk potentials for all 19 risk agents is shown in Table 1. The results show that there is only one risk agent with anARP value of more than 1,500; one risk agents with an ARP value between 1,000 and 1,500; six risk agents withan ARP value between 500 and 1,000; and the rests (10) have an ARP value below 500. Further analysis shows that the nine risk agents contribute to 80 percent of the total ARP (Pettit et al., 2019).

Table 7. House of Risk phase 1

Code		Risk Agent																		
		Chart Title	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	Si
Risk Event	E1	9																			6
	E2	3	9	1					3					9							8
	E3		1	9		1			3					3							8
	E4				9				9	9		3									7
	E5			3		9			3	3		3		3							9
	E6						9														10
	E7			3	3	1		9	9	3	9	9		3							8
	E8			3	3	1		3	9	9	9	9		3							7
	E9							3		3	3	9	9	9							3
	E10			1					3						9	9					9
	E11														3	9	9				8
	E12	3							9	3					3	9	9	9	9		6
	E13																			9	3
	Oi	3	2	5	3	7	2	3	6	3	5	2	3	2	7	6	6	2	3	2	
	ARP	288	160	805	324	728	180	306	1980	612	720	420	81	390	861	1242	756	108	162	54	
	Rank	12	14	4	10	5	13	11	1	8	7	9	17	15	3	2	6	18	16	19	

Picture 2. Pareto Chart



Identification and prioritizing preventive/mitigation action

The above Pareto diagram indicates that the degree of importance of reducing the probability of occurrence of each risk agent differs widely. Naturally, a company should prioritize those with high-aggregate risk potentials. We picked the nine risk agents which contribute to about 80 percent of the total ARP. After getting the risk agentpriority, carry out the House of Risk analysis stage 2 which aims to determine the most effective risk mitigation strategy to minimize the possibility of the risk of delays in the delivery of goods using air cargo to Sorong West Papua at X company.

In phase 2 of the House of risk analysis, identification of preventive actions against priority risk agents is carriedout as well as an assessment regarding the level of difficulty in implementing preventive measures, an assessmentof the correlation between each preventive action and priority risk agents, Calculation of Total Effectiveness to assess how effective the adjustment strategy is implemented, and calculations The effectiveness of difficulties inobtaining a sequence of countermeasures strategies that can be carried out for the risk of overcoming delays in the delivery of goods using air cargo to Sorong, West Papua at X company.

Preventive action or mitigation strategy is an effort to overcome the problems that have occurred in this study interpreted as handling actions to address the priority of risk agents for delays in shipping goods using air cargo to Sorong West Papua at X company. Preventive actions are carried out by conducting interviews and conductingan assessment related to the level of difficulty in implementing these preventive actions according to the company's requirements using the questionnaire given to the respondents The difficulty of performing each actionis classified into three categories: low with a score of 3, medium with a score of 4, and high with a score of 5. Calculation of Total Effectiveness is carried out to obtain the effectiveness value of the identified preventive measures. This assessment is carried out based on the correlation value between each preventive action and the priority of the risk agent and the ARP priority value. Calculation of Total Effectiveness obtained in this study shows how influential preventive measures are on priority risk agents to overcome the problem of delays in the delivery of goods using air cargo to Sorong West Papua at X company.

Calculation of Effectiveness to Difficulty is carried out to determine the effectiveness and difficulty ratio in implementing each preventive action, this assessment is carried out based on the Total Effectiveness value and the difficulty level of each preventive

action. Calculation of Effectiveness for Difficulties obtained in this study shows a sequence of countermeasures strategies that can be carried out to overcome the risk of delays in shippinggoods using air cargo to Sorong West Papua at X company.

Table 8. Preventive action

Preventive action	Code
Improve communication with the origin warehouse so that goods can be issued immediately	PA1
Increase the number of trained freelance workers	PA2
Provide rewards to employees who fully contribute to delivery	PA3
Conduct briefing before carrying out activities in the transit warehouse	PA4
Adding supporting facilities in the transit warehouse	PA5
Collaborate with other Regulated Agent for delivery to Sorong	PA6
Doing transit warehouse renovation	PA7
Using another airline for delivery to Sorong	PA8

Table 9. House of Risk phase 2

Code	*Preventive action*								ARP
	PA1	PA2	PA3	PA4	PA5	PA6	PA 7	PA8	
A8	3	9	9	9	9	9	9	9	1980
A15					1	3		1	1242
A14		1			1	9			861
A3	9			1	0				805
A16	1	3		1	1			9	756
A5								9	728
A10							9		720
A9		9	9	9	3		3	3	612
A11		3	9	9				3	420
Tek	13941	27717	27108	28669	22515	29295	26136	35514	
Dk	4	3	4	3	4	3	4	3	
ETDK	3485	9239	6777	9556	5629	9765	6534	11838	
Rank	8	4	5	3	7	2	6	1	

CONCLUSION

This study shows that supply chain strategic mapping of delays in the delivery of goods using air cargo based onthe House of Risk model has provided an overview of the business processes of suppliers, producers, logistics andconsumers. This study identified 13 risk events and 19 risk agents, 9 priority risk agent from risk events and risk agents. The implication of this research is in the form of recommendations for preventive/mitigation strategies that can be applied to the management of the air logistics industry in overcoming the problem of late delivery of goods using air cargo based on risk sources in each business process.

REFERENCE

1) Chopra, S., & Meindl, P. (2010). *Supply Chain Management Strategy, Planning, And Operation Fourth Edition* (Fourth Edi). Pearson.
2) Evrianto, W. I. (2005). *Manajemen Proyek Konstruksi Edisi Revisi* (Edisi Revi). Andi.
3) Alijoyo, F. A. (2021). *Risk Management Maturity Assessment based on ISO 31000 – A pathway toward the Organization's Resilience and Sustainability Post COVID-19: The Case Study of SOE Company in Indonesia*. 125–142. https://doi.org/10.33422/3rd.icmef.2021.02.134
4) Pujawan, I. N., & Mahendrawati. (2017). *Supply Chain Management Edisi 3* (Edisi 3). Andi.
5) O'Brien, W. J., Formoso, C. T., Ruben, V., & London, K. (2008). *Construction Supply Chain Management Handbook*. CRC Press. https://books.google.co.id/books?id=XFF75B-vzl4C
6) Rizaldy, W., & Rifni, M. (2013). *Manajemen Dasar Penanganan Kargo (Udara dari/ke Laut via Darat). In Media*
7) Bambang Herry Purnomo, Bertung Suryadharma, Ridha Ghaniy Al-hakim (2021). *Risk Mitigation Analysis in a SupplyChain of Coffee Using House of Risk Method.*

8) Pujawan, I. N., & Geraldin, L. H. (2009). House of risk: A model for proactive supply chain risk management. *BusinessProcess Management Journal*, *15*(6), 953–967. https://doi.org/10.1108/14637150911003801

9) E Rizqiah (2017). *Manajemen Risiko Supply Chain Supply Chain Risk Management Considerated To the Interests of Stakeholders in Sugar Industry*

10) Hayati, E. N. (2014). Supply Chain Management (SCM) Dan Logistic Management. *Jurnal Dinamika Teknik*, *8*(1), 25–34

11) Dewi, D. P., Harjoyo, H., & Salam, A. (2020). *Prosedur Administrasi Jasa Pengiriman Barang Di Pt Citra Van TitipanKilat Tangerang. Jurnal Sekretari Universitas Pamulang*, *7*(1), 1. https://doi.org/10.32493/skr.v7i1.4570

12) Fahmi, I. (2010). *Manajemen Kinerja*. Alfabeta.

13) Park, Y. H. (2010). A study of risk management and performance measures on new product development. *Asian Journalon Quality*, *11*(1), 39–48. https://doi.org/10.1108/15982681011051813

14) Zaroni. (2017). *Logistics & Supply Chain Konsep Dasar - Logistik Kontemporer - Praktik Terbaik* (P. M. PUBLISHING,Ed.).

15) Heizer, J., & Render, B. (2014). *Manajemen Operasi: Manajemen Keberlangsungan dan Rantai Pasokan* (Edisi 11).Pearson Education, Inc.

16) Dumbravă & Vladut-Severian, 2013. *Using Probability – Impact Matrix in Analysis and Risk Assessment Projects*.

17) Fetters et al., 2013. *Achieving Integration in Mixed Methods Designs—Principles and Practices*

18) RB Johnson, AJ Onwuegbuzie (2004). *Mixed methods research: A research paradigm whose time has come.*

19) T Guetterman (2015). *Descriptions of sampling practices within five approaches to qualitative research in education andthe health sciences*.

20) Philipp Mayring (2001). *Combination and Integration of Qualitative and Quantitative Analysis. Volume 2, No. 1, Art. 6*