**FINAL PROJECT – TI 141501**

# DEVELOPING IMPROVEMENT STRATEGY TO INCREASE LOGISTICS SERVICE QUALITY AND MITIGATE RISKS IN PT. TIGA PERMATA LOGISTIK AND PT. TIGA PERMATA EKSPRES

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**TUGAS AKHIR – TI 141501**

# PENGEMBANGAN STRATEGI PERBAIKAN UNTUK MENINGKATKAN *LOGISTICS SERVICE QUALITY* DAN MITIGASI RISIKO DI PT. TIGA PERMATA LOGISTIK DAN PT. TIGA PERMATA EKSPRES

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Surabaya 2016

# APPROVAL SHEET

## DEVELOPING IMPROVEMENT STRATEGY TO INCREASE LOGISTICS SERVICE QUALITY AND MITIGATE RISKS IN PT. TIGA PERMATA LOGISTIK AND PT. TIGA PERMATA EKSPRES

**FINAL PROJECT**

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**SURABAYA, JULY 2016**

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# Developing Improvement Strategy to Increase Logistics Service Quality and Mitigate Risks in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres


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## ABSTRACT


Recently, the growth of business value of 3PL in Indonesia increases from year to year. It can be seen from the growth of 15% of 3PL value business in 2014, which equals to US$ 170 billion from the previous year, 2013, which has reached US$ 150 billion or equals to IDR 1,772 trillion (Asosiasi Logistik Indonesia, 2014). As the business, trading, production are growing, the needs of 3PL are also increasing. 3PL industries are faced with the growing interest in their services, thus they have to deal with the increased competition as well. They compete to serve the best logistics service quality to attract and grab more customers. It has become a concern for 3PL or logistics service provider to improve the logistics service quality and to increase the competitiveness. Improving the logistics service quality does not only aim to get more profit, but also to engage more with the customers, to satisfy and to increase the loyalty of the customers. With this strategy, a 3PL company can be more sustain in the competition. Besides trying to increase the competitiveness by improving the logistics service quality, a 3PL company is required to run its business and provide a service in an efficient way.

This research aims to propose strategy in increasing the logistics service quality and mitigating the risks in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres. This research applies House of Risk (HOR) in evaluating the risks or problems occurred in logistics service quality and generating the strategy required to improve the logistics service quality that will be provided by PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.

The result of HOR I and the use of Pareto concepts shows that there are 12 critical risk agents and 3 critical indicator problems to be prioritized. Based on these critical risk agents and indicator problems, the improvement strategy is developed. The result of HOR II shows that there are 28 improvement strategies that can be implemented. These strategies used to increase Logistics Service Quality (LSQ) indicator and mitigate risks that potentially occur in this company.



**Keywords** : HOR, Logistics, Risk Management, Strategy, Third Party Logistics.

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# CHAPTER 1
# INTRODUCTION

This chapter consists of the background, problem formulation, objectives, benefits, limitation, assumptions, and writing schemes of the research.

## 1.1 Background

Third-party logistics (3PL) or the logistics service provider are now widely involved in an industrial area. Many businesses or industries use this beneficial logistic service since they do not need to make a large number of investment in term of transportation and warehouse. Recently, the growth of business value of 3PL in Indonesia increases from year to year. It can be seen from the growth of 15% of 3PL value business in 2014, which equals to US$ 170 billion from the previous year, 2013, which has reached US$ 150 billion or equals to IDR 1,772 trillion (Asosiasi Logistik Indonesia, 2014). Global Vice President of Frost & Sullivan Transportation & Logistics, Gopal R, predicted that Indonesia's logistics industry market to grow about 14-15 percent within the next 5 years (Business Review, 2015).

Globalization has caused rapid growth of logistics activities especially transportation due to expansion of globalization market and global advanced technology that covers supply chain and operation (Saatçioglu, et al., 2009). ASEAN Economic Community (AEC) started on December 31$^{st}$, 2015 has led to an increase of the export trade for many developing countries, one of them is Indonesia. In this globalization and AEC era, Indonesia becomes one of targeted countries to conduct a manufacturing due to several advantages. These advantages are relatively low operating cost (particularly labor and electricity) and also the large labor pool. This situation becomes a factor of the increase of demand and supply activities in Indonesia. Then it leads to the increasing logistics activities and the need of logistics and warehousing service (3PL) as well. It can be both a chance and a challenge for 3PL companies to expand their business and increase their capacity. The increasing logistics is represented in Logistic Performance Index

(LPI). Indonesia's LPI score has improved by 0.14 compare to 2012, and moved up on global rank from 59 to 53 (Kurniawan, 2015). Figure 1.1 below shows the LPI of six countries in ASEAN, in which Indonesia is on the 5th rank.

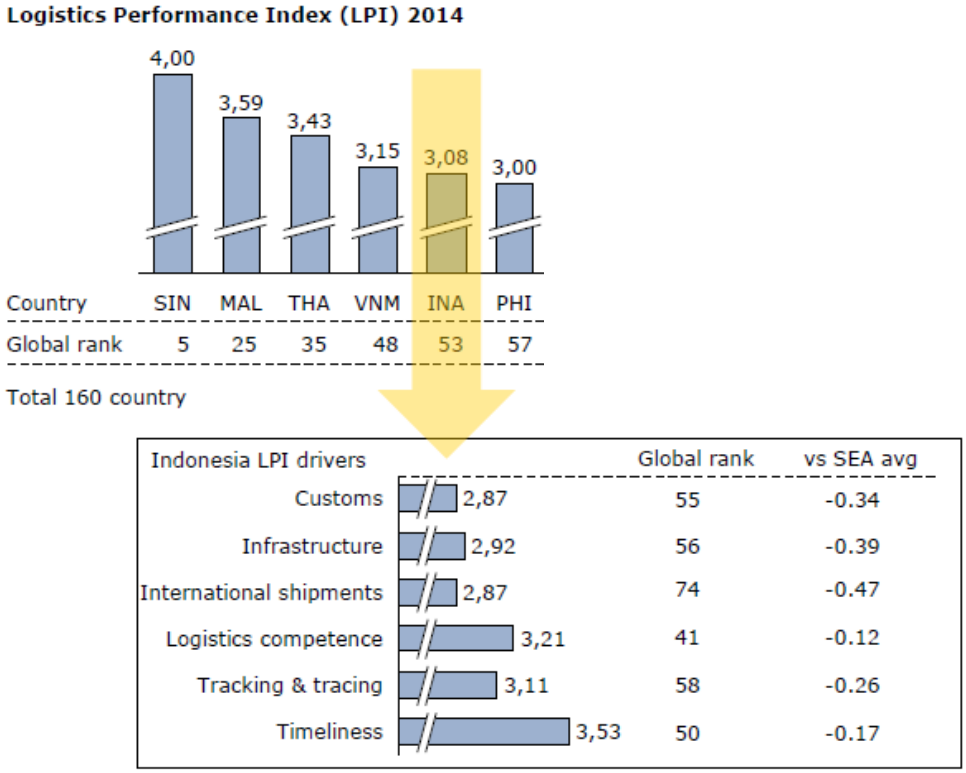


Figure 1.1 Logistics Performance Index (LPI) in 2014 (Source: http://lpi.worldbank.org/)

Logistics activities play a significant role in supporting business expansion. The effectiveness of logistics service has been a central and essential feature as it will determine the performance for the particular company. Without logistics, no materials move, no operations are done, no products are delivered, and no customers are served. Due to the increasing customer demand, every company always needs to evaluate and improve their logistic operations.

The increasing goods manufacturing process has led to the rapid growth of third party logistics (3PL) industry in Indonesia. In Surabaya, one of the major cities in Indonesia, there are many 3PL companies start to develop their business. These 3PL companies have some services offered, such as goods delivery (courier), cargo service, handling cargo service, freight forwarding, warehousing, etc. Based on the

study about market segmentation of third party logistics done by Sudrajat (2010), around 93% of manufacturing companies use sea freight service provided by 3PL company, 41% of them use air freight, and only 3% use trucking service from or to the port. In trucking service provided by 3PL company, 28% of customers use this service in transporting the materials from suppliers, while 77% of customers use it for distribution. Meanwhile in warehousing activity, there is only about 23% of companies hand it over to the 3PL company. Clearance service is used by around 82.14% of these companies, while the management of warehousing, labelling, repacking, tracing/tracing is the service that is not much used by the companies, 11% only.

As the business, trading, production are growing, the needs of 3PL are also increasing. 3PL industries are faced with the growing interest in their services, thus they have to deal with the increased competition as well. They compete to serve the best logistics service quality to attract and grab more customers. It has become a concern for 3PL or logistics service provider to improve the logistics service quality and to increase the competitiveness. Improving the logistics service quality does not only aim to get more profit, but also to engage more with the customers, to satisfy and to increase the loyalty of the customers. With this strategy, a 3PL company can be more sustain in the competition. Besides trying to increase the competitiveness by improving the logistics service quality, a 3PL company is required to run its business and provide a service in an efficient way. Thus, the logistic cost can be reduced and the customers of a 3PL company are expected to be able to increase the selling and distribution volume.

Quality is a key requirement in every field. In terms of industrial growth, quality plays an important role either in goods manufacturing or service company. Service quality is the difference between the customers' expectation about the service and service actually received by the customer (Parasuraman, et al., 1990). Service quality is affected by some factors which are called as service dimensions. These service dimensions must be considered in providing service, they are reliability, assurance, tangibles, empathy, and responsiveness. Third-party logistics as a service company also needs to improve its logistics service quality by considering the aforementioned dimensions of a service quality. In improving the

logistics service quality, the evaluation of performance must be first done as the initial step. This evaluation process involves the listing of problems occur and logistics service quality indicators followed by analysis of the causes affecting the problems. The problems occur are also seen as risks. Risks do not mean unpleasant things that may happen, but it refers broadly to situations where outcomes are uncertain or unexpected. After the causes are known, the strategy required in increasing the logistics service quality and mitigating the risks can be generated. This attempt of improving the logistics service quality in a 3PL company can be done by considering attributes that may affect the quality of a 3PL company. Based on the survey done by Sudrajat (2010), there are 75% of companies as respondents stated that the most important attribute in a 3PL company is price, while 40% of these companies stated that on-time delivery, reputation, and service quality become the important attributes following the price. Handling capacity, coverage area, safety, track record, the number of fleet owned, quality of human resource, and information technology are the next important attributes stated by 20% of respondents. Meanwhile, facility, financial condition, responsiveness, communication, networking, reliability, kinds of service offered, and assurance are the attributes that rarely stated by the respondents.

This research aims to evaluate the service provided by 3PL companies in Surabaya, named PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres. These both companies are run under the same group, which is Tiga Permata Group. PT. Tiga Permata Logistik concerns in warehousing service, while PT. Tiga Permata Ekspres concerns in expedition or distribution service. PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres have been established in 2009 and now they provide various service, which are land freight, sea freight, air freight, relocation, courier, and storage. This company's position in the logistics service provider is categorized in the middle, with the superior competitor such as DHL, while inferior competitor such as Lukman Logistik. There are some problems frequently occur, especially in expedition service, such as about the price and on-time delivery. Many of its customers still complain about the price offered by PT. Tiga Permata Ekspres, even though the price offered by this company has already in the middle level, compared to the competitor. The more critical problems is about on-time delivery. This

company has set that the on-time delivery must be 99% of all the shipments, while the fulfillment of this target is only around 74.86% of all shipments. There are still delivery process that require more than the lead time that has been set and offered by the company. It mostly occurs in LCL shipment (sea freight). In warehousing service, the problem is there are still many sudden inbound request from the customer frequently occur, thus the company is overwhelmed in providing and arranging the space in warehouse. Moreover, this research aims to propose strategy in increasing the logistics service quality and mitigating the risks in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres. This research applies House of Risk (HOR) in evaluating the risks or problems occurred in logistics service quality and generating the strategy required to improve the logistics service quality that will be provided by PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres. Cause-and-Effect Diagram is also utilized in analyzing the causes of the problems occurred in logistics service quality.

## 1.2 Problem Formulation

The problem formulated in this research is how to develop improvement strategy to mitigate risks and increase Logistics Service Quality (LSQ) in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres by using House of Risk (HOR).

## 1.3 Objectives

The objectives that will be achieved in this research are:

1. To develop Logistics Service Quality (LSQ) measurement in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.
2. To measure Logistics Service Quality (LSQ) in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.
3. To analyze critical risk agents that are required to be mitigated and critical indicator to be improved in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.
4. To develop improvement strategy for PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.

## 1.4 Benefits

The benefit that can be obtained through this research is that the logistics service provider/company will be able to improve the logistics service quality.

## 1.5 Limitations and Assumptions

Limitations and assumptions used in conducting this research are:

### 1.5.1 Limitations

Here are the limitations used in conducting this research.

1. The research uses the data on January – May 2016.
2. The research will focus on warehousing and expedition activities.
3. The research proposes improvement strategy, without controlling the implementation of it.

### 1.5.2 Assumptions

Here are the assumptions used in conducting this research.

1. Business activities in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres normally run during this research.
2. All the activities carried in warehousing and expedition are in accordance with the activities identified in this research.
3. The data used in this research represents the whole data in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.
4. The objects of this research, which are PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres represent other logistics provider companies which also can implement the strategy proposed by this research.

## 1.6 Writing Scheme

The writing scheme will provide the general overview of the structure used in this report. Here is the writing scheme of this research report.

CHAPTER 1: INTRODUCTION

In this introduction chapter, there are several information provided which are the background of this research, problem formulation, objectives that will be achieved in this research, benefits that can be obtained through this research, limitations and assumption used in this research, and also the writing scheme that will explain the general overview of this research.

CHAPTER 2: LITERATURE REVIEW

Literature review chapter consists of some theoretical basis to support the research, including the previous studies in related areas, definitions, methods, and others which are related to the problems discussed in this research.

CHAPTER 3: RESEARCH METHODOLOGY

Research methodology chapter consists of phases of the research. This chapter is written in systematical way based on the method used in this research.

CHAPTER 4: DATA COLLECTION AND PROCESSING

This chapter consists of the data that will be collected and processed based on the existing condition in the company which are including the company overview, development of logistics service quality measurement, measurement of logistics service quality indicator, identification of risks, development of mitigation, strategy formulation to improve logistics service quality, and selection of the alternative strategy.

CHAPTER 5: ANALYSIS OF DETAILED STRATEGY

This chapter consists of the result of strategies proposed to be implemented. The result of strategies will be analyzed to mitigate risks and increase the Logistics Service Quality in the company. The technical details in conducting the each alternative selected are analyzed as well.

CHAPTER 6: CONCLUSSIONS AND SUGGESTIONS

This chapter consists of the conclusion that will answer the objective of this research. Besides, there are also some suggestions provided for the company and further research studies.

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# CHAPTER 2
# LITERATURE REVIEW

This chapter consists of the theoretical basis used in this research including overview of logistics, third party logistics, Logistics Service Quality (LSQ), Risk Management, and the cause-and-effect diagram.

## 2.1 Logistics

Based on the Council of Logistics Management (CLM), a professional organization of logistics managers, educators, and practitioners formed in 1962, logistics is the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of conforming customer requirements. The mission of logistics is to get the right goods or services to the right place, at the right time, and in the desired condition, while making the greatest contribution to the firm.

According to (Ballou, 1999), logistics is a collection of functional activities that are repeated many times throughout the channel through which raw materials are converted into finished products and value is added in the eyes of consumers. Since raw material sources, plants, and selling points are not typically located at the same places and the channel represents a sequence of manufacturing steps, logistics activities recur many times before a product arrives in the marketplace.

Activities occur in an industry can be classified into two in term of their correlation with logistics, which are key activities and support activities. Key activities consist of customer service standard, transportation, inventory management, and information flows and order processing. Support activities consist of warehousing, material handling, purchasing, protective packaging, cooperation with production or operations, and information maintenance.

Logistics has become an increasingly important value-adding process for a number of reasons. These reasons are logistics has significant cost of the gross domestic product, supply and distribution lines are lengthening, logistics is

important to strategy, logistics adds significant customer value, customers increasingly want quick customized response, etc.

## 2.2 Third Party Logistics

Third party logistics or as known as 3PL, is an external organization that is utilized to handle the logistics activities in a cooperated companies. According to (Lieb, et al., 1993), 3PL refers to the use of subcontracted specialized logistics companies to perform logistics functions that can encompass the entire logistics process or selected activities within that process and that have traditionally been performed within an organization. According to (Hajar & Arifin, 2015), 3PL is also a company or a business that provides logistics distribution services according to the desired complexity of logistics distribution service. The responsibilities handled by a 3PL company are all activities related with inbound transportation from the customers, freight forwarding, warehousing, packaging, order fulfillment, distribution, and outbound transportation to the consumers, etc. According to the survey on 3PL users (Langley & Capgemini, 2015), the activities most frequently outsourced to 3PL service providers are outbound transportation and warehousing, followed by customs clearance/brokerage, inbound transportation, freight forwarding, freight bill auditing/payment, cross-docking/shipment consolidated, and order dispatch/distribution.

There are several advantages achieved by a company that engages with the service of 3PL service provider, such as greater flexibility in distributing goods, operational efficiency, improved customer service level, enhanced supply chain performance, and better focus on their core businesses. According to the third-party logistics study (Langley & Capgemini, 2015), there are some benefits from using 3PL services:

1. Logistics cost reduction : 9%
2. Inventory cost reduction : 5%
3. Logistics fixed-asset reduction : 15%
4. Order fill rate from : 60% to 66%
5. Order accuracy from : 61% to 66%

## 2.3 Logistics Service Quality

Logistic service quality is a value-added utilities of time, place, and form. It consists of three technical dimensions of physical distribution service quality, which are timeliness, availability, and condition (Bienstock, et al., 1997). According to Mentzer, et al., (2001), the research revealed that the delivery service quality consisted of "customer service quality" and "physical distribution service quality". They conceptualized Logistics Service Quality (LSQ) as a process in an effort to increase the understanding of how logistics service customers form their perceptions of LSQ and satisfaction with logistics services (SATIS). Their process model of LSQ consists of several customers' perceptions of logistics process quality, such as personnel contact quality, order release quantities, information quality, ordering procedures, and order discrepancy handling. These customers' perceptions both directly and directly affect the satisfactions with the logistics service. The indirect effects occur through customer perceptions logistics outcome quality that in this model consists of four dimensions, which are order accuracy, order condition, order timeliness, and order quality.

## 2.4 Risk Management

The term risk is used to describe any situation where there is uncertainty about what outcome will occur. In probability and statistics, financial management, and investment management, risk is often used in a more specific sense to indicate possible variability in outcomes around some expected value (Harrington & Niehaus, 1999). Risks do not mean unpleasant things that may happen, but it refers broadly to situations where outcomes are uncertain or unexpected. According to Australian New Zealand Standard (A/NZS) 4360:2004, risk can be defined as a chance of the occurrence of uncertain event that may affect the achievement of an objective. Risk will give effect objectively, measured in a function of consequence and likelihood. Consequence is an outcome of the occurrence of an event. Whereas likelihood is a qualitative explanation about probability and frequency (A/NZS, 2004).

In a company, risk can be classified into several types, which are:

1. Operational risk is a risk related to the company's organizational operations.
2. Financial risk is a risk that impacts on the company's financial performance.
3. Hazard risks is a physical accident risk, such as risk event as an effect of natural disasters, effects or damage on a company's property, and the threat of a devastation.
4. Strategic risk encompasses risk events related to the company's strategy, political economy, regulation and legislation, free market, company's reputation, leadership, and the shift of what customers want.

Risk Management is defined as culture, structure, and process directed to the achievement of potential chance by managing the harmful effect. The main element of risk management process is shown in Figure 2.1.

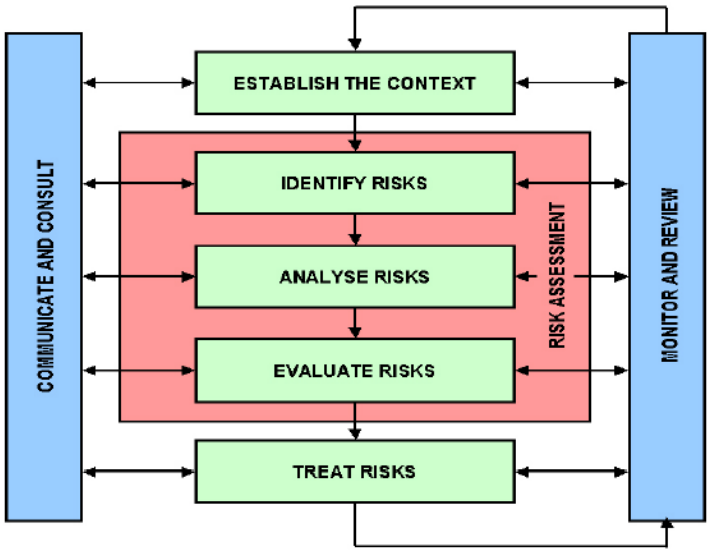



Figure 2.1 Risk Management Process-Overview (A/NZS, 20014) (Anityasari & Wessiani, 2011)

Figure 2.1 can be explained as follows.

- Communicate and consult

Communication and consultation are done by both internal and external stakeholders.

- Establish the context

In this step, the determination of organization's scope, organization's relation with its internal and external environment, organization's objective and strategy is done. The object scope of risk management, including target, objective, strategy, and organizations' activity indicator, is determined afterwards. Thus, the risks management process can run more focused and targeted.

- Identify the risks

In this step, the risks faced and how they occur will be identified. Tools used in identifying the risks are checklist, based on experience or existing documents, observation, and interview or direct interactions with the object which its risks will be identified.

- Analyze the risks

In this step, the consequence, possibility of occurrence, and risk rating are determined. The risks can be analyzed by estimating the possibility of occurrence and the consequence. When possibility (likelihood) and effect (consequence) have been identified, the evaluation will be then done by prioritizing the most significant risk to overcome earlier. The likelihood used is shown on Table 2.1.

Table 2.1 Likelihood Scale

| Likelihood | Possibility of Occurrence |
|---|---|
| Rare | Possibility of occurrence less than 5% |
| Unlikely | Possibility of occurrence 5% - 25% |
| Possible | Possibility of occurrence 25% - 50% |
| Likely | Possibility of occurrence 50% - 75% |
| Almost Certain | Possibility of occurrence more than 75% |

Source: Anityasari & Wessiani, 2011

The consequence used is shown on Table 2.2.

Table 2.2 Consequence Scale

| Consequence | Description |
|---|---|
| Insignificant | Low financial loss, no injuries |
| Minor | Medium financial loss, first aid treatment |
| Moderate | High financial loss, medical treatment required |
| Major | Major financial loss, loss of production capability, extensive injuries |

| Consequence | Description |
|---|---|
| Catastrophic | Huge financial loss, death |

Source: Anityasari & Wessiani, 2011

The risks rate used are extreme, high, moderate, or low. As for the risks rating and its response actions are shown in Table 2.3

Table 2.3 Risk Rating

| Risk Rating | Action Required |
|---|---|
| Extreme Risk | Immediate action required |
| High Risk | Senior management attention needed |
| Moderate Risk | Management responsibility must be specified |
| Low Risk | Management by routine procedure |

Source: Anityasari & Wessiani, 2011

Based on the risk rating value, it can be mapped on the risk map shown on Figure 2.2.

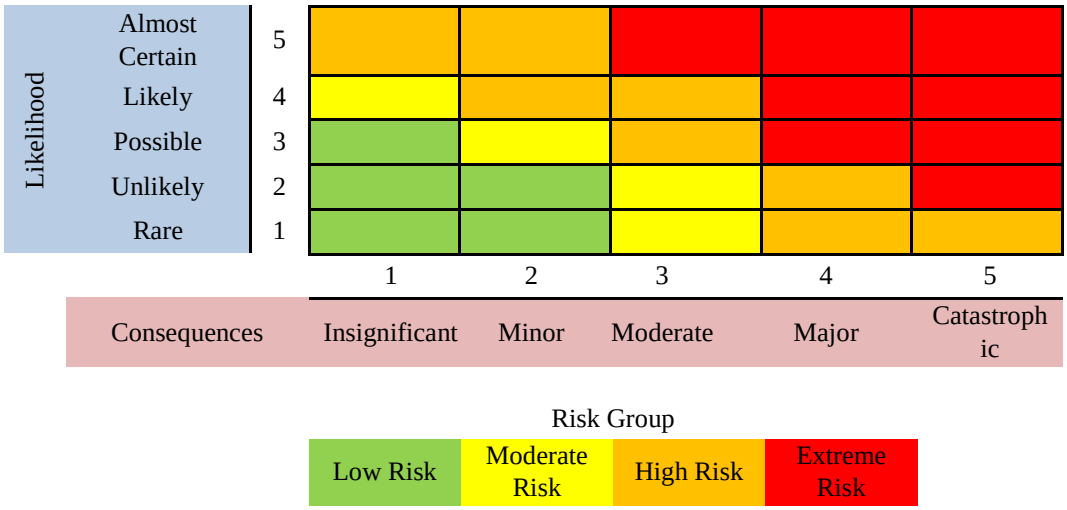



Figure 2.2 Risk Map (Anityasari & Wessiani, 2011)

The objective of risk analysis are to separate major risks with minor risks, to prepare data and further step, which are evaluation and mitigation.

- Evaluate risks

This step is done by comparing risk level with preliminary provisions criteria and considering the balance between potential advantage and harmful result. It

enables decisions will be made widely. The result of evaluation is in a form of priority level for further actions.

- Treat risks

The steps that will be done to overcome the identified risks will be done in this stage. There are several choices that can be done to control the risks based on Australia/New Zealand Standard (A/NZS) 4360:2004, which are:

- Avoiding risks
- Accepting risks
- Transferring risks
- Reducing the possibility of occurrence
- Reducing effects

- Monitor and review

This stage is required to monitor the effectiveness all steps in risk management process. It is important in continuous improvement. Risks and effectiveness of measurement are required to control in order to ensure the condition change without changing priority.

## 2.5 House of Risk (HOR)

The House of Risk (HOR) is a model or framework developed using Failure Mode and Effect Analysis (FMEA) method and Quality Function Deployment (QFD) method. According to Pujawan & Geraldine (2009), this model is used in attempting to reduce the occurrence of risk agents. Reducing the occurrence of risk agents would typically prevent some of the risk events to occur.

Generally, the stages in utilizing this framework can be divided into two phases, which are risk identification phase and risk treatment phase. In risk identification phase, risk events and risk agents are identified and measured. Whereas in risk treatment phase, the risk agents chosen in the end of first phase are assessed with treatment actions or mitigations.

In this model, the probability of risk agents and the severity of risk events are assigned. Since one risk agent could induce a number of risk events, it is necessary to quantity the aggregate risk potential (ARP) of a risk event. ARP can be calculated as follows.

$$ARP_j = O_j \sum_i S_i R_{ij} \quad (2.1)$$

The following notations will be used in this model.

$O_j$ = The probability of occurrence of risk agent

$S_i$ = The severity of impact if risk event *i* occurred

$R_{ij}$ = The correlation between risk agent *j* and risk event *i* (which is interpreted as how likely risk agent *j* would induce risk event *i)*

As it has been said before, this model adapts HOQ model to determine which risk agents should be given priority for preventive actions. A rank is assigned to each risk agent based on the magnitude of the $ARP_j$ values for each *j*. Hence, if there are many risk agents, the company can select first a few of those considered having large potentials to induce risk events.

- HOR phase 1

Table 2.4 HOR Phase 1

| Risk Event ($E_i$) | Risk Agent ($A_i$) | | | | | | | Severity of Risk Event *i* ($S_i$) |
|---|---|---|---|---|---|---|---|---|
| | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_7$ | |
| $E_1$ | $R_{11}$ | $R_{12}$ | $R_{13}$ | | | | | $S_1$ |
| $E_2$ | $R_{21}$ | $R_{22}$ | | | | | | $S_2$ |
| $E_3$ | $R_{31}$ | | | | | | | $S_3$ |
| $E_4$ | $R_{41}$ | | | | | | | $S_4$ |
| $E_5$ | | | | | | | | $S_5$ |
| $E_6$ | | | | | | | | $S_6$ |
| $E_7$ | | | | | | | | $S_7$ |
| 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* | | | | | | | | |

Source: Pujawan & Geraldine, 2009

The following steps used in HOR phase 1.

(1) Identify risks events that could happen. In HOR phase 1 shown in Table 2.4, the risk events are put in the left column, represented as $E_i$.

(2) Assess the impact (severity) of such risk event (if happened), use 1-10 scale where 10 represents extremely severe or catastrophic impact. The severity of each risk event is put in the right column of Table 2.4, indicated as $S_i$.

(3) Identify risk agents and assess the likelihood of occurrence of each risk agent. Here, a scale of 1-10 is also applied where 1 means almost never occurred and 10 means almost certain to happen. The risk agents ($A_j$) are placed on top row of the table and the associated occurrence is on the bottom row, notated as $O_j$.

(4) Develop a relationship matrix which is a relationship between each risk agent and each risk event. Assign $R_{ij}$ {0,1,3,9}, where 0 represents no correlation, 1,3, and 9 represent low, moderate, and high correlations respectively.

(5) Calculate the aggregate risk potential of agent *j* ($ARP_j$) which is determined as the product of the likelihood of occurrence of the risk agent *j* and the aggregate impacts generated by the risk events caused by the risk agent *j* as in equation above.

(6) Rank risk agents according to their aggregate risk potentials in a descending order (from large to low values).

- HOR phase 2

HOR phase 2 is to give priority to those actions considered effective but with reasonable money and resource commitments. It is used to determine which actions are to be done first, considering their differing effectiveness as well as resources involved and the degree of difficulties in performing. The company should ideally select set of actions that are not so difficult to perform but could effectively reduce the probability of risk agents occurring.

The following steps used in HOR phase 2.

(1) Select a number of risk agents with high-priority rank, possibly using Pareto analysis of the $ARP_j$, to be dealt with in the second HOR. Those selected will be placed in the left side of HOR2 as depicted in Table 2.5. Put the corresponding $ARP_j$ values in the right column.

(2) Identify actions considered relevant for preventing the risk agents. Note that one risk agent could be tackled with more than one actions and one action could simultaneously reduce the likelihood of occurrence of more than one risk agent. The actions are put on the top row.

Table 2.5 HOR Phase 2

| To be treated risk agent ($A_i$) | Preventive action ($PA_i$) | | | | | Aggregate risk potentials ($ARP_j$) |
|---|---|---|---|---|---|---|
| | $PA_1$ | $PA_2$ | $PA_3$ | $PA_4$ | $PA_5$ | |
| $A_1$ | $R_{11}$ | $R_{12}$ | $R_{13}$ | | | $ARP_1$ |
| $A_2$ | $R_{21}$ | $R_{22}$ | | | | $ARP_2$ |
| $A_3$ | $R_{31}$ | | | | | $ARP_3$ |
| $A_4$ | $R_{41}$ | | | | | $ARP_4$ |
| 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 | $R_1$ | $R_2$ | $R_3$ | $R_4$ | $R_5$ | |

Source: Pujawan & Geraldine, 2009

(3) Determine the relationship between each preventive action and each risk agent, $E_{jk}$. The values could be {0, 1, 3, 9} which represent no, low, moderate, and high relationships respectively between action $k$ and agent $j$. This relationship ($E_{jk}$) could be considered as the degree of effectiveness of action $k$ in reducing the likelihood of occurrence of risk agent $j$.

(4) Calculate the total effectiveness of each action as follows.

$$TE_k = \sum_j ARP_j E_{jk} \qquad \forall k \tag{2.2}$$

(5) Assess the degree of difficulties in performing each action, $D_k$, and put those values in a row below the total effectiveness. The degree of difficulties, which can be represented by a scale (such as Likert or other scale), should reflect the fund and other resources needed in doing the action.

(6) Calculate the total effectiveness to difficulty ratio,

$$ETD_k = TE_k / D_k. \tag{2.3}$$

(7) Assign rank of priority to each action ($R_k$) where Rank 1 is given to the action with the highest $ETD_k$.

## 2.6 Failure Mode and Effect Analysis (FMEA)

Failure Mode and Effect Analysis, known as FMEA, is a qualitative analysis towards risks identification and can be applied universally in various kinds of industry (Anderson, 2001). FMEA is a tool that is supposed to be used in managing the risk, especially in analysis stage, which are risks identification, risks measurement, and risks prioritizing.

Here is the process of risks identification, measurement, and prioritizing using FMEA.

1. Define the scope and the function of process that are going to be analyzed. This process can be done by making map and conducting review to the process that occurs.
2. Identify all associated component in the process. This process can be done through brainstorming to obtain failure cause and effect.
3. Identify and make the list or potential failures and their effects. Cause-and-effect diagram can be used as a tool in identifying all possibilities of failure.
4. Assess the severity, occurrence, and the detection of potential failure possibility using the scale of 1 to 10, according to each value ranking definition.
5. Calculate Risk Priority Number (RPN) by multiplying severity, occurrence, and detection.
6. List risk priority based on RPN rank.
7. Plan risk mitigation and determine expectation of RPN value.

There are several scale for severity, occurrence, and detection given by Anderson (2001). Severity is an assessment of effect level caused by potential failure. The example of severity scale is shown in Table 2.6.

Table 2.6 Severity Scale

| Rating | Description | Effect on System or Customer | Potential for Property Damage | Potential Hazard |
|---|---|---|---|---|
| 1 | Not Noticeable | Almost none | Almost none | Almost none |
| 2 | Very Minor | Noticeable | Almost none | Almost none |

| Rating | Description | Effect on System or Customer | Potential for Property Damage | Potential Hazard |
|---|---|---|---|---|
| 3 | Minor | Customer annoyed | Almost none | Almost none |
| 4 | Slight | Customer annoyed System needs service | Almost none | Almost none |
| 5 | Moderate | Customer complains System needs service | Minor | Slight |
| 6 | Significant | Customer complains Partial system malfunction | Moderate | Slight |
| 7 | Major | Customer dissatisfied Major system malfunction | Significant | Minor injury |
| 8 | Extreme | System inoperable or unfit for use | Major | Injury |
| 9 | Critical | System inoperable or unfit for use | Extreme | Serious injury |
| 10 | Hazardous | System inoperable or unfit for use | Extreme | Life threatening injury |

Source: Anderson, 2001

Occurrence is an assessment of the damage cause level. From the rating of this occurrence, the possibility of damage occurrence and the frequency of damage occurrence. The example of occurrence scale is shown in Table 2.7.

Table 2.7 Occurrence Scale

| Rating | Description | One Occurrence per ? Events | One Occurrence |
|---|---|---|---|
| 1 | Extremely Remote | ≥ 500,000,000 | In 5+ years |
| 2 | Highly Unlikely | 500,000,000 | In 3-5 years |
| 3 | Very Slight Chance | 1,666,667 | In 1-3 years |
| 4 | Slight Chance | 16,667 | Per year |
| 5 | Occasional | 10,000 | In 6 months |
| 6 | Moderate | 333 | In 3 months |
| 7 | Fairly Frequent | 100 | Per month |
| 8 | High | 20 | Per week |
| 9 | Very High | 3 | Every few days |
| 10 | Extremely High | ≤ 3 | Per day |

Source: Anderson, 2001

The example of detection scale is shown in Table 2.8.

Table 2.8 Detection Scale

| Rating | In Service | Manufacturing Quality Control |
|---|---|---|
| 1 | Almost Certain | 100% automatic inspection (SPC) + routine calibration & maintenance |
| 2 | Very High | 100% automatic inspection (SPC) |
| 3 | High | 100% SPC (Cpk $\geq$ 1.33) |
| 4 | Moderately High | 100% SPC |
| 5 | Moderate | Some SPC plus 100% final inspection |
| 6 | Low | 100% manual inspection using go/no-go gauges |
| 7 | Slight | 100% manual inspection in the process |
| 8 | Remote | Samples inspected, 100% no defects |
| 9 | Very Remote | Samples inspected by acceptable quality level |
| 10 | Almost None | No inspection |

Source: Anderson, 2001

## 2.7 Cause and Effect Diagram

The cause-and-effect diagram is a graphical-tabular chart used to list and analyze the potential causes of a given problem. It is not really a statistical tool in process control activity (Groover, 2008). As shown in Figure 2.3, the diagram has a central steam leading to the effect (the problem). It also consists of multiple branches coming off the stem listing the various groups of possible causes of the problem. Because of its characteristics appearance, the cause-and-effect diagram is also known as a fishbone diagram.

The cause-and-effect diagram is a formal tool frequently useful in unlayering the potential causes. According to (Montgomery, 2009), the cause-and effect diagram is very useful in the analyze and improve steps of DMAIC. Once a defect, error, or problem has been identified and isolated for further study, we must begin to analyze potential causes of this undesirable effect.

In application, the cause-and-effect diagram is developed by a quality team. The team then attempts to determine which causes are most consequential and how to take corrective action against them.

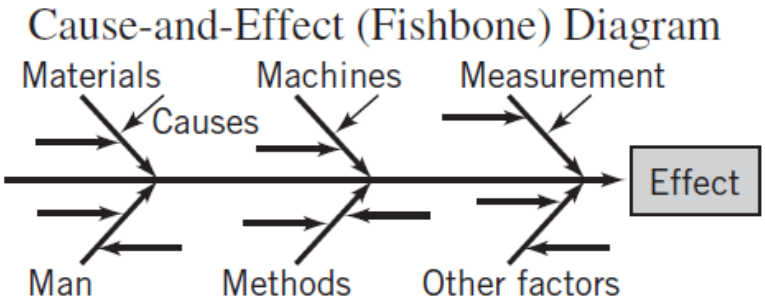



Figure 2.3 Cause-and-Effect (Fishbone) Diagram (Montgomery, 2009)

## 2.8 Pareto Chart

According to (Montgomery, 2009), Pareto chart simply a frequency distribution (or histogram) of attribute data arranged by category. Pareto charts are often used in both the measure and analyze steps of DMAIC. Pareto chart is a series of bar charts that illustrate the frequency or the influence of process / situation / problem. The chart is arranged starting from the highest diagram to the lowest from left to right. The bar chart on left side is relatively more important than the right side.

Pareto chart or Pareto diagram is often used as a tool to find the cause or the dominant factor of a problem. In the production process, often times we find many issues that affect the cost, loss, machine efficiency and so forth. To overcome this problem, all these problems simultaneously should not be equalized and resolved simultaneously. But the first dominant factors should be prioritized. With a Pareto chart, the dominant factors can be known. According to Pareto, to determine the dominant factor, the principle of 80-20 is used. That is, 80% of disruptions come from 20% of problems. Thus, 80% of the accumulated percentage factor is a dominant factor that should be prioritized, while the rest is later. By completing the dominant factor, the problem can be solved significantly.

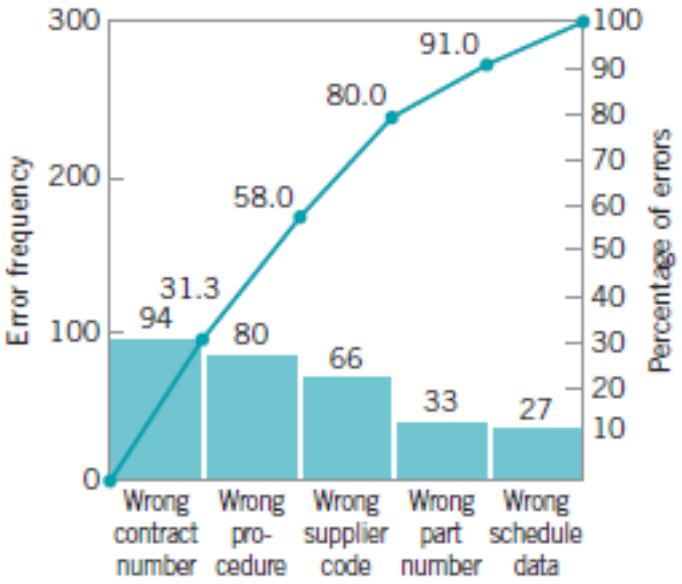



Figure 2.4 Pareto Chart (Montgomery, 2009)

# CHAPTER 3
# RESEARCH METHODOLOGY

This chapter represents the research methodology used to conduct this research. The research methodology consists of steps required to perform in this research. It is presented by flowchart and followed by its explanation.

## 3.1 Flowchart

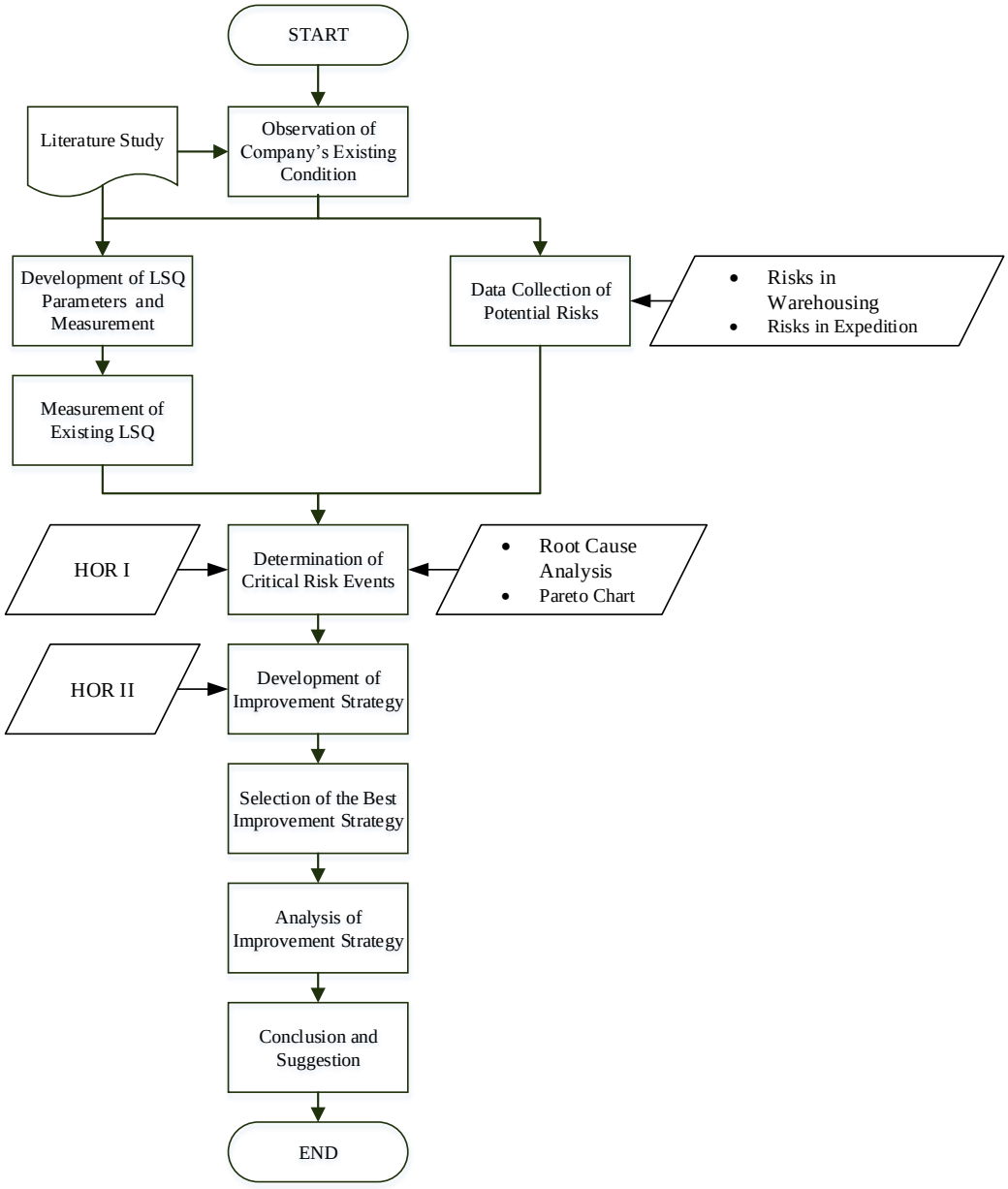



Figure 3.1 Flowchart of Research Methodology

## 3.2 Flowchart Explanation

According to the flowchart illustrated previously on Figure 3.1, flowchart explanation is provided to give detail information for each step.

### 3.2.1 Observation of Company's Existing Condition

Observation of company's existing condition is done by collecting some information through direct observations and discussions with related functions. This step aims to learn the real existing condition of the object under research such as the types of service offered by the company, the activities carried in the company to run its business, the challenge faced by the company to know the problems exist in the company, the target set by the company and its fulfillment. The observation requires supporting theoretical information available in academic literatures such as books, journals, and others as the input for better comprehension in observing the object. Reading previous related researches is also beneficial to enhance the information regarding the problems in the logistics service provider.

### 3.2.2 Development of Logistics Service Quality (LSQ) Indicators and Measurement

This step is consists of comparison of several case study and previous researches in related area, which is about the service quality in logistics service provider companies. Besides comparing them, it is also done through brainstorming and discussion with the manager of PT. Tiga Permata Logistik and Tiga Permata Ekspres. From these activities, the indicators or indicators in logistics service quality are obtained. The indicators should be aligned with the condition, activities carried, and processes run in these companies. It is continued by the development of LSQ measurement to know how to measure the performance of each indicator obtained previously and the factors affecting each indicator as well.

### 3.2.3 Measurement of Existing Logistics Service Quality (LSQ)

After developing how to measure the indicators of LSQ determined previously, the next step to be done is measuring the performance of indicators in

accordance with the existing condition of LSQ in PT. Tiga Permata Logistik and Tiga Permata Ekspres.

### 3.2.4 Data Collection of Potential Risks

This step consists of listing activity of all risks in both expedition and warehousing. The risks listed are the events or activities that usually occur and may occur in the future. This risks collection process requires the related information and data collected from observations, interview, discussion, and company's monthly report.

### 3.2.5 Determination of Critical Risk Events

The identification process of critical risk events is done in the HOR phase 1 (HOR I). It is started from assigning the severity and occurrence value to each risk event that has been collected previously. The risks events listed consist of LSQ indicators and all the potential risks collected previously. Assigning severity and occurrence value is done by the management of the company through the questionnaire. Thereafter, the risks' causes are identified as well. The identification of risks' causes is done through brainstorming and discussion with the manager. The causes of every critical risk is analyzed using cause-and-effect diagram. It is then continued by determining the correlation between each risk event and each cause. The correlation is represented by three values, which are 1,3, and 9. The description of these values is as follows.

1 = the risk event has weak correlation with the risk agent

3 = the risk event has moderate correlation with the risk agent

9 = the risk event has high correlation with the risk agent

The correlation, severity, and occurrence values are then multiplied to obtain ARP. The risks that have highest ARP value are then prioritized and chosen using Pareto concept. ARP value will be used as an input in HOR phase 2 (HOR II).

### 3.2.6 Development of Improvement Strategy

In this step, there will be the determination of improvement strategy used to increase LSQ and mitigate the risks. The selected critical risks to overcome are

obtained by comparing their ARP value and prioritizing based on that values. The critical risks to overcome are problems with some highest values of ARP. This step is conducted in HOR phase 2 (HOR II).

### 3.2.7 Selection of the Best Improvement Strategy

In this step, the best alternative improvement strategy are selected to overcome each risk. Besides, the strategies are proposed to improve the service quality in logistics service provider.

### 3.2.8 Analysis of Improvement Strategy

After the best alternative improvement strategy is selected in previous step, then it is continued to the analysis process. The improvement strategy should be able to mitigate the risks and increase the logistics service quality in this company. This analysis process also consists of the technical details in conducting the selected improvement strategy.

### 3.2.9 Conclusion and Suggestion

After constructing the technical details, the conclusions of this research are made. Besides, the suggestions are also proposed to do the improvement.

# CHAPTER 4
# DATA COLLECTION AND PROCESSING

There are some data that will be collected and processed in this research which are company overview, data related to the risks in both warehousing and expedition activities and also data collection required to develop the indicator of Logistics Service Quality (LSQ). Those information are collected based on the actual condition of the object. The data that have been collected and processed in this chapter will be used as the input for the analysis on the next chapter.

## 4.1 Company Overview

Here are the explanations of company overview of PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres which consist of Company's Profile and Organizational Structure.

### 4.1.1 Company's Profile

PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres are the companies that focus in providing logistics service. These companies are operated under the same group which is Tiga Permata Group. The head office of these companies are located at Jl. Raya Waru KM 15 Sidoarjo, Indonesia. They have 150 employees in total and two branch offices located in Jakarta and Semarang. Tiga Permata Group has a vision which is *"Menjadi perusahaan handal dan terpercaya dengan pelayanan terbaik"*. This vision is supported by several missions as listed below.

1. Offer the best service in logistics to increase the efficiency and to give added value in global competition.
2. Make continuous innovation to fulfill customers' needs.
3. Commit to develop the business in order to make the customers satisfied, maintain the welfare of employees, fulfill the needs of shareholder, and fulfill the corporate social responsibility towards its surroundings.

In running the business, Tiga Permata Group has several values which are customer orientation, fast, precise, and trusted. PT. Tiga Permata Logistik and PT.

Tiga Permata Ekspress now have customers coming from several kinds of industry, such as medical industry, shoes and footwear industry, cigarette industry, oil industry, and any other consumer goods industries.

PT. Tiga Permata Logistik is a company which focuses in warehousing and logistics business. It was established in 2009 and located in Surabaya as the central of distribution to East Java, Bali, Nusa Tenggara, Sulawesi, Kalimantan, and Papua. It then developed and established branch office in Semarang to support the distribution to Central Java and Yogyakarta. This company has several clients coming from several big companies such as PT. Huawei Tech Investment, PT. Gudang Garam, PT. Samsung Electronics Indonesia, PT. Trouw Nutrition Indonesia, PT. Suryamas Gemilang Lubricant, and many others.

PT. Tiga Permata Ekspres was established in 2012 has three offices in Surabaya, Jakarta, and Semarang. It focuses on expedition or distribution service to all around Indonesia. This company provides several services which are as air freight, land freight, sea freight, courier, and relocation. Here are several services provided by PT. Tiga Permata Ekspres.

1. **Air Freight Shipment**. It provides two kinds of shipment which are quick shipment and economical shipment. In quick shipment service, the company will prioritize the costumer's goods using the first available flight. While the economical shipment is cheaper and suitable for not urgent delivery.
2. **Sea Freight Shipment**. It provides two kinds of service which are FCL (Full Container Load) and LCL (Less Container Load) for either port-to-port shipment or direct shipment to destination.
3. **Land Freight Shipment**. It provides landline delivery to many destinations in Indonesia. This service is supported by transport fleets which are owned by the company.
4. **Courier**. This service is provided special for delivering package and documents to all big cities in Indonesia.
5. **Relocation**. It provides relocation service for all kinds of relocation such as house relocation, office relocation, and many others. It is included from packing, delivery, until storage.

### 4.1.2 Organizational Structure

PT. Tiga Permata Logistik is led by a President Director who supervises a Director and a Financial & Accounting Manager. The director supervises a Branch Manager. This Branch Manager supervises four other managers which are Warehouse Manager, Contract Logistic Manager, Business Development Manager, and Human Resource & General Affair Manager.

Basically, the organizational structure of PT. Tiga Permata Ekspres is slightly different with the organizational structure of PT. Tiga Permata Logistik. It is also led by a President Director who also supervises a Director and a Financial & Accounting Manager. The difference is that the Branch Manager supervises four other managers which are Transport Manager, Vendor Management Manager, Business Development Manager, and Human Resource & General Affair Manager.

This research focuses on Warehouse Division of PT. Tiga Permata Logistik and Transport Division of PT. Tiga Permata Ekspres. The organizational structure of PT. Tiga Permata Logistik is represented by Figure 4.1, while the organizational structure of PT. Tiga Permata Ekspres is represented by Figure 4.2.

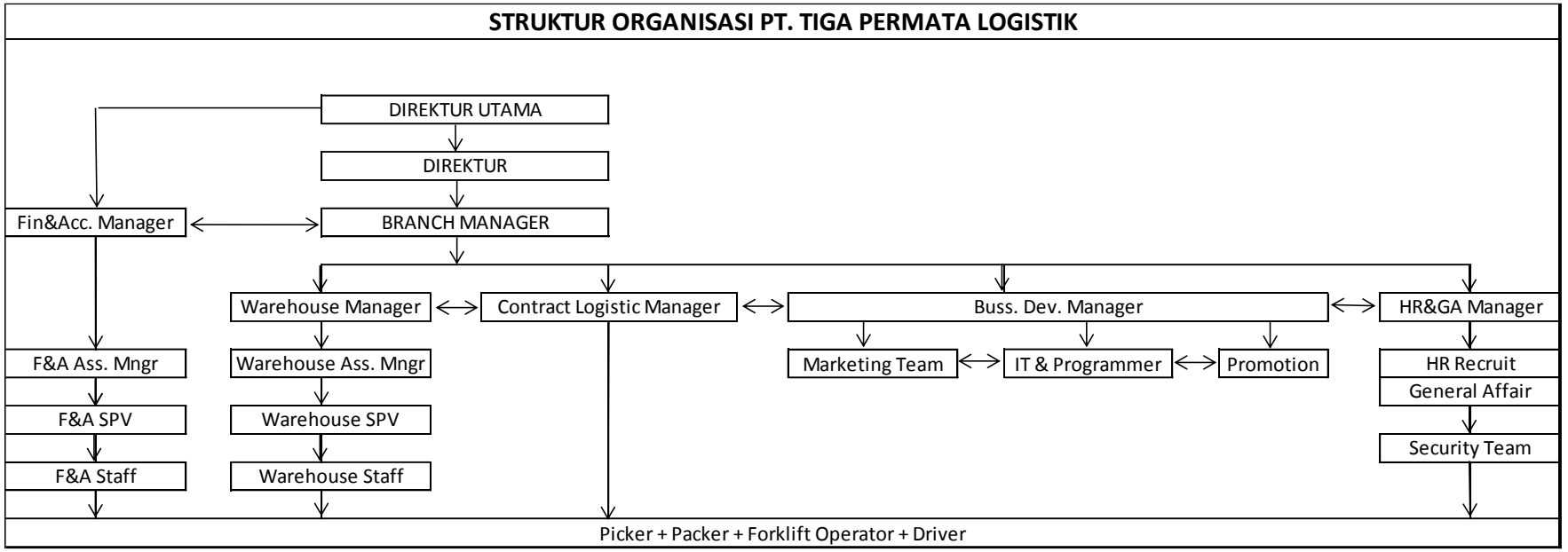



Figure 4.1 Organizational Structure of PT. Tiga Permata Logistik (PT. Tiga Permata Logistik, 2016)

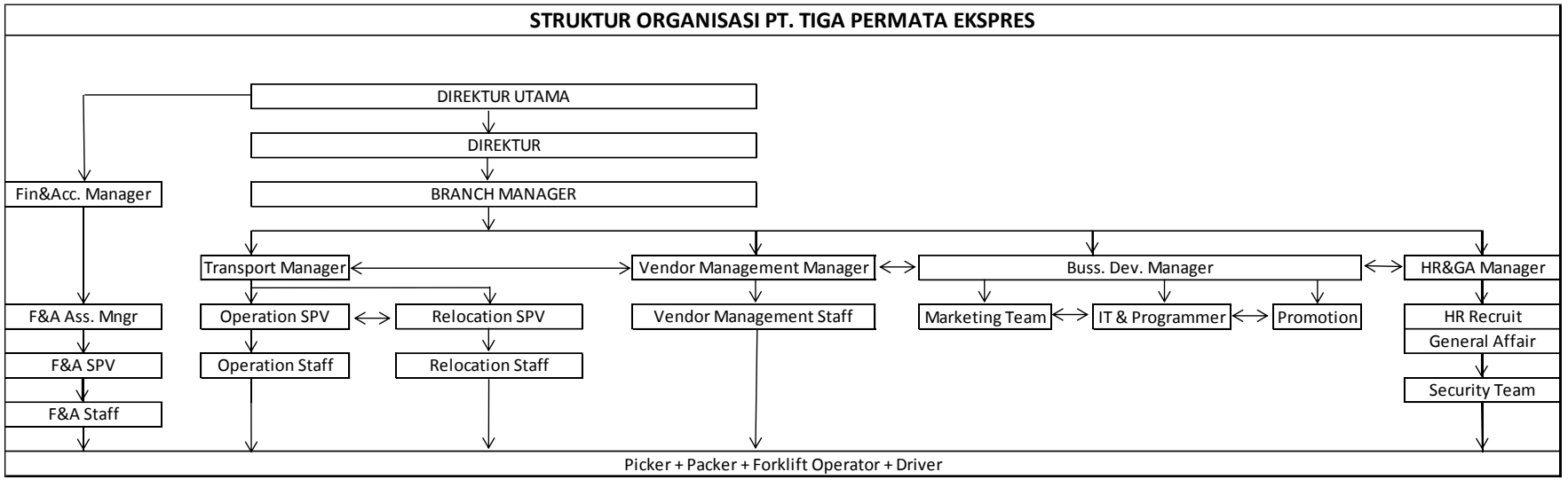



Figure 4.2 Organizational Structure of PT. Tiga Permata Ekspres (PT. Tiga Permata Ekspres, 2016)

### 4.1.3 Company's Standard Operating Procedure

Standard Operating Procedure (SOP) is a set of detailed and written instructions that must be done to achieve uniformity in performing specific function or task. As a company, PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres also have SOP in running tasks in their business.

#### 4.1.3.1 Warehouse SOP in PT. Tiga Permata Logistik

Warehouse Division has more activities than Transport Division due to its operations complexity. Since it has wider operations, thus the operations can be divided into four main operations, which are inbound management, transport management, outbound management, and return management. The detail procedures of these operations are presented in flowchart shown in Figure 4.3 – Figure 4.9 respectively.

Figure 4.3 and Figure 4.4 show the procedure of inbound operation. This procedure consists of necessary steps to handle inbound processing at customer warehouse. This process starts from receiving pre alert from customer regarding shipment arrival. It is then continued by documents preparation, space allocation, goods unloading and physical checking, material/goods storing, location recording, double checking, then documents report and endorsement.

Figure 4.5 and Figure 4.6 show the procedure of outbound operation. This procedure consists of necessary steps to handle outbound processing to customer distribution center. It starts from the DN received by warehouse from customer, continued by checking stock availability at WMS, material picking based on Picking List, material completeness checking, documents preparation and transfer to Transport Supervisor.

Figure 4.7 and Figure 4.8 show the procedure of transportation management. It consists of necessary steps to distribute goods/material from customer warehouse. It starts from documents delivery preparation, continued by material/goods loading to truck, shipment tracing, and documents scanning.

Figure 4.9 shows the procedure of goods return to the customer warehouse. This procedure used when the customer requests to return goods/material from site

back to the warehouse. It includes material picking, material checking and updating material database at WMS.

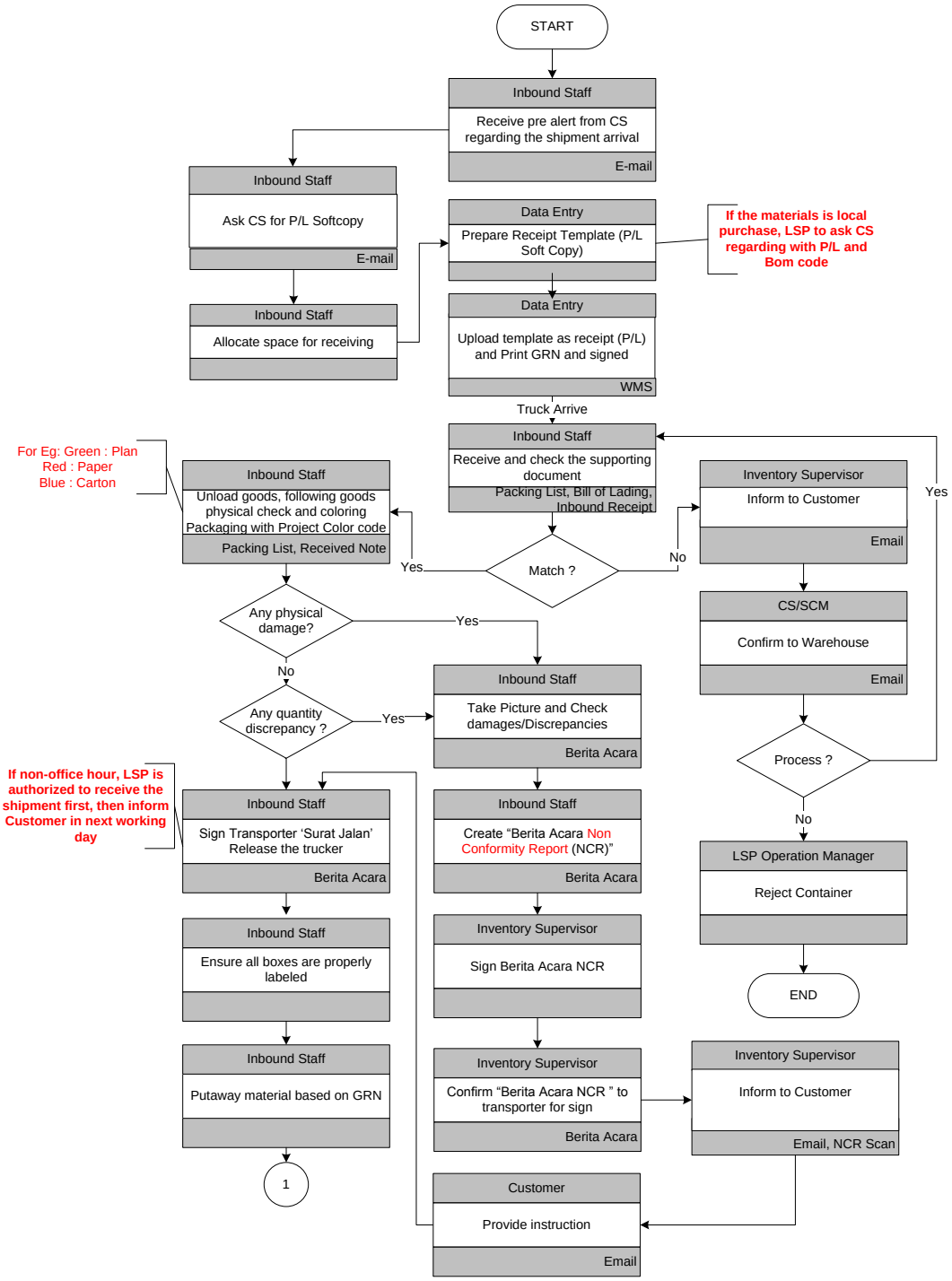



Figure 4.3 Inbound Procedure (PT. Tiga Permata Logistik, 2016)

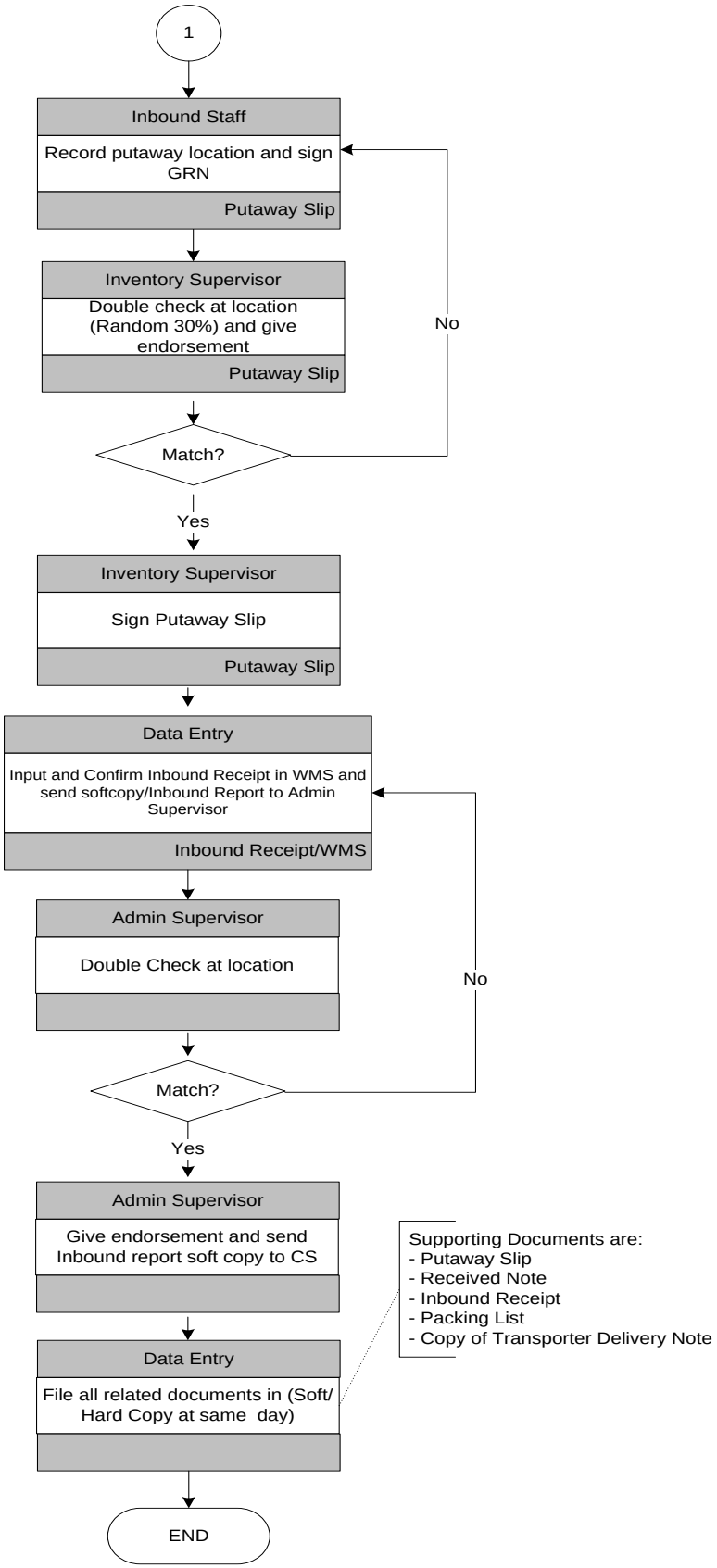



Figure 4.4 Inbound Procedure (cont') (PT. Tiga Permata Logistik, 2016)

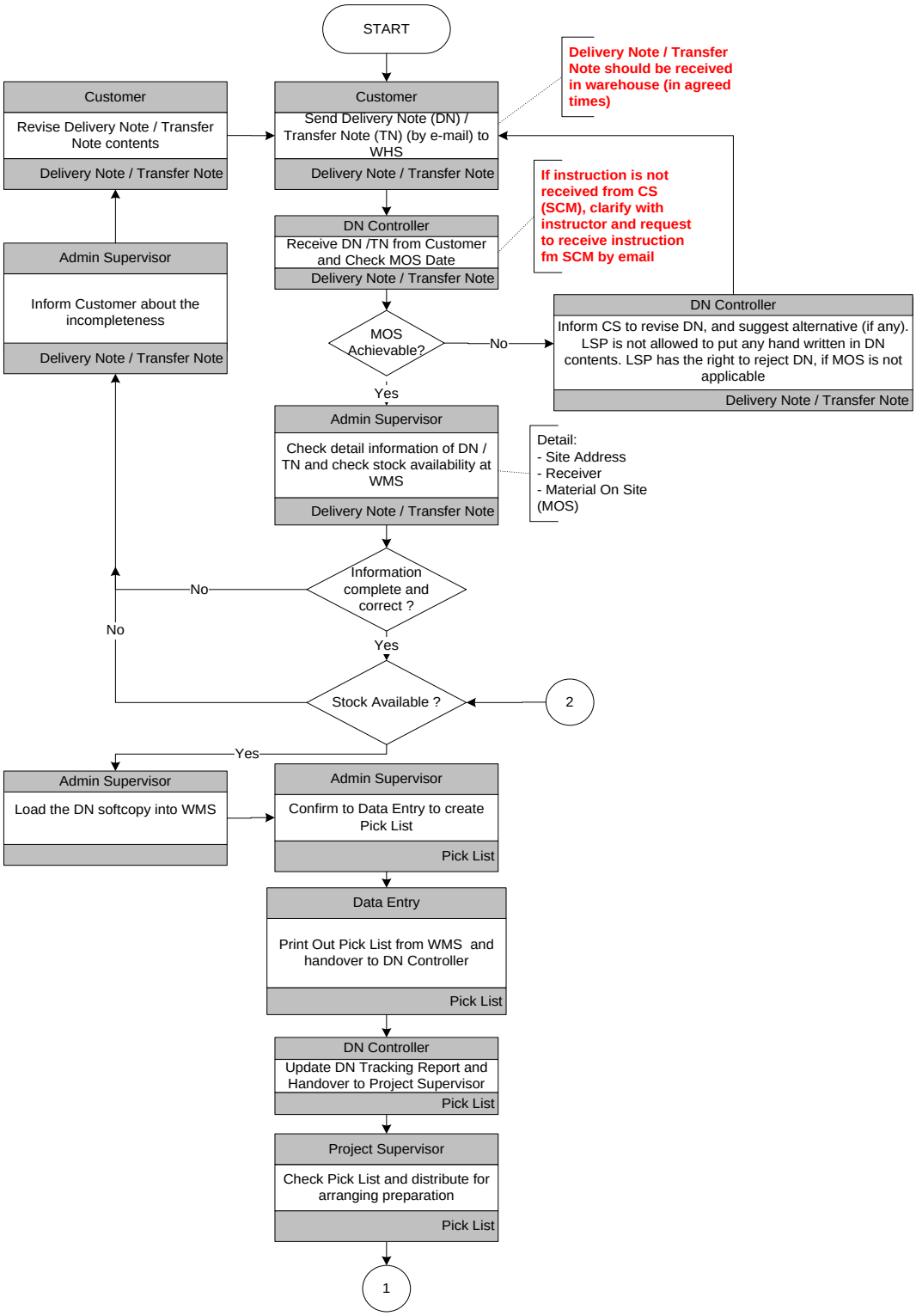



Figure 4.5 Outbound Procedure (PT. Tiga Permata Logistik, 2016)

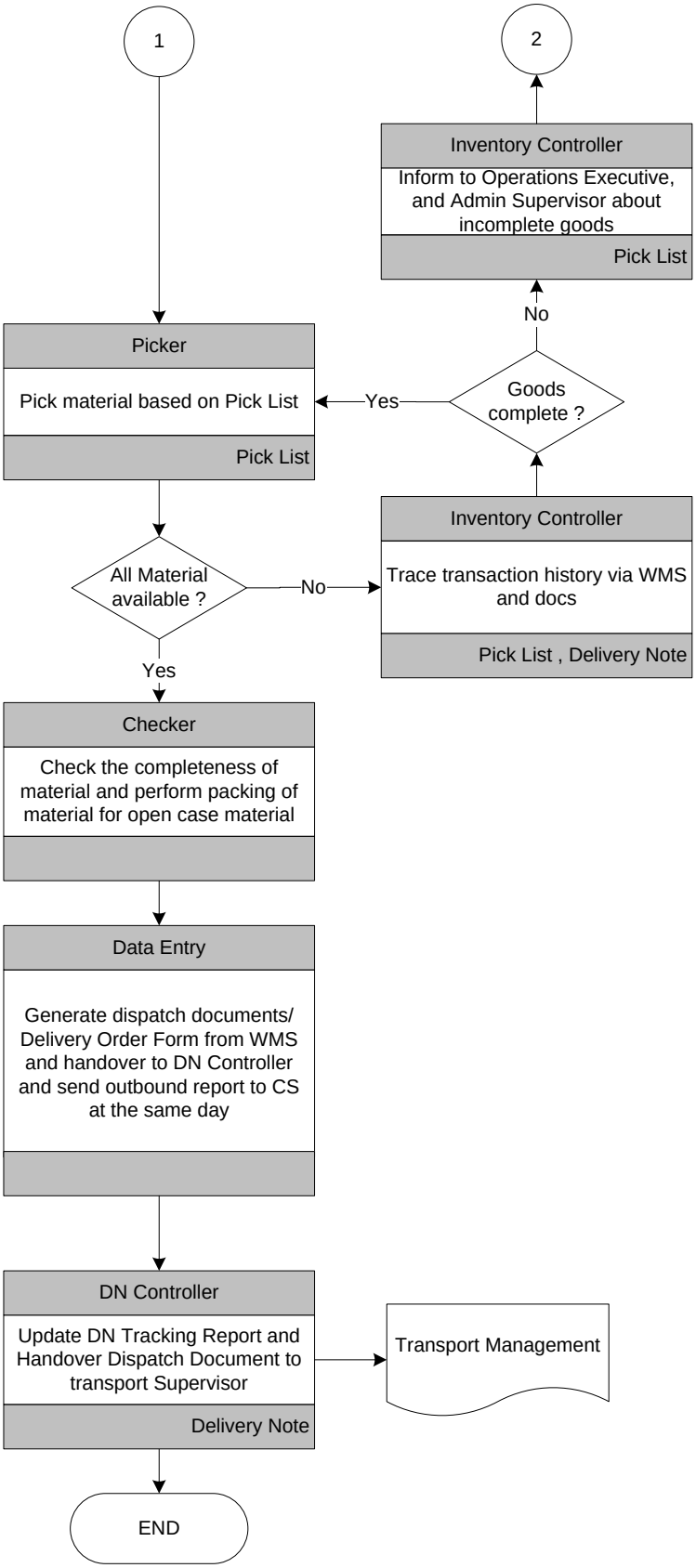



Figure 4.6 Outbound Procedure (cont') (PT. Tiga Permata Logistik, 2016)

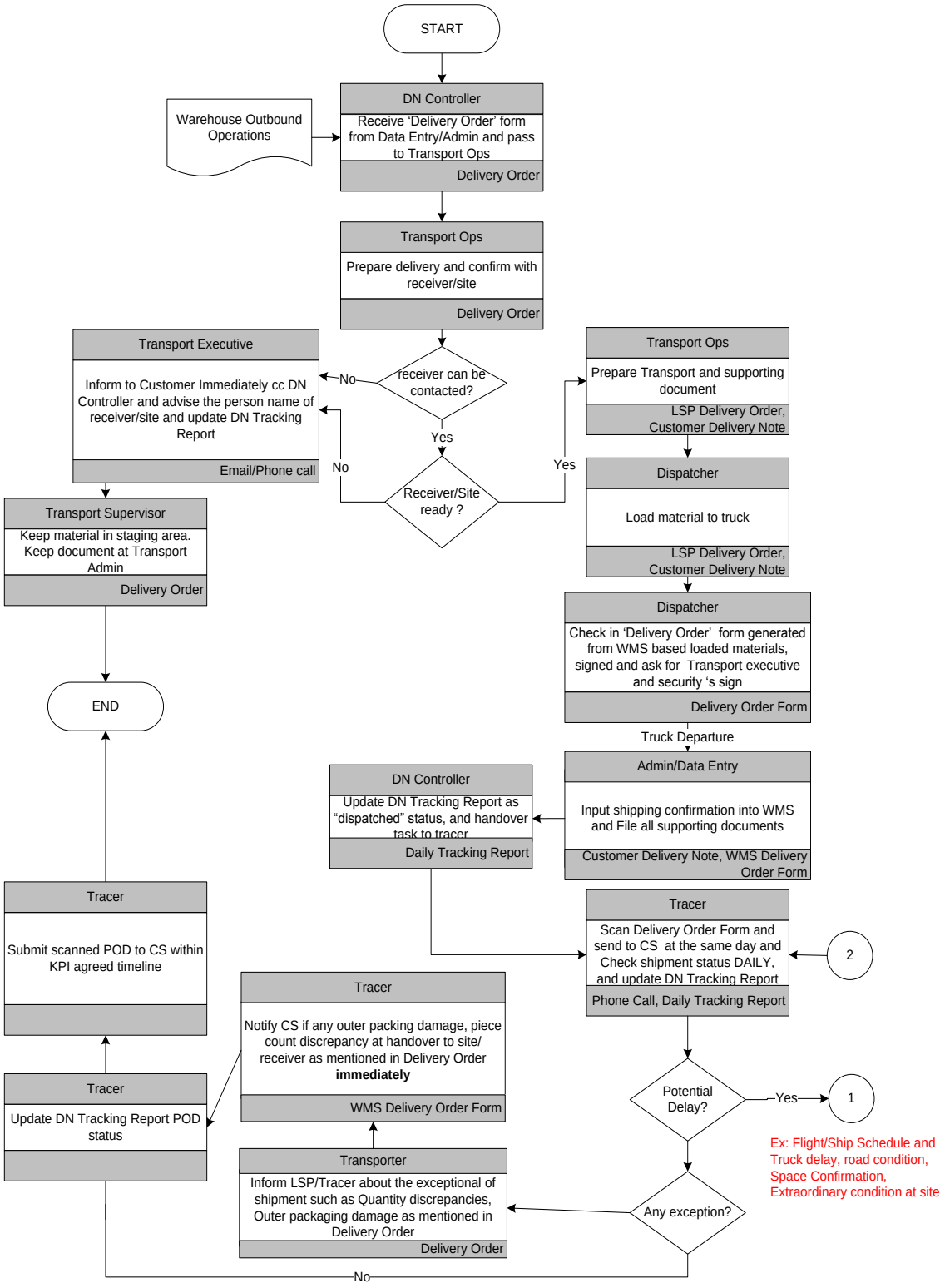



Figure 4.7 Transportation Management Procedure (PT. Tiga Permata Logistik, 2016)

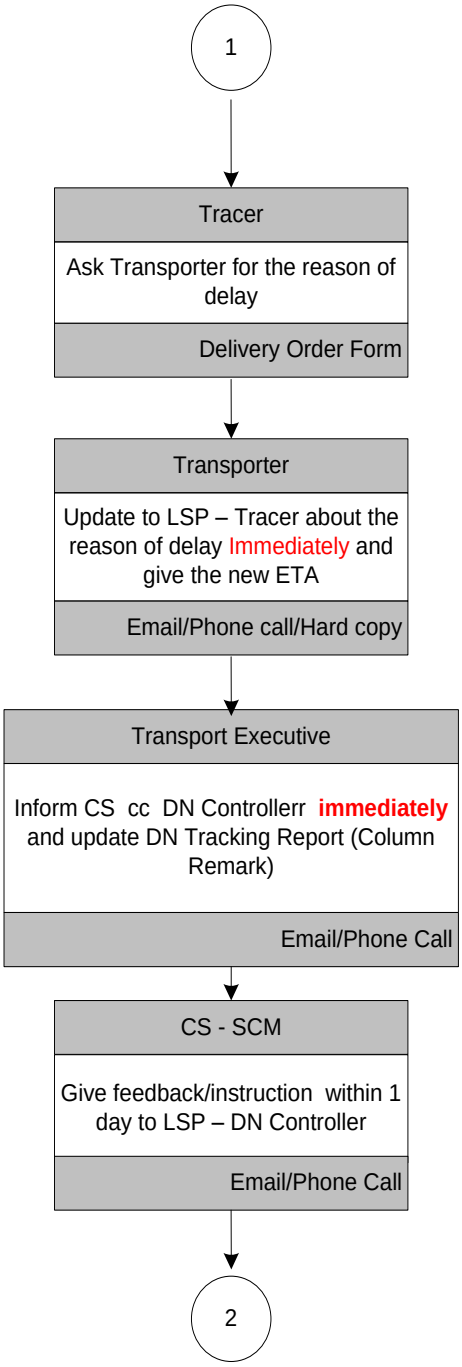



Figure 4.8 Transportation Management Procedure (cont') (PT. Tiga Permata Logistik, 2016)

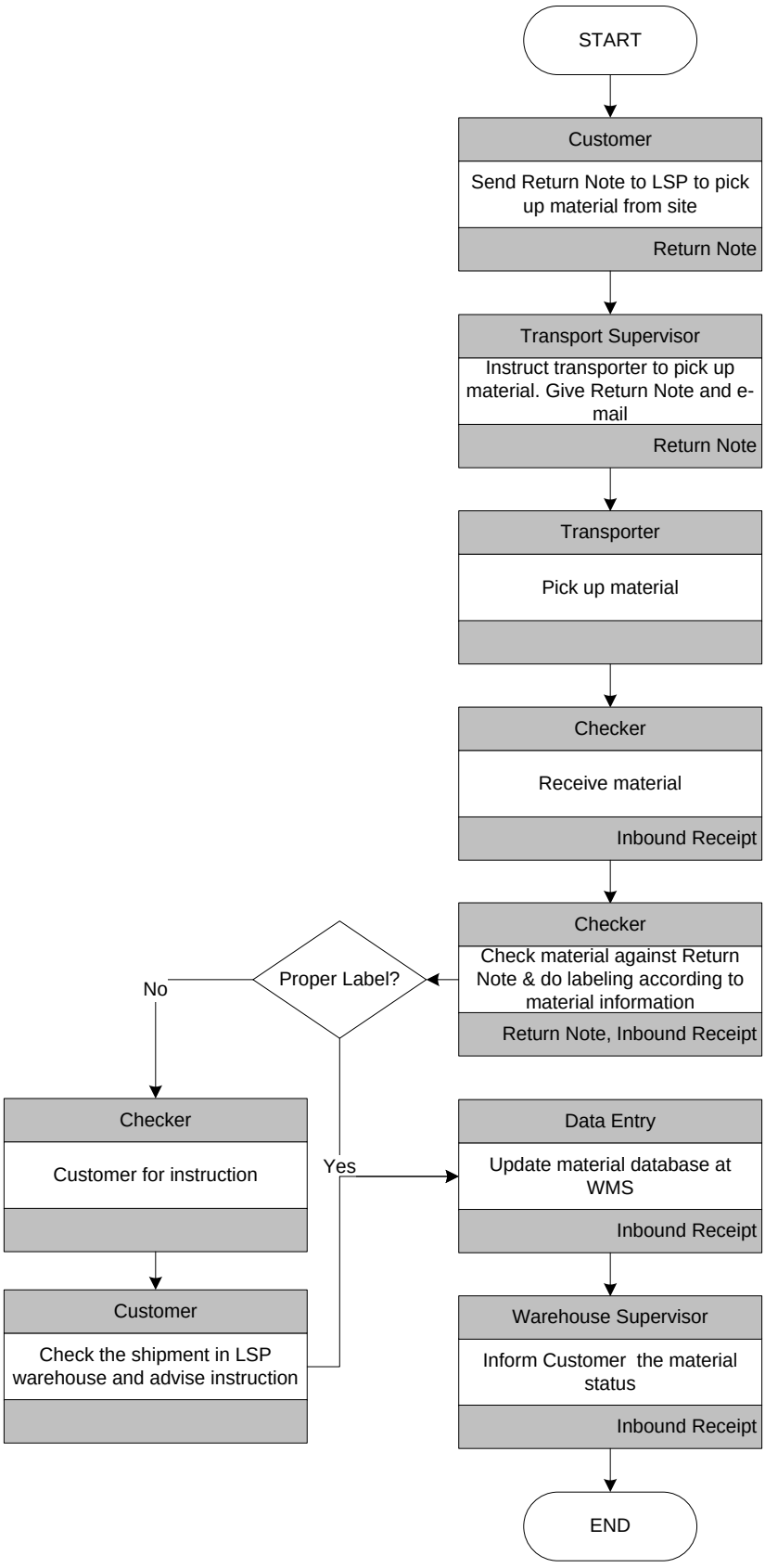



Figure 4.9 Return Procedure (PT. Tiga Permata Logistik, 2016)

4.1.3.2 Delivery SOP in PT. Tiga Permata Ekspres

There are four team involved in delivery or distribution under Transport Division, which are Transport Planning (TP), Transport Control (TC), Transport Administration (TA), and Transporter. Each team has different tasks interconnected each other in the whole delivery process. The flow of the delivery process done by PT. Tiga Permata Ekspres is standardized and written in Delivery SOP. The whole process of delivery can be divided into three stages which are pre-delivery, delivery, and post-delivery. These stages merged as Delivery SOP are represented in Figure 4.10, Figure 4.11, and Figure 4.12 respectively.

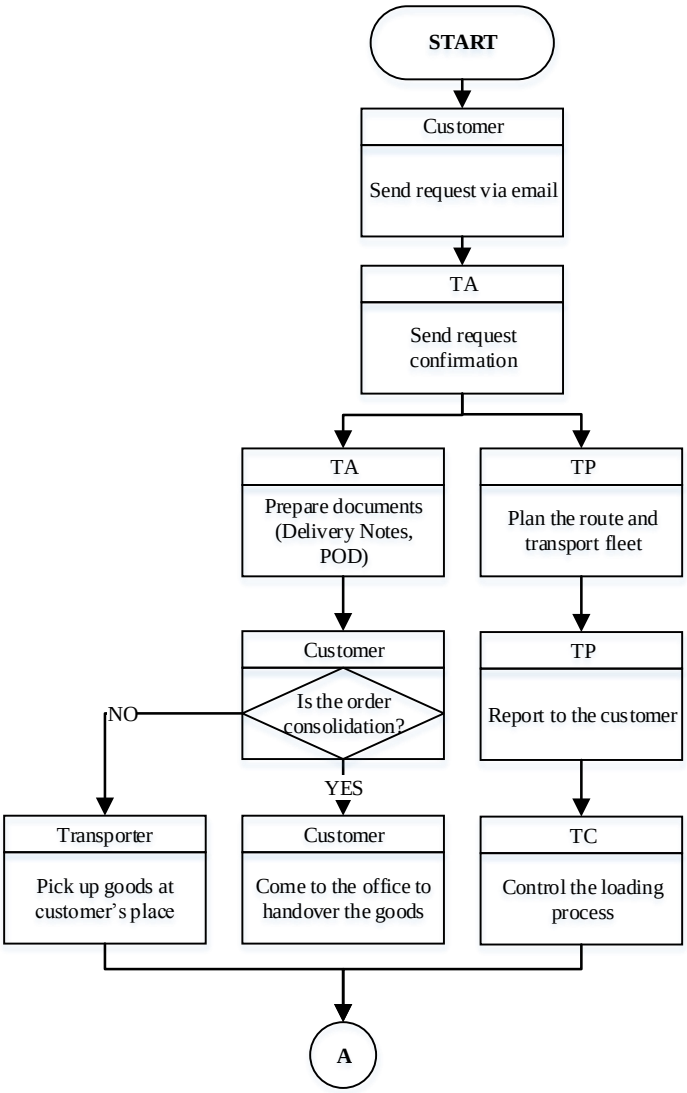



Figure 4.10 Flowchart of SOP in Delivery (Pre-delivery Stage) (PT. Tiga Permata Ekspres, 2016)

Pre-delivery stage starts from the coming request sent by the customer via email. The request consists of the order detail, such as kind of goods to be delivered, the amount of goods, the destination of delivery, etc. Actually, the customers have sent notification by phone before they send request by email. TA team has to reply the request as the confirmation within an hour from the request arrival. After the request is confirmed, TA team prepare documents needed in delivery, such as DN (Delivery Note), POD (Proof of Delivery), and Goods Handover Guide (for trucking service). The customer whose the order using consolidated service must come to the office to handover their goods to be then delivered to the requested destination. For the customer whose the order using trucking service, the Transporter team will pick up the goods at the customer's place. At the same time with documents preparation process, TP team has to plan the route and then report the delivery information (exact time of shipment, detail of transportation used, etc) to the customer. If the order is using consolidated service, it is then continued by loading process under the control of TC team. All processes in pre-delivery stage are mostly done in a day, especially when the goods are already taken over by the company.

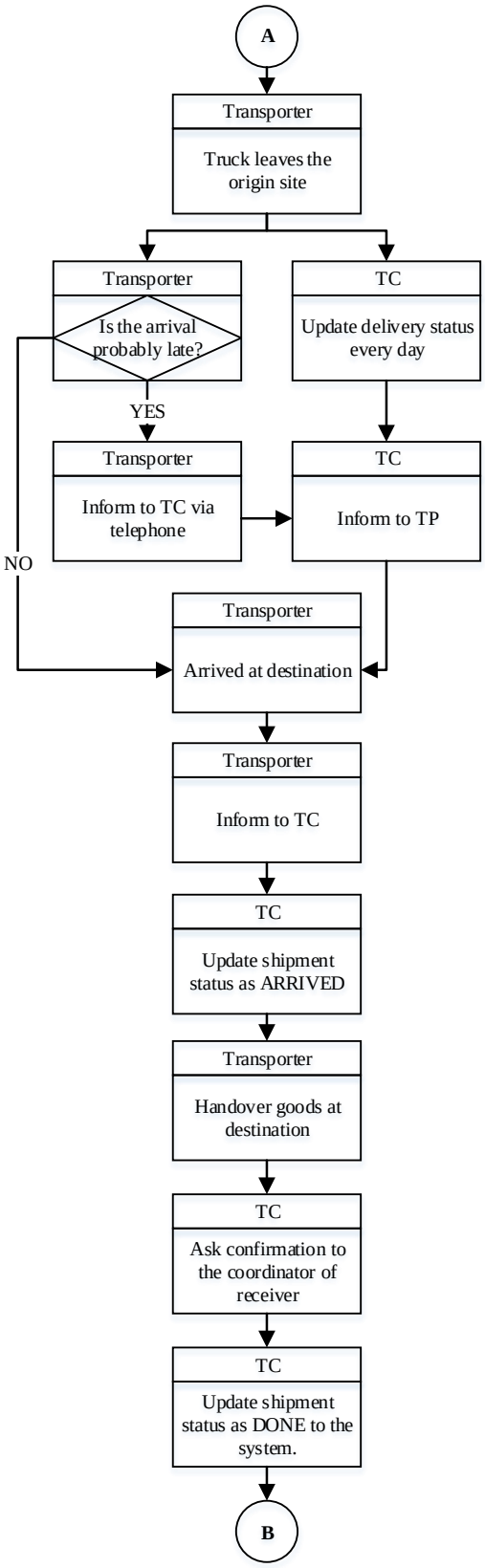



Figure 4.11 Flowchart of SOP in Delivery (Delivery Stage) (PT. Tiga Permata Ekspres, 2016)

Pre-delivery stage is then continued by delivery stage which starts from the truck leaving the site. If there is any estimation that the truck will arrive late, the transporter must inform it to TP team. TC team has to update the shipment status and also inform it to TP team. If there is any problem in the shipment, TP team must have another plan to solve the problem. For example the late arrival due to the breakdown of the truck, TP team sends another truck to continue the delivery. Transporter has to inform to TC team by the time Transporter arrives at the destination. Then, TC team will update the shipment status as "arrived". At the destination, Transporter handovers the goods as what has written in the Goods Handover Guide prepared by TA team. Then, TC team will call the coordinator of receiver to make sure that the handover process is running properly. The lead time of shipment stage depends on the destination since not all destinations have the same lead time.

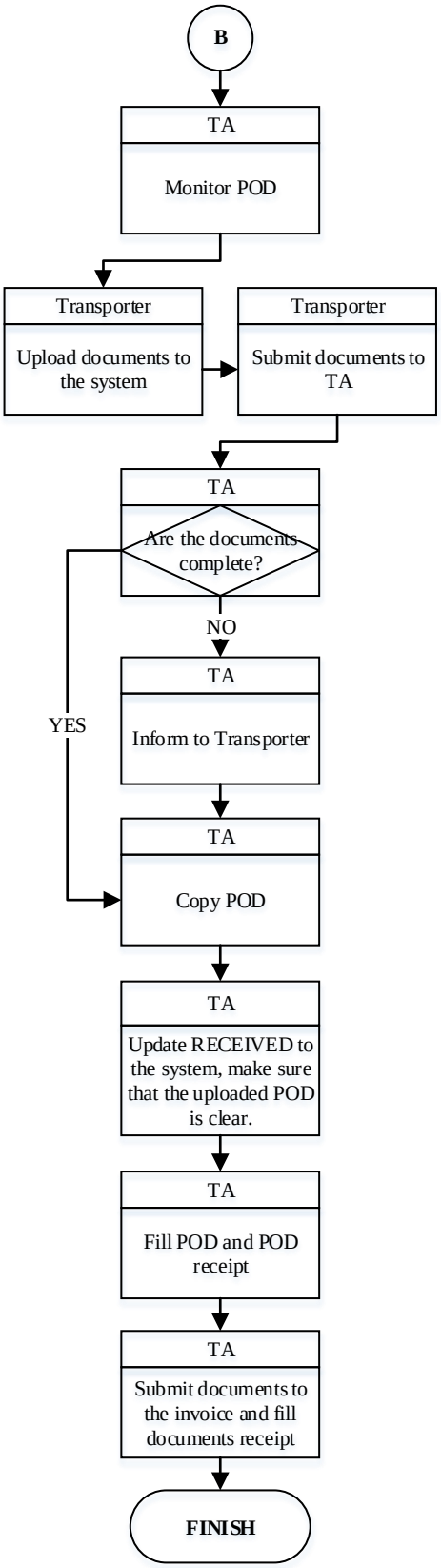



Figure 4.12 Flowchart of SOP in Delivery (Post-delivery Stage) (PT. Tiga Permata Ekspres, 2016)

The process is not finished yet after the goods are delivered, there is a stage called post-delivery stage. After the goods are already delivered, it becomes a responsibility for TA team to monitor POD (Proof of Delivery). As soon as possible, the Transporter must upload the documents and submit it to TA team. For the Transporter from the vendor, they also have to send it. If there is an incompleteness in documents submission, TA team has to inform the Transporter to send it completely. After the documents complete, TA team copies it to be saved as company's data. Then, TA team must update to the system as RECEIVED and also make sure that the documents uploaded are clear. After that, TA team must fill POD receipt and documents receipt.

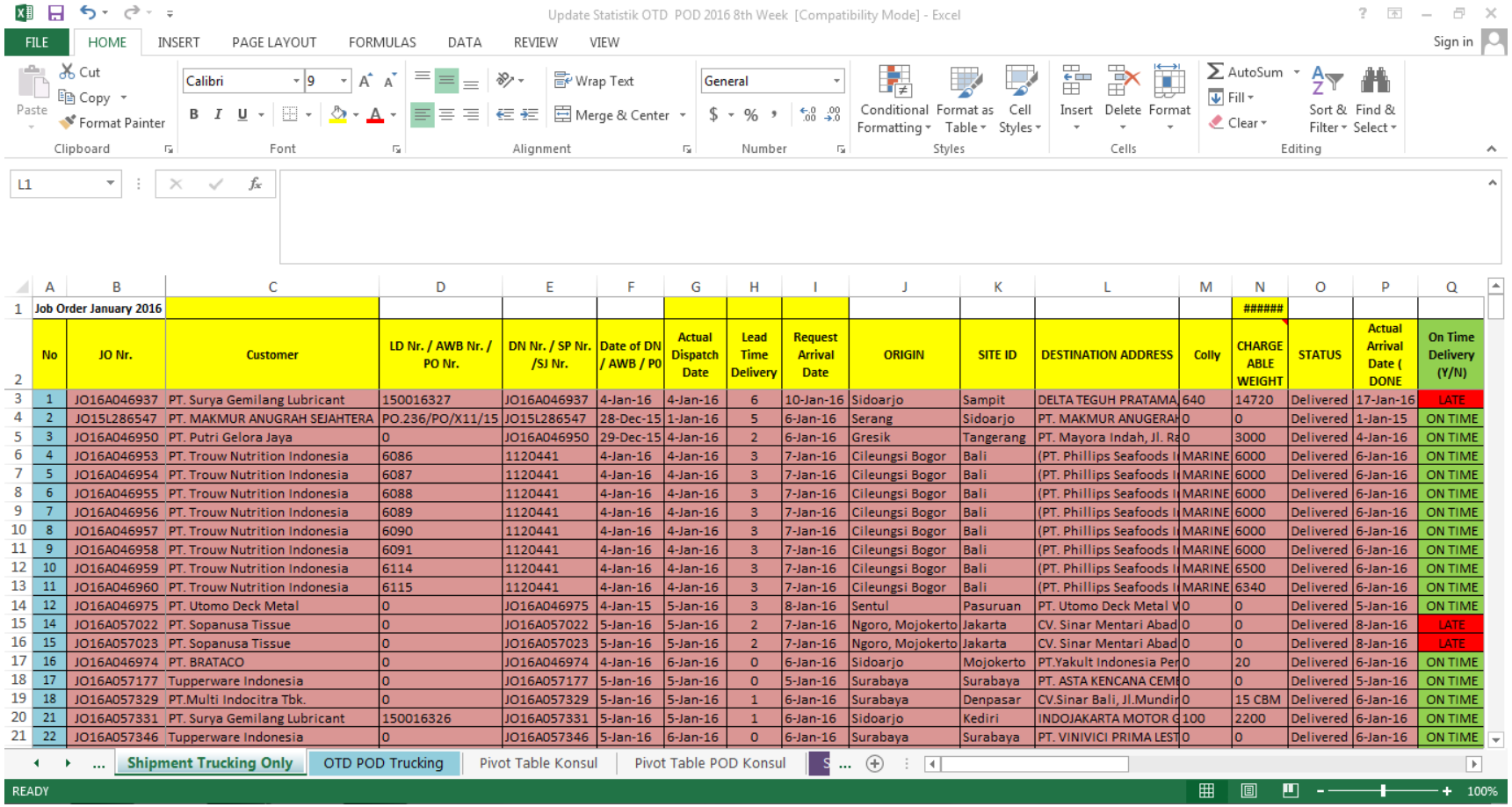
## 4.2 Logistics Service Quality (LSQ)

This sub-chapter contains the data collection and data processing to develop Logistics Service Quality (LSQ) indicators and its measurement along with the measurement of company's performance according to the developed LSQ indicators.

### 4.2.1 Development of Logistics Service Quality (LSQ) Indicators

This step is done through the discussion with the expert in the company and brainstorming. It is also done by considering the actual condition of these companies, the companies' objectives, and also KPI. The indicators should be aligned with the condition, activities carried, and processes run in these companies.

KPI available in Transport Division is On-Time Delivery (OTD) in both Consolidated shipment and Trucking shipment which should be at least 99% of all shipments. On-time delivery means that the order is arrived before or on the due date based on the arrival date requested by customer. Figure 4.13 shows the example of On-Time Delivery in January. It notes several important related information, such as Customer, Lead Time Delivery, Destination Address, Request Arrival Date, Actual Arrival Date, and many others.



Update Statistik OTD POD 2016 8th Week [Compatibility Mode] - Excel

| No | JO Nr. | Customer | LD Nr. / AWB Nr. / PO Nr. | DN Nr. / SP Nr. /SJ Nr. | Date of DN / AWB / PO | Actual Dispatch Date | Lead Time Delivery | Request Arrival Date | ORIGIN | SITE ID | DESTINATION ADDRESS | Colly | CHARGE ABLE WEIGHT | STATUS | Actual Arrival Date ( DONE | On Time Delivery (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JO16A046937 | PT. Surya Gemilang Lubricant | 150016327 | JO16A046937 | 4-Jan-16 | 4-Jan-16 | 6 | 10-Jan-16 | Sidoarjo | Sampit | DELTA TEGUH PRATAMA | 640 | 14720 | Delivered | 17-Jan-16 | LATE |
| 2 | JO15L286547 | PT. MAKMUR ANUGRAH SEJAHTERA | PO.236/PO/X11/15 | JO15L286547 | 28-Dec-15 | 1-Jan-16 | 5 | 6-Jan-16 | Serang | Sidoarjo | PT. MAKMUR ANUGERAH | 0 | 0 | Delivered | 1-Jan-15 | ON TIME |
| 3 | JO16A046950 | PT. Putri Gelora Jaya | 0 | JO16A046950 | 29-Dec-15 | 4-Jan-16 | 2 | 6-Jan-16 | Gresik | Tangerang | PT. Mayora Indah, Jl. Ra | 0 | 3000 | Delivered | 4-Jan-16 | ON TIME |
| 4 | JO16A046953 | PT. Trouw Nutrition Indonesia | 6086 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6000 | Delivered | 6-Jan-16 | ON TIME |
| 5 | JO16A046954 | PT. Trouw Nutrition Indonesia | 6087 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6000 | Delivered | 6-Jan-16 | ON TIME |
| 6 | JO16A046955 | PT. Trouw Nutrition Indonesia | 6088 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6000 | Delivered | 6-Jan-16 | ON TIME |
| 7 | JO16A046956 | PT. Trouw Nutrition Indonesia | 6089 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6000 | Delivered | 6-Jan-16 | ON TIME |
| 8 | JO16A046957 | PT. Trouw Nutrition Indonesia | 6090 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6000 | Delivered | 6-Jan-16 | ON TIME |
| 9 | JO16A046958 | PT. Trouw Nutrition Indonesia | 6091 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6000 | Delivered | 6-Jan-16 | ON TIME |
| 10 | JO16A046959 | PT. Trouw Nutrition Indonesia | 6114 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6500 | Delivered | 6-Jan-16 | ON TIME |
| 11 | JO16A046960 | PT. Trouw Nutrition Indonesia | 6115 | 1120441 | 4-Jan-16 | 4-Jan-16 | 3 | 7-Jan-16 | Cileungsi Bogor | Bali | (PT. Phillips Seafoods I | MARINE | 6340 | Delivered | 6-Jan-16 | ON TIME |
| 12 | JO16A046975 | PT. Utomo Deck Metal | 0 | JO16A046975 | 4-Jan-15 | 5-Jan-16 | 3 | 8-Jan-16 | Sentul | Pasuruan | PT. Utomo Deck Metal V | 0 | 0 | Delivered | 5-Jan-16 | ON TIME |
| 13 | JO16A057022 | PT. Sopanusa Tissue | 0 | JO16A057022 | 5-Jan-16 | 5-Jan-16 | 2 | 7-Jan-16 | Ngoro, Mojokerto | Jakarta | CV. Sinar Mentari Abad | 0 | 0 | Delivered | 8-Jan-16 | LATE |
| 14 | JO16A057023 | PT. Sopanusa Tissue | 0 | JO16A057023 | 5-Jan-16 | 5-Jan-16 | 2 | 7-Jan-16 | Ngoro, Mojokerto | Jakarta | CV. Sinar Mentari Abad | 0 | 0 | Delivered | 8-Jan-16 | LATE |
| 15 | JO16A046974 | PT. BRATACO | 0 | JO16A046974 | 4-Jan-16 | 6-Jan-16 | 0 | 6-Jan-16 | Sidoarjo | Mojokerto | PT.Yakult Indonesia Per | 0 | 20 | Delivered | 6-Jan-16 | ON TIME |
| 16 | JO16A057177 | Tupperware Indonesia | 0 | JO16A057177 | 5-Jan-16 | 5-Jan-16 | 0 | 5-Jan-16 | Surabaya | Surabaya | PT. ASTA KENCANA CEME | 0 | 0 | Delivered | 5-Jan-16 | ON TIME |
| 17 | JO16A057329 | PT.Multi Indocitra Tbk. | 0 | JO16A057329 | 5-Jan-16 | 5-Jan-16 | 1 | 6-Jan-16 | Surabaya | Denpasar | CV.Sinar Bali, Jl.Mundir | 0 | 15 CBM | Delivered | 6-Jan-16 | ON TIME |
| 18 | JO16A057331 | PT. Surya Gemilang Lubricant | 150016326 | JO16A057331 | 5-Jan-16 | 5-Jan-16 | 1 | 6-Jan-16 | Sidoarjo | Kediri | INDOJAKARTA MOTOR G | 100 | 2200 | Delivered | 6-Jan-16 | ON TIME |
| 19 | JO16A057346 | Tupperware Indonesia | 0 | JO16A057346 | 5-Jan-16 | 6-Jan-16 | 0 | 6-Jan-16 | Surabaya | Surabaya | PT. VINIVICI PRIMA LEST | 0 | 0 | Delivered | 6-Jan-16 | ON TIME |

Figure 4.13 On-Time Delivery in January (PT. Tiga Permata Ekspres, 2016)

Consolidated shipment is the type of shipment service offered which is the merger of several customer orders and several destinations in one truck. In this shipment service type, the customers come to the office to handover their goods/material that will be delivered. In fact, OTD for Consolidated shipment is average 58.72% per month. Trucking shipment refers to the full-chartered freight shipment by one customer. In this service, the fleet dispatched to the customer's place to take goods/material to be then delivered to the requested destination. In this shipment service type, there is an additional fee for transporter coming to customer's site to take goods/material. In fact, OTD of Trucking shipment is average 91.00% per month. The recapitulation of OTD of Consolidated shipment from January until May 2016 is shown in Table 4.1, while OTD of Trucking shipment from January until May 2016 is shown in Table 4.2.

Table 4.1 Consolidated On-Time Delivery (OTD) in January-May 2016

| Month | Late Delivery | On Time Delivery | Delivering | LATE (%) | ON TIME (%) | DELIVERING (%) | Grand Total |
|---|---|---|---|---|---|---|---|
| January | 36 | 65 | 0 | 35.64% | 64.36% | 0.00% | 101 |
| February | 35 | 57 | 0 | 38.04% | 61.96% | 0.00% | 92 |
| March | 46 | 63 | 0 | 42.20% | 57.80% | 0.00% | 109 |
| April | 38 | 57 | 0 | 40.00% | 60.00% | 0.00% | 95 |
| May | 32 | 47 | 16 | 33.68% | 49.47% | 16.84% | 95 |
| Average | | | | 37.91% | 58.72% | 3.37% | 98 |

Source: Tiga Permata Ekspres, 2016

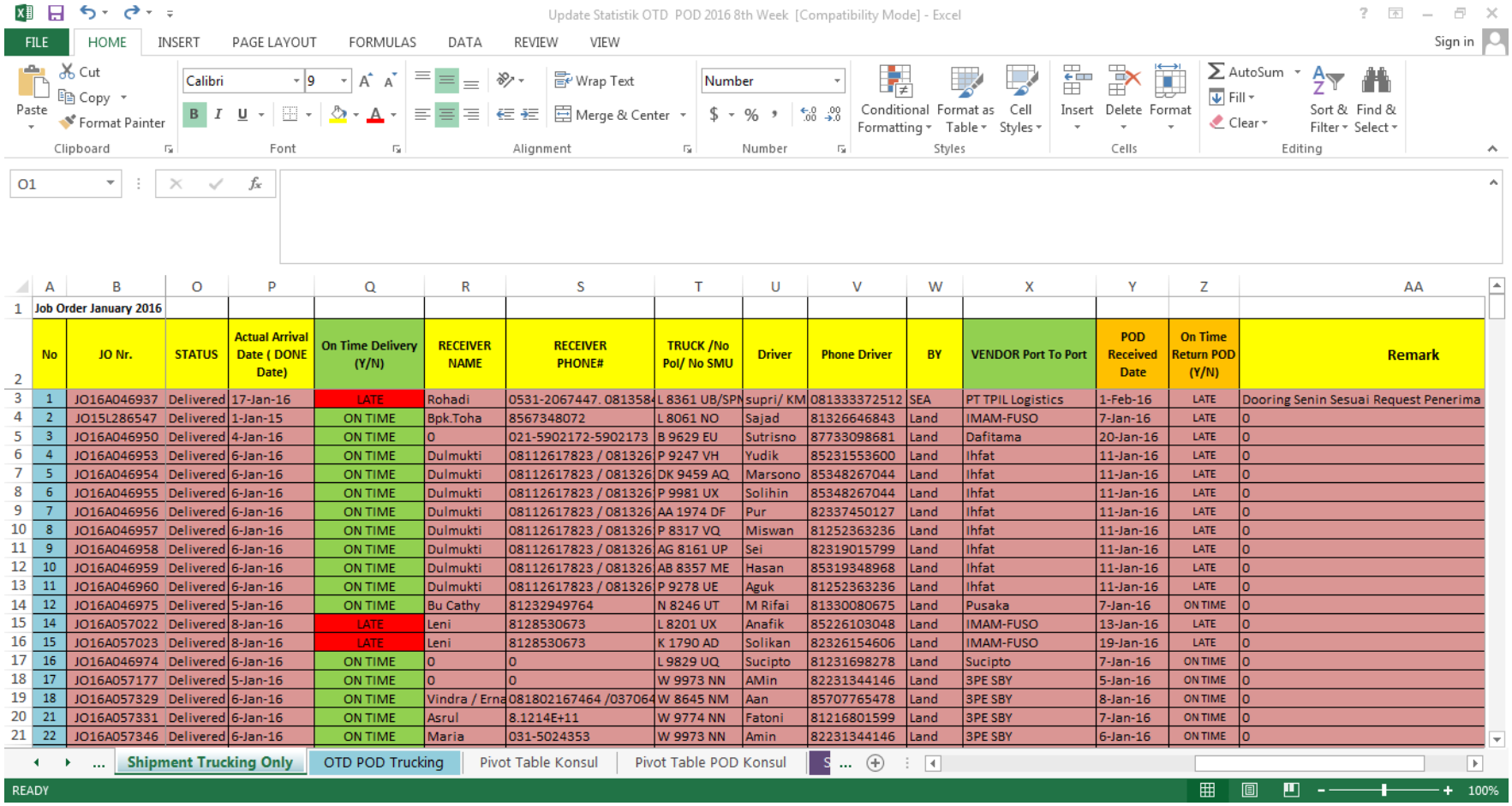
Table 4.2 Trucking On-Time Delivery (OTD) in January-May 2016

| Month | Late Delivery | On Time Delivery | Delivering | LATE (%) | ON TIME (%) | DELIVERING (%) | Grand Total |
|---|---|---|---|---|---|---|---|
| January | 20 | 137 | 0 | 12.74% | 87.26% | 0.00% | 157 |
| February | 13 | 102 | 0 | 11.30% | 88.70% | 0.00% | 115 |
| March | 14 | 177 | 0 | 7.33% | 92.67% | 0.00% | 191 |
| April | 3 | 130 | 0 | 2.26% | 97.74% | 0.00% | 133 |
| May | 5 | 133 | 12 | 3.33% | 88.67% | 8.00% | 150 |
| Average | | | | 7.40% | 91.00% | 1.60% | 7.39% |

Source: Tiga Permata Ekspres, 2016

Another KPI in Transport Division is Proof of Delivery (POD) Return in both Consolidated type and Trucking type. POD is a form listing several information to

proof that the order is delivered and received. POD should be returned by the drivers or by the Transporter from port-to-port vendor to the TA team in Transport Division after the delivery. The returns have a due date that some of PODs return late (after the due date). Figure 4.14 shows the example of POD Return in January. It notes several important related information, such as Receiver Identity, Truck Detail Information, Driver Information, Port-to-port Vendor, POD Received Date, etc.



Job Order January 2016

| No | JO Nr. | STATUS | Actual Arrival Date ( DONE Date) | On Time Delivery (Y/N) | RECEIVER NAME | RECEIVER PHONE# | TRUCK /No Pol/ No SMU | Driver | Phone Driver | BY | VENDOR Port To Port | POD Received Date | On Time Return POD (Y/N) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JO16A046937 | Delivered | 17-Jan-16 | LATE | Rohadi | 0531-2067447. 081358 | L 8361 UB/SPN | supri/ KM | 081333372512 | SEA | PT TPIL Logistics | 1-Feb-16 | LATE | Dooring Senin Sesuai Request Penerima |
| 2 | JO15L286547 | Delivered | 1-Jan-15 | ON TIME | Bpk.Toha | 8567348072 | L 8061 NO | Sajad | 81326646843 | Land | IMAM-FUSO | 7-Jan-16 | LATE | 0 |
| 3 | JO16A046950 | Delivered | 4-Jan-16 | ON TIME | 0 | 021-5902172-5902173 | B 9629 EU | Sutrisno | 87733098681 | Land | Dafitama | 20-Jan-16 | LATE | 0 |
| 4 | JO16A046953 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | P 9247 VH | Yudik | 85231553600 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 5 | JO16A046954 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | DK 9459 AQ | Marsono | 85348267044 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 6 | JO16A046955 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | P 9981 UX | Solihin | 85348267044 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 7 | JO16A046956 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | AA 1974 DF | Pur | 82337450127 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 8 | JO16A046957 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | P 8317 VQ | Miswan | 81252363236 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 9 | JO16A046958 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | AG 8161 UP | Sei | 82319015799 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 10 | JO16A046959 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | AB 8357 ME | Hasan | 85319348968 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 11 | JO16A046960 | Delivered | 6-Jan-16 | ON TIME | Dulmukti | 08112617823 / 081326 | P 9278 UE | Aguk | 81252363236 | Land | Ihfat | 11-Jan-16 | LATE | 0 |
| 12 | JO16A046975 | Delivered | 5-Jan-16 | ON TIME | Bu Cathy | 81232949764 | N 8246 UT | M Rifai | 81330080675 | Land | Pusaka | 7-Jan-16 | ON TIME | 0 |
| 13 | JO16A057022 | Delivered | 8-Jan-16 | LATE | Leni | 8128530673 | L 8201 UX | Anafik | 85226103048 | Land | IMAM-FUSO | 13-Jan-16 | LATE | 0 |
| 14 | JO16A057023 | Delivered | 8-Jan-16 | LATE | Leni | 8128530673 | K 1790 AD | Solikan | 82326154606 | Land | IMAM-FUSO | 19-Jan-16 | LATE | 0 |
| 15 | JO16A046974 | Delivered | 6-Jan-16 | ON TIME | 0 | 0 | L 9829 UQ | Sucipto | 81231698278 | Land | Sucipto | 7-Jan-16 | ON TIME | 0 |
| 16 | JO16A057177 | Delivered | 5-Jan-16 | ON TIME | 0 | 0 | W 9973 NN | AMin | 82231344146 | Land | 3PE SBY | 5-Jan-16 | ON TIME | 0 |
| 17 | JO16A057329 | Delivered | 6-Jan-16 | ON TIME | Vindra / Erna | 081802167464 /037064 | W 8645 NM | Aan | 85707765478 | Land | 3PE SBY | 8-Jan-16 | ON TIME | 0 |
| 18 | JO16A057331 | Delivered | 6-Jan-16 | ON TIME | Asrul | 8.1214E+11 | W 9774 NN | Fatoni | 81216801599 | Land | 3PE SBY | 7-Jan-16 | ON TIME | 0 |
| 19 | JO16A057346 | Delivered | 6-Jan-16 | ON TIME | Maria | 031-5024353 | W 9973 NN | Amin | 82231344146 | Land | 3PE SBY | 6-Jan-16 | ON TIME | 0 |

Figure 4.14 Proof of Delivery Return in January (PT. Tiga Permata Ekspres, 2016)

In real condition, the on time POD Return of Consolidated shipment service is 42.72% per month in average, while in Trucking shipment service is 59.02% per month in average. The recapitulation of POD Return of Consolidated shipment from January until May 2016 is shown in Table 4.3, while POD Return of Trucking shipment from January until May 2016 is shown in Table 4.4.

Table 4.3 Consolidated POD Return in January-May 2016

| Month | Late POD | On Time POD | Delivering | LATE (%) | ON TIME (%) | WAITING (%) | Grand Total |
|---|---|---|---|---|---|---|---|
| January | 42 | 41 | 18 | 41.58% | 40.59% | 17.82% | 101 |
| February | 39 | 33 | 20 | 42.39% | 35.87% | 21.74% | 92 |
| March | 49 | 29 | 31 | 44.95% | 26.61% | 28.44% | 109 |
| April | 31 | 48 | 16 | 32.63% | 50.53% | 16.84% | 95 |
| May | 27 | 57 | 11 | 28.42% | 60.00% | 11.58% | 95 |
| **Average** | | | | 38.00% | 42.72% | 19.28% | 98 |

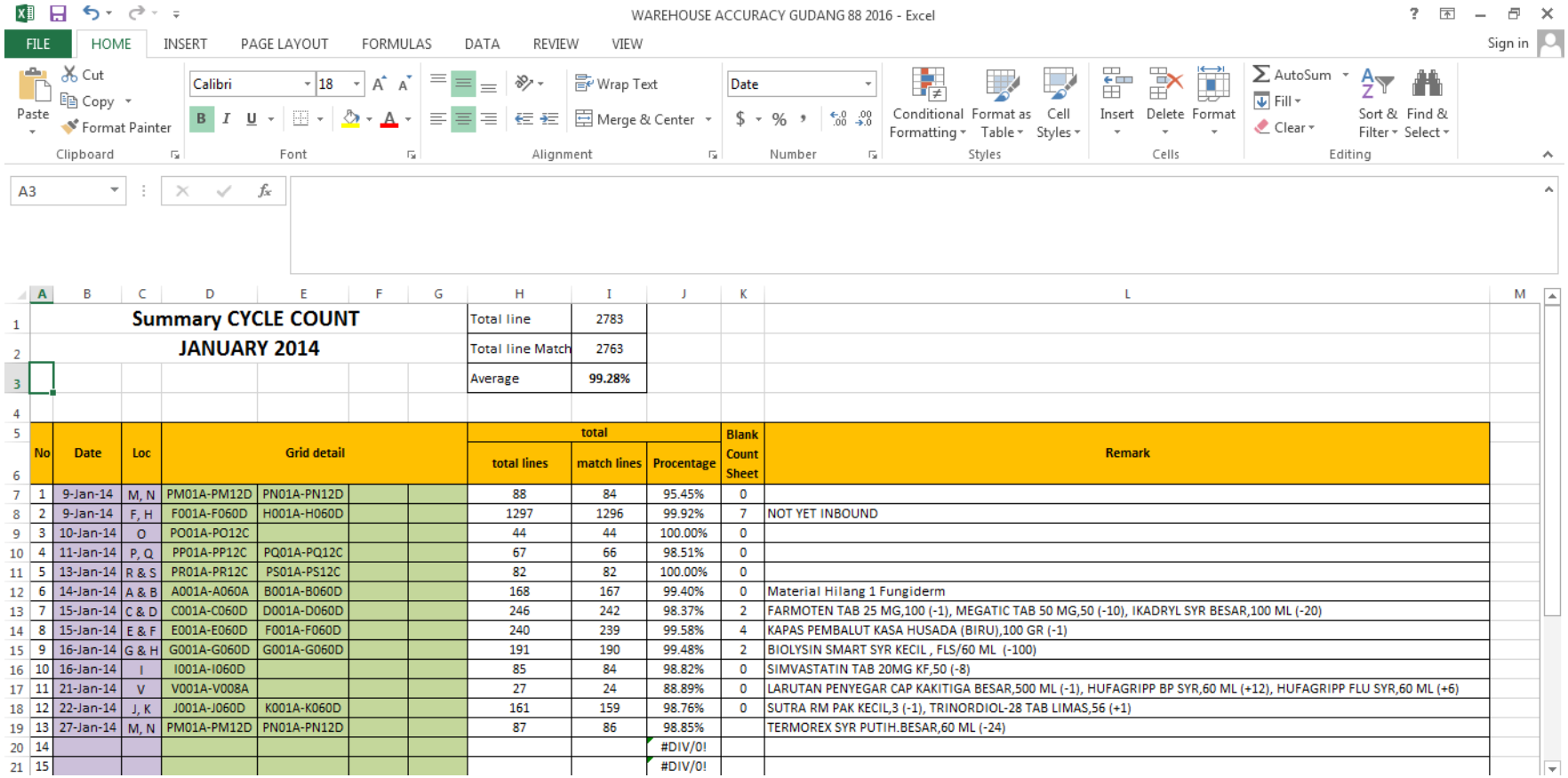
Source: Tiga Permata Ekspres, 2016

Table 4.4 Trucking POD Return in January-May 2016

| Month | Late POD | On Time POD | Delivering | LATE (%) | ON TIME (%) | WAITING (%) | Grand Total |
|---|---|---|---|---|---|---|---|
| January | 65 | 90 | 2 | 41.40% | 57.32% | 1.27% | 157 |
| February | 47 | 62 | 6 | 40.87% | 53.91% | 5.22% | 115 |
| March | 87 | 90 | 14 | 45.55% | 47.12% | 7.33% | 191 |
| April | 35 | 95 | 3 | 26.32% | 71.43% | 2.26% | 133 |
| May | 31 | 98 | 21 | 20.67% | 65.33% | 14.00% | 150 |
| **Average** | | | | 34.96% | 59.02% | 6.02% | 149 |

Source: Tiga Permata Ekspres, 2016

KPI available in Warehouse Division is Warehouse Accuracy. This KPI determines the percentage of accuracy between the lines (a line consists of one type of items in a certain amount) recorded in the system at the beginning and the ones currently stored in inventory (in actual condition).




**Summary CYCLE COUNT**
**JANUARY 2014**

| | |
|---|---|
| Total line | 2783 |
| Total line Match | 2763 |
| Average | **99.28%** |

| No | Date | Loc | Grid detail | | | | total | | | Blank Count Sheet | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | total lines | match lines | Procentage | | |
| 1 | 9-Jan-14 | M, N | PM01A-PM12D | PN01A-PN12D | | | 88 | 84 | 95.45% | 0 | |
| 2 | 9-Jan-14 | F, H | F001A-F060D | H001A-H060D | | | 1297 | 1296 | 99.92% | 7 | NOT YET INBOUND |
| 3 | 10-Jan-14 | O | PO01A-PO12C | | | | 44 | 44 | 100.00% | 0 | |
| 4 | 11-Jan-14 | P, Q | PP01A-PP12C | PQ01A-PQ12C | | | 67 | 66 | 98.51% | 0 | |
| 5 | 13-Jan-14 | R & S | PR01A-PR12C | PS01A-PS12C | | | 82 | 82 | 100.00% | 0 | |
| 6 | 14-Jan-14 | A & B | A001A-A060A | B001A-B060D | | | 168 | 167 | 99.40% | 0 | Material Hilang 1 Fungiderm |
| 7 | 15-Jan-14 | C & D | C001A-C060D | D001A-D060D | | | 246 | 242 | 98.37% | 2 | FARMOTEN TAB 25 MG,100 (-1), MEGATIC TAB 50 MG,50 (-10), IKADRYL SYR BESAR,100 ML (-20) |
| 8 | 15-Jan-14 | E & F | E001A-E060D | F001A-F060D | | | 240 | 239 | 99.58% | 4 | KAPAS PEMBALUT KASA HUSADA (BIRU),100 GR (-1) |
| 9 | 16-Jan-14 | G & H | G001A-G060D | G001A-G060D | | | 191 | 190 | 99.48% | 2 | BIOLYSIN SMART SYR KECIL , FLS/60 ML (-100) |
| 10 | 16-Jan-14 | I | I001A-I060D | | | | 85 | 84 | 98.82% | 0 | SIMVASTATIN TAB 20MG KF,50 (-8) |
| 11 | 21-Jan-14 | V | V001A-V008A | | | | 27 | 24 | 88.89% | 0 | LARUTAN PENYEGAR CAP KAKITIGA BESAR,500 ML (-1), HUFAGRIPP BP SYR,60 ML (+12), HUFAGRIPP FLU SYR,60 ML (+6) |
| 12 | 22-Jan-14 | J, K | J001A-J060D | K001A-K060D | | | 161 | 159 | 98.76% | 0 | SUTRA RM PAK KECIL,3 (-1), TRINORDIOL-28 TAB LIMAS,56 (+1) |
| 13 | 27-Jan-14 | M, N | PM01A-PM12D | PN01A-PN12D | | | 87 | 86 | 98.85% | | TERMOREX SYR PUTIH.BESAR,60 ML (-24) |
| 14 | | | | | | | | | #DIV/0! | | |
| 15 | | | | | | | | | #DIV/0! | | |

Figure 4.15 Summary Cycle Count of Warehouse Accuracy in January (PT. Tiga Permata Logistik, 2016)

Figure 4.15 shows the summary cycle count of warehouse accuracy in January. Generally, summary cycle count of warehouse accuracy is done each month. It notes several information, such as the date when the inventory is checked, the locator where the lines existed, grid detail (name of line), total lines recorded in the system, current existing match lines at actual condition, percentage of accuracy, blank count sheet to record the item or line exists in the actual yet not in the system, and the remark to note if there is a discrepancy between the actual condition and the system.

PT. Tiga Permata Logistik has set that the KPI of warehouse accuracy chould be at least 99%. In real condition, the warehouse accuracy is not always above 99%. The recapitulation of warehouse accuracy from January until May 2016 (in average) is shown in Table 4.5.

Table 4.5 Warehouse Accuracy in January - May 2016

| Month | Total Lines | Total Match Lines | Accuracy Percentage (%) | Total Blank Count Sheet |
|---|---|---|---|---|
| January | 2783 | 2763 | 99.28% | 8 |
| February | 1427 | 1392 | 97.55% | 12 |
| March | 1112 | 1107 | 99.55% | 1 |
| April | 663 | 657 | 99.10% | 0 |
| May | 89 | 89 | 100.00% | 0 |
| **Average** | **1215** | **1202** | **99.10%** | **4** |

Source: Tiga Permata Ekspres, 2016

By considering the actual condition, the existing KPI, the whole processes and operations done in this company, there are six LSQ indicators which align with the aforementioned considerations. The indicators and description aligned with companies' existing condition are shown in Table 4.6.

Table 4.6 Logistics Service Quality (LSQ) Indicator

| No. | Indicator | Description |
|---|---|---|
| 1 | Lead Time | Time occurred in order processing process (inbound) |
| | | Time occurred in material/goods unloading process, including physical checking, coloring, packaging, etc (inbound) |
| | | Time occurred in material/goods storage (inbound) |
| | | Time occurred in location recording process (inbound) |

| No. | Indicator | Description |
|---|---|---|
| | | Time occurred in documents preparation, until picking list created (outbound) |
| | | Time occurred material/goods picking and checking process (outbound) |
| | | Time occurred in documents and transportation preparation (transport) |
| | | Time occurred in material/goods loading process (transport) |
| | | Time occurred from receiving Return Note until transportation departure (return) |
| | | Time occurred in material/goods checking (return) |
| | | Time occurred in updating database (return) |
| | | Time occurred from request arrival until documents preparation (expedition) |
| | | Time occurred in goods loading process (expedition) |
| | | Time occurred in delivery (expedition) |
| | | Time occurred in POD receipt process (expedition) |
| 2 | Reliability | The ability to send POD to the customer to the due date. |
| | | The ability to deliver orders to the due date. |
| 3 | Completeness | The ability to deliver full orders in accordance with customer's order. |
| 4 | Flexibility | The ability to handle special request or urgent orders. |
| 5 | Correctness | The ability to sustain warehouse accuracy. |
| | | The ability to dispatch the right goods or orders. |
| 6 | Carefulness | The ability to keep goods undamaged during the whole shipping process. |

### 4.2.2 Measurement of Existing Logistics Service Quality (LSQ)

In this step, the company's performance is measured based on the indicators that have been developed previously. This process is done by discussion and brainstorming with the manager in the company. The measurement does not refer to the certain or current period, but it refers to average condition within five months, from January until May 2016. Here are the development of indicator measurement along with the measurement of company's performance towards the indicators.

#### 4.2.2.1 Lead Time

Lead time is the total time required to complete an operation or process. There are several activities or processes in both warehousing and expedition in which the lead time should be concerned. The company also has targeted the lead time for these activities or processes. However, at the actual condition, these

activities or processes may run either within or beyond the lead time. The list of activities or processes along with the lead time and the achievement within five months (in percentage) is presented in Table 4.7.

Table 4.7 Company's Performance for Lead Time Indicator

| Operations | Activities | Targeted Lead Time | Average Achievement of all Occurrences (%) |
|---|---|---|---|
| Inbound | Time occurred in order processing process. | 60 min | 100% |
| | Time occurred in material/goods unloading process, including physical checking, coloring, packaging, etc. | 60 min | 100% |
| | Time occurred in material/goods storage. | 60 min | 100% |
| | Time occurred in location recording process. | 60 min | 100% |
| Outbound | Time occurred in documents preparation, until picking list created. | 30 min | 100% |
| | Time occurred material/goods picking and checking process. | 60 min | 98% |
| Transport | Time occurred in documents and transportation preparation. | 30 min | 100% |
| | Time occurred in material/goods loading process. | 60 min | 100% |
| Return | Time occurred from receiving Return Note until transportation departure. | 120 min | 95% |
| | Time occurred in material/goods checking. | 30 min | 100% |
| | Time occurred in updating database. | 15 min | 100% |
| Expedition | Time occurred from request arrival until documents preparation. | 30 min | 100% |
| | Time occurred in goods loading process. | 60 min | 100% |
| | Time occurred in delivery (around Java). | 1-3 days (T)<br>1-5 days (C) | 91% (T)<br>58.72% (C) |
| | Time occurred in POD receipt process. | (2* delivery LT) + 1 | 59.02% (T)<br>42.72% (C) |
| **Average** | | | **91%** |

4.2.2.2 Reliability

The reliability refers to the ability of the company to consistently perform its required function or task. In warehousing operation, the reliability refers to the ability to send POD (Proof of Delivery) to the customer, after the distribution activity, within the agreed timeline. The reliability in warehousing operation is calculated using Formula 4.1.

$$Reliability = \frac{number\ of\ POD\ sent\ to\ the\ due\ date}{number\ of\ POD\ required\ to\ the\ due\ date}\ x\ 100\% \quad (4.1)$$

By using Formula 4.1, the reliability in warehousing operation (e.g., in January 2016 for trucking service) can be calculated as follows.

$$Reliability = \frac{90}{157}\ x\ 100\%$$

$$Reliability = 57.32\%$$

The recapitulation of reliability in warehousing operation from January 2016 until May 2016 is shown in Table 4.8.

Table 4.8 Company's Performance for Reliability Indicator in January-May 2016 (Warehousing Operation)

| Months | Number of POD sent to the due date | | Number of POD required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | 90 | 41 | 157 | 101 | 57.32% | 40.59% |
| February | 62 | 33 | 115 | 92 | 53.91% | 35.87% |
| March | 90 | 29 | 191 | 109 | 47.12% | 26.61% |
| April | 95 | 48 | 133 | 95 | 71.43% | 50.53% |
| May | 98 | 57 | 150 | 95 | 65.33% | 60.00% |
| **Average** | | | | | **59.02%** | **42.72%** |
| **Grand Average** | | | | | **50.87%** | |

Based on the calculation, the reliability in consistently sending POD to the customer to the due date is 50.87%.

In expedition, the reliability refers to the ability to deliver orders to the due date. The reliability in expedition is calculated using Formula 4.2.

$$Reliability = \frac{number\ of\ orders\ delivered\ to\ the\ due\ date}{number\ of\ orders\ required\ to\ the\ due\ date}\ x\ 100\% \quad (4.2)$$

By using Formula 4.2, the reliability in expedition (e.g., in January 2016 for trucking service) can be calculated as follows.

$$Reliability = \frac{137}{157}\ x\ 100\%$$

$$Reliability = 87.26\%$$

The recapitulation of reliability in warehousing operation from January 2016 until May 2016 is shown in Table 4.9.

Table 4.9 Company's Performance for Reliability Indicator in January-May 2016 (Expedition Operation)

| Months | Number of orders delivered to the due date | | Number of orders required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | 137 | 65 | 157 | 101 | 87.26% | 64.36% |
| February | 102 | 57 | 115 | 92 | 88.70% | 61.96% |
| March | 177 | 63 | 191 | 109 | 92.67% | 57.80% |
| April | 130 | 57 | 133 | 95 | 97.74% | 60.00% |
| May | 133 | 47 | 150 | 95 | 88.67% | 49.47% |
| **Average** | | | | | **91.01%** | **58.72%** |
| **Grand Average** | | | | | **74.86%** | |

Based on the calculation, the reliability in consistently delivering orders to the customer to the due date is 74.86%.

4.2.2.3 Completeness

The completeness refers to the ability of the company to deliver full orders in accordance with customer's order. This indicator may exist in both warehousing operation, especially in distribution activity, and expedition. For example, in distribution, the customer request the LSP to distribute a certain quantity of several items, but there is an item that is sent not as same as the quantity requested. The completeness is calculated using Formula 4.3.

$$Completeness = \frac{number\ of\ full\ orders\ delivered\ in\ a\ period}{total\ number\ of\ orders\ delivered\ in\ the\ same\ period}\ x\ 100\% \quad (4.3)$$

By using Formula 4.3, the completeness (e.g., in January 2016 for trucking service) can be calculated as follows.

$$Completeness = \frac{157}{157}\ x\ 100\%$$

$$Completeness = 100\%$$

The recapitulation of company's performance in term of completeness indicator from January 2016 until May 2016 is shown in Table 4.10.

Table 4.10 Company's Performance for Completeness Indicator in January-May 2016

| Months | Number of orders delivered fully | | Number of full orders required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | 157 | 101 | 157 | 101 | 100% | 100% |
| February | 115 | 92 | 115 | 92 | 100% | 100% |
| March | 191 | 109 | 191 | 109 | 100% | 100% |
| April | 133 | 95 | 133 | 95 | 100% | 100% |
| May | 150 | 95 | 150 | 95 | 100% | 100% |
| **Average** | | | | | **100%** | **100%** |

Based on the calculation, the completeness indicator in delivering full orders is 100% achieved.

4.2.2.4 Flexibility

The flexibility refers to the ability of the company to confirm and handle special request or urgent orders. Similar with completeness, this indicator may exist in both warehousing operation and expedition. The flexibility is calculated using Formula 4.4.

$$Flexibility = \frac{number\ of\ special/urgent\ orders\ confirmed\ to\ the\ customer}{number\ of\ special/urgent\ orders\ required\ by\ customer}\ x\ 100\% \qquad (4.4)$$

By using Formula 4.3, the flexibility (e.g., in January 2016) can be calculated as follows.

$$Flexibility = \frac{8}{8}\ x\ 100\%$$

$$Flexibility = 100\%$$

The recapitulation of company's performance in term of flexibility indicator from January 2016 until May 2016 is shown in Table 4.11.

Table 4.11 Company's Performance for Flexibility Indicator in January-May 2016

| Month | Number of special/urgent orders confirmed | Number of special/urgent orders required | Achievement (%) |
|---|---|---|---|
| January | 8 | 8 | 100.00% |
| February | 10 | 10 | 100.00% |

| Month | Number of special/urgent orders confirmed | Number of special/urgent orders required | Achievement (%) |
|---|---|---|---|
| March | 11 | 13 | 84.62% |
| April | 7 | 7 | 100.00% |
| May | 10 | 11 | 90.91% |
| **Average** | | | 95.10% |

Based on the calculation, the flexibility in confirming and handling special request or urgent order from the customer is 95.10% achieved.

4.2.2.5 Correctness

In warehousing operation, the correctness refers to the ability to sustain the warehouse accuracy. Actually this indicator is similar with the existing KPI in warehousing operation which is warehouse accuracy. Company's ability to sustain the warehouse accuracy involves the correctness in storing material/goods in accordance with the predetermined location. The correctness in warehousing operation is calculated using Formula 4.5.

$$Correctness = \frac{number\ of\ match\ lines\ in\ actual\ condition}{number\ of\ match\ lines\ recorded\ by\ system}\ x\ 100\% \qquad (4.5)$$

By using Formula 4.5, the correctness in warehousing operation (e.g., in January 2016) can be calculated as follows.

$$Correctness = \frac{2763}{2783}\ x\ 100\%$$

$$Correctness = 99.28\%$$

The recapitulation of company's performance in term of correctness indicator in warehousing operation from January 2016 until May 2016 is shown in Table 4.12.

Table 4.12 Company's Performance for Correctness Indicator in January-May 2016 (Warehousing Operation)

| Month | Number of match lines in actual condition | Number of match lines recorded by system | Achievement (%) |
|---|---|---|---|
| January | 2763 | 2783 | 99.28% |
| February | 1392 | 1427 | 97.55% |
| March | 1107 | 1112 | 99.55% |
| April | 657 | 663 | 99.10% |
| May | 89 | 89 | 100.00% |
| **Average** | | | 99.10% |

Based on the calculation, the correctness indicator in sustaining the warehouse accuracy is 99.28%.

In expedition, the correctness refers to the ability to dispatch the right goods or order. The correctness in expedition is calculated using Formula 4.6.

$$Correctness = 100\% - \left(\frac{number\ of\ orders\ dispatched\ incorrectly\ in\ a\ period}{number\ of\ orders\ dispatched\ in\ that\ period}\ x\ 100\%\right) \quad (4.6)$$

By using Formula 4.6, the correctness in expedition (e.g., in January 2016 for trucking service) can be calculated as follows.

$$Correctness = 100\% - (\frac{0}{157}\ x\ 100\%)$$

$$Correctness = 100\%$$

The recapitulation of company's performance in term of correctness indicator from January 2016 until May 2016 is shown in Table 4.13.

Table 4.13 Company's Performance for Correctness Indicator in January-May 2016 (Expedition Operation)

| Months | Number of orders dispatched incorrectly | | Total number of orders dispatched | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | 0 | 0 | 157 | 101 | 100% | 100% |
| February | 0 | 0 | 115 | 92 | 100% | 100% |
| March | 0 | 0 | 191 | 109 | 100% | 100% |
| April | 0 | 0 | 133 | 95 | 100% | 100% |
| May | 0 | 0 | 150 | 95 | 100% | 100% |
| **Average** | | | | | **100%** | **100%** |

Based on the calculation, the correctness indicator in dispatching right orders (without mistake) is 100%.

#### 4.2.2.6 Carefulness

In expedition, the carefulness refers to the ability to keep orders undamaged (in a good condition) during the whole process in shipping. The carefulness in expedition is calculated using Formula 4.8.

$$Carefulness = \frac{number\ of undamaged\ orders\ during\ shipping}{total\ number\ of\ orders\ delivered\ in\ a\ period}\ x\ 100\% \quad (4.7)$$

By using Formula 4.7, the carefulness in expedition (e.g., in January 2016) can be calculated as follows.

$$Carefulness = \frac{156}{157}\ x\ 100\%$$

$$Carefulness = 99.36\%$$

The recapitulation of company's performance in term of carefulness indicator from January 2016 until May 2016 is shown in Table 4.14.

Table 4.14 Company's Performance for Carefulness Indicator in January-May 2016

| Months | Number of orders keep undamaged during shipping | | Total number of orders delivered | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | 156 | 100 | 157 | 101 | 99.36% | 99.01% |
| February | 115 | 92 | 115 | 92 | 100.00% | 100.00% |
| March | 189 | 108 | 191 | 109 | 98.95% | 99.08% |
| April | 133 | 95 | 133 | 95 | 100.00% | 100.00% |
| May | 149 | 95 | 150 | 95 | 99.33% | 100.00% |
| **Average** | | | | | 99.53% | 99.62% |
| **Grand Average** | | | | | 99.57% | |

Based on the calculation, the carefulness indicator in keeping orders undamaged in a good condition during the whole process in shipping is 99.57%.

### 4.2.3 Assessment of Logistics Service Quality (LSQ)

Based on the development of Logistics Service Quality (LSQ) indicator explained previously, the recapitulation of indicators along with the factors of each indicator and the achievement is presented in Table 4.15.

Table 4.15 Existing Achievement of LSQ Indicators

| (Ii) | Indicator | Factor | Achievement (%) |
|---|---|---|---|
| I1 | Lead Time | Fulfillment of targeted lead time | 91% |
| I2 | Reliability | Consignment of POD to the due date | 50.87% |
| | | Orders delivery to the due date | 74.86% |
| I3 | Completeness | Full orders delivery | 100% |
| I4 | Flexibility | Confirmation and handling of special/urgent request | 95.10% |
| I5 | Correctness | Warehouse accuracy | 99.10% |
| | | Dispatch of correct goods/orders | 100% |
| I6 | Carefulness | Undamaged goods during shipping | 99.57% |

#### 4.2.3.1 Determination of Severity Level of LSQ Indicator

In this step, the severity level of each indicator is determined. This process is done by distributing questionnaire to the personals (as the respondents) of several functions related to these activities. The questionnaire consists of questionnaire of severity and questionnaire of occurrence (questionnaires presented in attachment). Here is the recapitulation of respondents who filled out the questionnaire, shown in Table 4.16.

Table 4.16 Respondents of LSQ Indicator Questionnaire

| No. | Position | Number of Respondents |
|---|---|---|
| 1 | Branch Manager | 1 |
| 2 | Manager | 2 |
| 3 | Supervisor | 2 |
| 4 | Staff | 5 |

The respondents listed above are also the respondents who fill the questionnaire of occurrence in the next step. In assigning the severity level, 1-10 scale is used (presented in attachment). The mode of severity values from all respondents are used to obtain final severity value. Table 4.17 shows the recapitulation of severity level of LSQ indicator.

Table 4.17 Severity of Indicator

| (Ii) | Indicator | Severity |
|---|---|---|
| I1 | Lead Time | 4 |
| I2 | Reliability | 7 |
| I3 | Completeness | 7 |
| I4 | Flexibility | 4 |
| I5 | Correctness | 5 |
| I6 | Carefulness | 4 |

#### 4.2.3.2 Determination of Correlation between Indicator and Problem

In this step, the correlation between each indicator and problems affecting each indicator fulfillment. This determination process is done by assigning correlation scale shown and described in Table 4.18.

Table 4.18 Description of Correlation Scale between Indicator and Problem

| Scale | Description |
|---|---|
| 9 | the indicator has high correlation with problem |
| 3 | the indicator has moderate correlation with problem |
| 1 | the indicator has weak correlation with problem |

This step is done through the questionnaire with the Branch Manager of the company as the only respondent since it is considered as the expert in the company. The recapitulation of correlation value between each indicator and problem affecting is shown in Table 4.20.

Table 4.19 Recapitulation of Correlation between Indicator and Problem

| (Ii) | Indicator | C | (Pi) | Problem |
|---|---|---|---|---|
| I1 | Lead Time | 9 | P1 | Targeted lead time cannot be fulfilled |
| I2 | Reliability | 9 | P2 | POD is not sent to the due date |
| | | 9 | P3 | Orders are not delivered to the due date |
| I3 | Completeness | 9 | P4 | Orders are not fully delivered |
| I4 | Flexibility | 9 | P5 | Special/urgent request is not confirmed and handled |
| I5 | Correctness | 9 | P6 | Low warehouse accuracy |
| | | 3 | P7 | Goods/orders are not sent correctly |
| I6 | Carefulness | 9 | P8 | Goods are damaged during shipping |

4.2.3.3 Determination of Occurrence of Problem

In this step, the occurrence of each problem affecting the indicator is determined. This process is done by distributing questionnaire to the personals (as the respondents) of several functions related to these activities. In assigning the probability of occurrence, 1-10 scale is used (presented in attachment). The mode of occurrence values from all respondents are used to obtain final occurrence value. Table 4.20 shows the recapitulation of occurrence of problem affecting indicator.

Table 4.20 Occurrence Probability of Problem

| (Pi) | Problem | Occurrence |
|---|---|---|
| P1 | Targeted lead time cannot be fulfilled | 9 |
| P2 | POD is not sent to the due date | 9 |
| P3 | Orders are not delivered to the due date | 9 |
| P4 | Orders are not fully delivered | 2 |

| (Pi) | Problem | Occurrence |
|---|---|---|
| P5 | Special/urgent request is not confirmed and handled | 7 |
| P6 | Low warehouse accuracy | 7 |
| P7 | Goods/orders are not sent correctly | 2 |
| P8 | Goods are damaged during shipping | 6 |

The severity of indicator and the occurrence of problem affecting indicator are then used in ARP calculation and combined with the risks to be processed in HOR I and HOR II.

## 4.3 Risk

This sub-chapter contains the data collection and data processing to mitigate risks that may occur in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres.

### 4.3.1 Determination of Critical Risk Events (HOR I)

HOR phase I is used in analyzing the risk in order to obtain critical risk events. There are several steps in calculation of HOR I, starts from the determination of risk events until the calculation of Aggregate Risk Potential (ARP) value. HOR I is presented in Attachment. Here are the explanations of each step in HOR I.

#### 4.3.1.1 Identification of Risk Events

Before determining and listing all potential risks that may occur in the Transport Division and Warehouse Division in these companies, it is necessary to know what activities done in these two divisions. Knowing all activities done in each division will ease the identification of risks that potentially occur in each activities. The whole activities or processes are already explained previously in company's SOP explanation and also shown in Figure 4.3 – Figure 4.12

The risk event identification process is done through the discussion with the expert in the company and brainstorming. This process is also done by considering the actual condition of these companies, the companies' objectives, existing KPI, and the SOP in the company. Thus, the risk events identified are the risks that may obstruct the objectives fulfillment. One example of the risks is the late arrival of goods in destination. This risks will obstruct one of KPIs in the

company, which is on-time delivery that should be at least 99% of all shipments. The risk events identified are listed in Table 4.21.

Table 4.21 Risk Event

| Division | Stage | (Ei) | Risk Event |
|---|---|---|---|
| **Warehouse** | Inbound | E1 | Insufficient space |
| | | E2 | Incomplete supporting documents |
| | | E3 | Damaged material/goods |
| | | E4 | Incorrect project color code packaging |
| | | E5 | Quantity discrepancy |
| | | E6 | Boxes are not properly labeled |
| | | E7 | Material/goods are not stored based on GRN |
| | | E8 | Incorrect put away location recording |
| | | E9 | Inaccurate inventory data entry |
| | | E10 | Delay in filling related documents after inbound process |
| | Outbound | E11 | Incorrect picking list |
| | | E12 | Incorrect material/goods picked |
| | | E13 | Damaged material/goods |
| | | E14 | Quantity discrepancy |
| | | E15 | Delay in generating dispatch documents |
| | | E16 | Delay in sending outbound report |
| | Transportation | E17 | Receiver cannot be contacted |
| | | E18 | Receiver/site is not ready |
| | | E19 | Incomplete/incorrect supporting documents in transport operation |
| | | E20 | Incorrect material/goods loaded to truck |
| | | E21 | Late in updating DN Tracking Report status |
| | | E22 | Incorrect shipment status |
| | | E23 | Delay in distribution |
| | | E24 | Late in submitting POD to the customer |
| | Return | E25 | Damaged material/goods |
| | | E26 | Incorrect material or labelling checking |
| | | E27 | Late in updating material database in WMS |
| | | E28 | Incorrect update of material database |
| | | E29 | Customer dissatisfaction |

| Division | Stage | (Ei) | Risk Event |
|---|---|---|---|
| Expedition | Pre-delivery | E30 | Late in confirming or replying customer request |
| | | E31 | Incorrect information in Supporting documents |
| | | E32 | Error in planning the route |
| | | E33 | Error in assigning fleet |
| | Delivery | E34 | Damaged goods |
| | | E35 | Late Delivery |
| | | E36 | Late arrival at destination |
| | | E37 | Late in updating delivery status |
| | Post-delivery | E38 | Late in submitting documents to TA |
| | | E39 | Incomplete documents submitted to TA |
| | | E40 | Incorrect information in invoice |
| | | E41 | Late in updating the system |
| | | E42 | Customer dissatisfaction |
| | | E43 | Late payment from customer |

4.3.1.2 Identification of Risk Agent (Source of Problem)

In this step, the sources of problem or also called as risk agents, which are all possible factors affecting the occurrence of risk events, are identified. This identification process is done through the discussion with the expert in the company and brainstorming. Fishbone diagram is also used to ease in obtaining risk agents. Figure 4.16 shows the example of fishbone diagram for the risk of Late arrival at destination (E36).

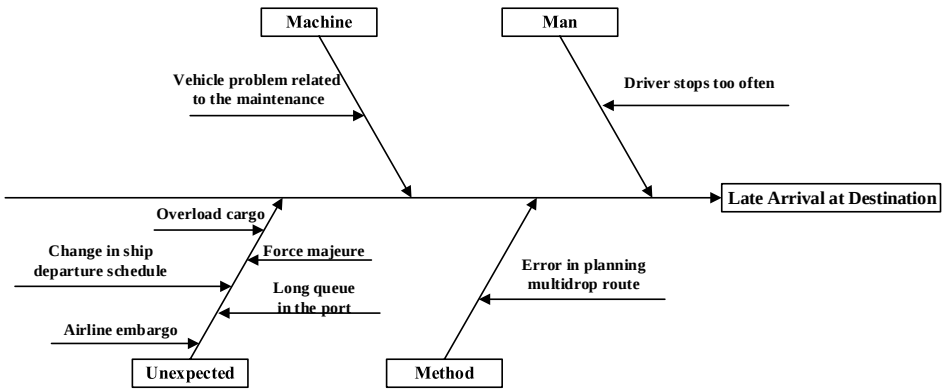



Figure 4.16 Fishbone Diagram for Risk: Late Arrival at Destination

From fishbone diagram, the cause of risk occurred can be known. Each risk event consists of at least one risk agent, while each risk agent may affects more than one risk event. The risk agents identified are listed in Table 4.22.

Table 4.22 Risk Agent (Source of Problem)

| (Ai) | Risk Agent |
|---|---|
| A1 | Customer does not send pre alert (sudden request) |
| A2 | Unoptimized space arrangement |
| A3 | Customer does not know information about required documents |
| A4 | Staff carelessness |
| A5 | Human error in checking |
| A6 | Goods are not properly arranged into the truck |
| A7 | Goods are not properly packed |
| A8 | Human error in inputting data |
| A9 | Staff indiscipline |
| A10 | Staffs are not responsive |
| A11 | System error |
| A12 | Truck tarpaulins or box leakage |
| A13 | No coordination between customer and receiver |
| A14 | Vehicle problems related to the maintenance |
| A15 | Driver stops repeatedly / too often |
| A16 | Force majeure |
| A17 | Incorrect material information |
| A18 | Lack of friendliness in customer service |
| A19 | Lack of knowledge related to problem solving |
| A20 | Lack of ability in handling the problem or complaint |
| A21 | Staff is not stand by |
| A22 | Incorrect information from customer |
| A23 | Human error in marking destination |
| A24 | Lack of route optimization knowledge |
| A25 | Unoptimized fleet assignment |
| A26 | Human error in fleet assignment |
| A27 | Lack number of fleet available |
| A28 | Error in planning the multidrop route |
| A29 | Long queue in the port |
| A30 | Overload cargo |
| A31 | Change in ship departure schedule |
| A32 | Airline embargo |
| A33 | Transporter cannot be contacted |
| A34 | Transporter is not responsive |

| (Ai) | Risk Agent |
|---|---|
| A35 | Lack of information about documents required |
| A36 | There is no good communication between admin and customers |
| A37 | Lack of information about payment |
| A38 | Unclear SOP related to the payment |

4.3.1.3 Determination of Severity Level of Risk Event

In this step, the severity level of each risk event is determined. This process is done by distributing questionnaire to the personals (as the respondents) of several functions related to these activities. The questionnaire consists of questionnaire of severity and questionnaire of occurrence (questionnaires presented in attachment). Here is the recapitulation of respondents who filled out the questionnaire, shown in Table 4.23.

Table 4.23 Recapitulation of Respondents

| No. | Position | Number of Respondents |
|---|---|---|
| 1 | Branch Manager | 1 |
| 2 | Manager | 2 |
| 3 | Supervisor | 2 |
| 4 | Staff | 5 |

The respondents listed above are also the respondents who fill the questionnaire of occurrence in the next step. In assigning the severity level, 1-10 scale is used (presented in attachment). The mode of severity values from all respondents are used to obtain final severity value. Table 4.24 shows the recapitulation of severity level of risk event.

Table 4.24 Severity of Risk Event

| (Ei) | Risk Event | Severity |
|---|---|---|
| E1 | Insufficient space | 3 |
| E2 | Incomplete supporting documents | 5 |
| E3 | Damaged material/goods | 7 |
| E4 | Incorrect project color code packaging | 3 |
| E5 | Quantity discrepancy | 7 |
| E6 | Boxes are not properly labeled | 3 |

| (Ei) | Risk Event | Severity |
|---|---|---|
| E7 | Material/goods are not stored based on GRN | 7 |
| E8 | Incorrect put away location recording | 4 |
| E9 | Inaccurate inventory data entry | 6 |
| E10 | Delay in filling related documents after inbound process | 4 |
| E11 | Incorrect picking list | 5 |
| E12 | Incorrect material/goods picked | 6 |
| E13 | Damaged material/goods | 8 |
| E14 | Quantity discrepancy | 6 |
| E15 | Delay in generating dispatch documents | 3 |
| E16 | Delay in sending outbound report | 6 |
| E17 | Receiver cannot be contacted | 2 |
| E18 | Receiver/site is not ready | 4 |
| E19 | Incomplete/incorrect supporting documents in transport operation | 3 |
| E20 | Incorrect material/goods loaded to truck | 5 |
| E21 | Late in updating DN Tracking Report status | 3 |
| E22 | Incorrect shipment status | 3 |
| E23 | Delay in distribution | 7 |
| E24 | Late in submitting POD to the customer | 6 |
| E25 | Damaged material/goods | 7 |
| E26 | Incorrect material or labelling checking | 6 |
| E27 | Late in updating material database in WMS | 4 |
| E28 | Incorrect update of material database | 4 |
| E29 | Customer dissatisfaction | 9 |
| E30 | Late in confirming or replying customer request | 2 |
| E31 | Incorrect information in Supporting documents | 2 |
| E32 | Error in planning the route | 7 |
| E33 | Error in assigning fleet | 3 |
| E34 | Damaged goods | 8 |
| E35 | Late Delivery | 8 |
| E36 | Late arrival at destination | 5 |
| E37 | Late in updating delivery status | 4 |
| E38 | Late in submitting documents to TA | 2 |
| E39 | Incomplete documents submitted to TA | 3 |
| E40 | Incorrect information in invoice | 4 |
| E41 | Late in updating the system | 4 |
| E42 | Customer dissatisfaction | 8 |
| E43 | Late payment from customer | 3 |

#### 4.3.1.4 Determination of Correlation between Risk Event and Risk Agent

In this step, the correlation between each risk event and its each risk agent is determined. This determination process is done by assigning correlation scale shown and described in Table 4.25.

Table 4.25 Correlation Scale between Risk Event and Risk Agent

| Scale | Description |
|---|---|
| 9 | the risk event has high correlation with risk agent |
| 3 | the risk event has moderate correlation with risk agent |
| 1 | the risk event has weak correlation with risk agent |

This step is done through the questionnaire with the Branch Manager of the company as the only respondent since it is considered as the expert in the company. The recapitulation of correlation value between each risk event and risk agent is shown in Table 4.26.

Table 4.26 Correlation between Risk Event and Risk Agent

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| E1 | Insufficient space | 9 | A1 | Customer does not send pre alert (sudden request) |
| | | 1 | A2 | Unoptimized space arrangement |
| E2 | Incomplete supporting documents | 9 | A3 | Customer does not know information about required documents |
| E3 | Damaged material/goods | 9 | A4 | Staff carelessness |
| | | 9 | A5 | Human error in physical checking |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| E4 | Incorrect project color code packaging | 9 | A4 | Staff carelessness |
| E5 | Quantity discrepancy | 9 | A5 | Human error in checking |
| E6 | Boxes are not properly labeled | 1 | A4 | Staff carelessness |
| | | 1 | A5 | Human error in checking |
| E7 | Material/goods are not stored based on GRN | 1 | A4 | Staff carelessness |
| E8 | Incorrect put away location recording | 1 | A4 | Staff carelessness |
| | | 1 | A8 | Human error in inputting data |
| E9 | Inaccurate inventory data entry | 9 | A4 | Staff carelessness |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | 1 | A8 | Human error in inputting data |
| E10 | Delay in filling related documents after inbound process | 1 | A9 | Staff indiscipline |
| | | 1 | A10 | Staffs are not responsive |
| | | 3 | A11 | System error |
| E11 | Incorrect picking list | 3 | A4 | Staff carelessness |
| E12 | Incorrect material/goods picked | 3 | A4 | Staff carelessness |
| | | 3 | A5 | Human error in checking |
| E13 | Damaged material/goods | 9 | A4 | Staff carelessness |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| | | 9 | A12 | Truck tarpaulins or box leakage |
| E14 | Quantity discrepancy | 1 | A5 | Human error in checking |
| E15 | Delay in generating dispatch documents | 9 | A9 | Staff indiscipline |
| | | 9 | A10 | Staffs are not responsive |
| | | 1 | A11 | System error |
| E16 | Delay in sending outbound report | 1 | A9 | Staff indiscipline |
| | | 1 | A10 | Staffs are not responsive |
| | | 3 | A11 | System error |
| E17 | Receiver cannot be contacted | 3 | A13 | No coordination between customer and receiver |
| E18 | Receiver/site is not ready | 9 | A13 | No coordination between customer and receiver |
| E19 | Incomplete/incorrect supporting documents in transport operation | 3 | A9 | Staff indiscipline |
| E20 | Incorrect material/goods loaded to truck | 9 | A5 | Human error in checking |
| E21 | Late in updating DN Tracking Report status | 9 | A9 | Staff indiscipline |
| | | 9 | A10 | Staffs are not responsive |
| E22 | Incorrect shipment status | 1 | A8 | Human error in inputting data |
| | | 9 | A9 | Staff indiscipline |
| E23 | Delay in distribution | 1 | A14 | Vehicle problems related to the maintenance |
| | | 9 | A15 | Driver stops repeatedly / too often |
| | | 3 | A16 | Force majeure |
| E24 | Late in submitting POD to the customer | 1 | A9 | Staff indiscipline |
| E25 | Damaged material/goods | 1 | A4 | Staff carelessness |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | 9 | A12 | Truck tarpaulins or box leakage |
| E26 | Incorrect material or labelling checking | 3 | A5 | Human error in checking |
| | | 3 | A17 | Incorrect material information |
| E27 | Late in updating material database in WMS | 9 | A9 | Staff indiscipline |
| | | 3 | A10 | Staffs are not responsive |
| | | 1 | A11 | System error |
| E28 | Incorrect update of material database | 9 | A8 | Human error in inputting data |
| E29 | Customer dissatisfaction | 3 | A10 | Staffs are not responsive |
| | | 3 | A18 | Lack of friendliness in customer service |
| | | 9 | A19 | Lack of knowledge related to problem solving |
| | | 9 | A20 | Lack of ability in handling the problem or complaint |
| E30 | Late in confirming or replying customer request | 9 | A9 | Staff indiscipline |
| | | 9 | A21 | Staff is not stand by |
| E31 | Incorrect information in supporting documents | 9 | A8 | Human error in inputting data |
| | | 3 | A22 | Incorrect information from customer |
| E32 | Error in planning the route | 9 | A23 | Human error in marking destination |
| | | 9 | A24 | Lack of route optimization knowledge |
| E33 | Error in assigning fleet | 9 | A25 | Unoptimized fleet assignment |
| | | 1 | A26 | Human error in fleet assignment |
| E34 | Damaged goods | 9 | A4 | Staff carelessness |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| | | 9 | A12 | Truck tarpaulins or box leakage |
| E35 | Late delivery | 3 | A10 | Staffs are not responsive |
| | | 1 | A25 | Unoptimized fleet assignment |
| | | 9 | A27 | Lack number of fleet available |
| E36 | Late arrival at destination | 3 | A14 | Vehicle problems related to the maintenance |
| | | 9 | A15 | Driver stops repeatedly / too often |
| | | 9 | A16 | Force majeure |
| | | 3 | A28 | Error in planning the multidrop route |
| | | 9 | A29 | Long queue in the port |
| | | 9 | A30 | Overload cargo |
| | | 9 | A31 | Change in ship departure schedule |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | 9 | A32 | Airline embargo |
| E37 | Late in updating delivery status | 3 | A9 | Staff indiscipline |
| | | 3 | A33 | Transporter cannot be contacted |
| | | 3 | A34 | Transporter is not responsive |
| E38 | Late in submitting documents to TA | 9 | A9 | Staff indiscipline |
| | | 1 | A10 | Staffs are not responsive |
| E39 | Incomplete documents submitted to TA | 3 | A8 | Human error in inputting data |
| | | 3 | A35 | Lack of information about documents required |
| E40 | Incorrect information in invoice | 1 | A8 | Human error in inputting data |
| E41 | Late in updating the system | 9 | A9 | Staff indiscipline |
| | | 3 | A10 | Staffs are not responsive |
| | | 9 | A11 | System error |
| E42 | Customer dissatisfaction | 9 | A10 | Staffs are not responsive |
| | | 9 | A18 | Lack of friendliness in customer service |
| | | 9 | A19 | Lack of knowledge related to problem solving |
| | | 9 | A20 | Lack of ability in handling the problem or complaint |
| E43 | Late payment from customer | 9 | A36 | There is no good communication between admin and customers |
| | | 9 | A37 | Lack of information about payment |
| | | 3 | A38 | Unclear SOP related to the payment |

4.3.1.5 Determination of Occurrence of Risk Agent

In this step, the occurrence of each risk agent is determined. This process is done by distributing questionnaire to the personals (as the respondents) of several functions related to these activities. In assigning the probability of occurrence, 1-10 scale is used (presented in attachment). The mode of occurrence values from all respondents are used to obtain final occurrence value. Table 4.27 shows the recapitulation of occurrence of risk agent.

Table 4.27 Occurrence Probability of Risk Agent

| (Ai) | Risk Agent | Occurrence |
|---|---|---|
| A1 | Customer does not send pre alert (sudden request) | 6 |

| (Ai) | Risk Agent | Occurrence |
|---|---|---|
| A2 | Unoptimized space arrangement | 6 |
| A3 | Customer does not know information about required documents | 7 |
| A4 | Staff carelessness | 9 |
| A5 | Human error in checking | 7 |
| A6 | Goods are not properly arranged into the truck | 6 |
| A7 | Goods are not properly packed | 7 |
| A8 | Human error in inputting data | 7 |
| A9 | Staff indiscipline | 9 |
| A10 | Staffs are not responsive | 7 |
| A11 | System error | 5 |
| A12 | Truck tarpaulins or box leakage | 6 |
| A13 | No coordination between customer and receiver | 6 |
| A14 | Vehicle problems related to the maintenance | 6 |
| A15 | Driver stops repeatedly / too often | 8 |
| A16 | Force majeure | 4 |
| A17 | Incorrect material information | 4 |
| A18 | Lack of friendliness in customer service | 6 |
| A19 | Lack of knowledge related to problem solving | 5 |
| A20 | Lack of ability in handling the problem or complaint | 5 |
| A21 | Staff is not stand by | 2 |
| A22 | Incorrect information from customer | 7 |
| A23 | Human error in marking destination | 4 |
| A24 | Lack of route optimization knowledge | 2 |
| A25 | Unoptimized fleet assignment | 6 |
| A26 | Human error in fleet assignment | 2 |
| A27 | Lack number of fleet available | 4 |
| A28 | Error in planning the multidrop route | 7 |
| A29 | Long queue in the port | 6 |
| A30 | Overload cargo | 2 |
| A31 | Change in ship departure schedule | 7 |
| A32 | Airline embargo | 4 |
| A33 | Transporter cannot be contacted | 6 |
| A34 | Transporter is not responsive | 8 |
| A35 | Lack of information about documents required | 7 |
| A36 | There is no good communication between admin and customers | 3 |
| A37 | Lack of information about payment | 3 |
| A38 | Unclear SOP related to the payment | 5 |

4.3.1.6 Calculation of Aggregate Risk Potential (ARP)

After the value of severity, correlation, and occurrence are identified, the next step to be done is the calculation of Aggregate Risk Potential (ARP). This calculation aims to obtain the rank of critical risk agents and problems affecting the indicator. ARP is calculated by using Formula 2.1 for both risk agents and problems affecting the indicators. Here is the example of calculation.

$$ARP_j = O_j \sum_i S_i R_{ij}$$

$$ARP_5 = O_5 x\ [(S_3 x R_{3.5}) + (S_5 x R_{5.5}) + (S_6 x R_{6.5}) + (S_{12} x R_{12.5}) + (S_{14} x R_{14.5}) + (S_{20} x R_{20.5}) + (S_{26} x R_{26.5})]$$

$$ARP_5 = 7x\ [(7x9) + (7x9) + (3x1) + (6x3) + (6x1) + (5x9) + (6x3)]$$

$$ARP_5 = 1512$$

$ARP_5$ is the value of risk agent A5 (Human error in checking). Risk Agent A5 has correlation with E3 (Damaged material/goods), E5 (Quantity discrepancy in inbound), E6 (Boxes are not properly labeled), E12 (Incorrect material/goods picked), E14 (Quantity discrepancy in outbound), E20 (Incorrect material/goods loaded in truck), and E26 (Incorrect material or labelling checking).

The same method of calculation is done for A1 – A38 and P1 – P8. The recapitulation of ARP value from A1 to A38 and from P1 to P8 is presented in Table 4.28.

Table 4.28 Recapitulation of ARP Value

| (Ai) | Risk Agent | ARP |
|---|---|---|
| A1 | Customer does not send pre alert (sudden request) | 162 |
| A2 | Unoptimized space arrangement | 18 |
| A3 | Customer does not know information about required documents | 315 |
| A4 | Staff carelessness | 3078 |
| A5 | Human error in checking | 1512 |
| A6 | Goods are not properly arranged into the truck | 1620 |
| A7 | Goods are not properly packed | 1890 |
| A8 | Human error in inputting data | 560 |
| A9 | Staff indiscipline | 2430 |
| A10 | Staffs are not responsive | 1799 |
| A11 | System error | 245 |

| (Ai) | Risk Agent | ARP |
|---|---|---|
| A12 | Truck tarpaulins or box leakage | 1242 |
| A13 | No coordination between customer and receiver | 252 |
| A14 | Vehicle problems related to the maintenance | 132 |
| A15 | Driver stops repeatedly / too often | 864 |
| A16 | Force majeure | 264 |
| A17 | Incorrect material information | 72 |
| A18 | Lack of friendliness in customer service | 594 |
| A19 | Lack of knowledge related to problem solving | 765 |
| A20 | Lack of ability in handling the problem or complaint | 765 |
| A21 | Staff is not stand by | 36 |
| A22 | Incorrect information from customer | 42 |
| A23 | Human error in marking destination | 252 |
| A24 | Lack of route optimization knowledge | 126 |
| A25 | Unoptimized fleet assignment | 210 |
| A26 | Human error in fleet assignment | 6 |
| A27 | Lack number of fleet available | 288 |
| A28 | Error in planning the multidrop route | 105 |
| A29 | Long queue in the port | 270 |
| A30 | Overload cargo | 90 |
| A31 | Change in ship departure schedule | 315 |
| A32 | Airline embargo | 180 |
| A33 | Transporter cannot be contacted | 72 |
| A34 | Transporter is not responsive | 96 |
| A35 | Lack of information about documents required | 63 |
| A36 | There is no good communication between admin and customers | 81 |
| A37 | Lack of information about payment | 81 |
| A38 | Unclear SOP related to the payment | 45 |
| **(Pi)** | **Problem** | **ARP** |
| P1 | Targeted lead time cannot be fulfilled | 324 |
| P2 | POD is not sent to the due date | 567 |
| P3 | Orders are not delivered to the due date | 567 |
| P4 | Orders are not fully delivered | 126 |
| P5 | Special/urgent request is not confirmed and handled | 252 |
| P6 | Low warehouse accuracy | 315 |
| P7 | Goods/orders are not sent correctly | 30 |
| P8 | Goods are damaged during shipping | 216 |

#### 4.3.1.7 Risk Evaluation

After the ARP has been calculated, it is continued by the risk agent rank determination. In this ranking process, several risk agents with the highest ARP values will be chosen based on Pareto concept to be processed in the next step, which is generating improvement strategy. Based on the calculation in HOR I (presented in attachment), ARP value of 38 risk agents and 8 problems are obtained. Pareto concept explains that ± 80% disruptions come from ± 20% problems. Thus, based on Pareto chart presented in Figure 4.17, there are 12 risk agents and 3 problems that contribute 79.72% and the rest contribute 20.28% from total ARP. From this Pareto concept, 12 risk agents and 3 problems are prioritized to be considerations in generating improvement strategy.

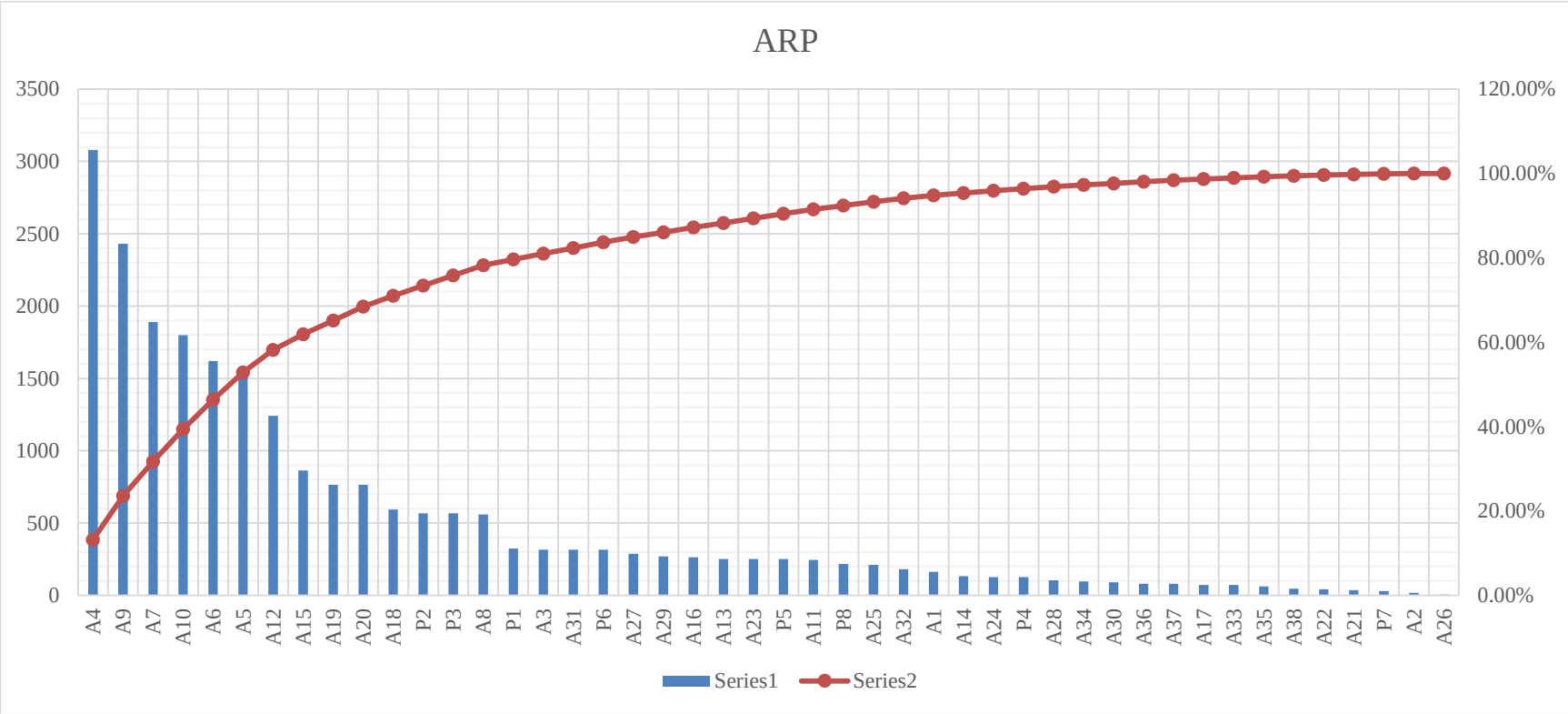



Figure 4.17 Pareto Chart of ARP

### 4.3.2 Risk Treatment (HOR II)

After all processes in HOR phase I have been done, the next step is to continue to the HOR phase II. In this stage, the improvement strategy plan will be generated to mitigate risk agents that may occur in the company. The output from the last step in HOR I will be used as input in this stage. The effectiveness and degree of difficulty will be considered in implementing the chosen mitigation strategy.

#### 4.3.2.1 Determination of Critical Risk Agents

The improvement strategy that will be generated will focus on the prioritized risk agents and indicator problems based on the Pareto concept. There are several critical risk agents and indicator problems having highest ARP value that will be prioritized, listed in Table 4.29.

Table 4.29 Critical Risk Agent and Indicator Problem

| Aj or Pj | ARPj | Risk Agent or Indicator Problem |
|---|---|---|
| A4 | 3078 | Staff carelessness |
| A9 | 2430 | Staff indiscipline |
| A7 | 1890 | Goods are not properly packed |
| A10 | 1799 | Staffs are not responsive |
| A6 | 1620 | Goods are not properly arranged into the truck |
| A5 | 1512 | Human error in physical checking |
| A12 | 1242 | Truck tarpaulins or box leakage |
| A15 | 864 | Driver stops repeatedly / too often |
| A19 | 765 | Lack of knowledge related to problem solving |
| A20 | 765 | Lack of ability in handling the problem or complaint |
| A18 | 594 | Lack of friendliness in customer service |
| P2 | 567 | POD is not sent to the due date |
| P3 | 567 | Orders are not delivered to the due date |
| A8 | 560 | Human error in inputting data |
| P1 | 324 | Targeted lead time cannot be fulfilled |

The critical risk agents and indicator problems listed will be used as the input of HOR phase II. Based on the discussion with the expert in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspress, these critical risk agents and indicator problems have high impact in the running of business indeed.

4.3.2.2 Development of Improvement Strategy

In this step, the improvement strategy plan will be developed for critical risk agents and indicator problems. Each risk agent or problem has more than one strategy alternatives and each strategy may contribute for more than one risk agent or problem. The development of improvement strategy is done through the discussion with the expert in the company and brainstorming. Therefore, the improvement strategy may be validated based on real condition in the company. All alternatives of improvement strategy listed in Table 4.30.

Table 4.30 Alternatives of Improvement Strategy

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| A4 | Staff carelessness | PA01 | The implementation of "Zero Error" principle. | The implementation of "Zero Error" principle requires the direct controlling done by manager to ensure that each staff is focus to the job description/task. It is done in order to minimize error in every task/activity. |
| | | PA02 | Inspection/quality control. | The inspection/quality control activity is added at the end of each process in which the quality is a main focus (e.g., labelling process, storing). |
| | | PA03 | Reward and punishment system. | Reward (e.g., incentive) is given to the staff who fulfills certain target, as the achievement The punishment (e.g., warning, retribution) is given to the staff who cannot fulfill the target or even causes the loss for company. It also consists of "Staff of the Month" announcement (for both the highest and lowest achievement) monthly to motivate employee to do their tasks better. |
| | | PA04 | Training to upgrade skill. | Training is necessary to be conducted in order to enhance the required skills of staffs, according to their job/tasks. |
| A9 | Staff indiscipline | PA05 | The coordinator makes plan, | The coordinator or supervisor makes clear, written plans and |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| | | | target, and gives directions. | target to the staff about according to the tasks to do. Besides, the coordinator also gives directions about how to do task efficiently. Thus, the staff can be more motivated to do their task faster and more focus. |
| | | PA01 | The implementation of "Zero Error" principle. | The implementation of "Zero Error" principle requires the direct controlling done by manager to ensure that each staff is focus to the job description/task. It is done in order to minimize error in every task/activity. |
| | | PA06 | Periodical evaluation. | The evaluation of employees' performance in each team is done periodically led by supervisor or team coordinator. |
| | | PA03 | Reward and punishment system. | Reward (e.g., incentive) is given to the staff who fulfills certain target, as the achievement The punishment (e.g., warning, retribution) is given to the staff who cannot fulfill the target or even causes the loss for company. It also consists of "Staff of the Month" announcement (for both the highest and lowest achievement) monthly to motivate employee to do their tasks better. |
| A7 | Goods are not properly packed | PA01 | The implementation of "Zero Error" principle. | The implementation of "Zero Error" principle requires the direct controlling done by manager to ensure that each staff is focus to the job description/task. It is done in order to minimize error in every task/activity. |
| | | PA02 | Inspection/quality control. | The inspection/quality control activity is added at the end of each process in which the quality is a main focus (e.g., labelling process, storing). |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| A10 | Staffs are not responsive | PA03 | Reward and punishment system. | Reward (e.g., incentive) is given to the staff who fulfills certain target, as the achievement The punishment (e.g., warning, retribution) is given to the staff who cannot fulfill the target or even causes the loss for company. It also consists of "Staff of the Month" announcement (for both the highest and lowest achievement) monthly to motivate employee to do their tasks better. |
| | | PA04 | Training to upgrade skill. | Training is necessary to be conducted in order to enhance the required skills of staffs, according to their job/tasks. |
| | | PA06 | Periodical evaluation. | The evaluation of employees' performance in each team is done periodically led by supervisor or team coordinator. |
| A6 | Goods are not properly arranged into the truck | PA05 | The coordinator makes plan, target, and gives directions. | The coordinator or supervisor makes clear, written plans and target to the staff about according to the tasks to do. Besides, the coordinator also gives directions about how to do task efficiently. Thus, the staff can be more motivated to do their task faster and more focus. |
| | | PA02 | Inspection/quality control. | The inspection/quality control activity is added at the end of each process in which the quality is a main focus (e.g., labelling process, storing). |
| A5 | Human error in physical checking | PA01 | The implementation of "Zero Error" principle. | The implementation of "Zero Error" principle requires the direct controlling done by manager to ensure that each staff is focus to the job description/task. It is done in order to minimize error in every task/activity. |
| | | PA02 | Inspection/quality control. | The inspection/quality control activity is added at the end of each process in which the |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| | | | | quality is a main focus (e.g., labelling process, storing). |
| A12 | Truck tarpaulins or box leakage | PA07 | Optimization of maintenance scheduling and periodical checkup. | The maintenance scheduling is optimized by conducting the most proper maintenance method (e.g., preventive maintenance). The truck checkup is also done periodically to minimize problem related to vehicle during shipment. |
| A15 | Driver stops repeatedly / too often | PA08 | More selective in recruiting driver and co-driver. | This strategy is done in considering the medical history, age, working history, and driving license of driver and co-driver. |
| | | PA09 | Provide health insurance. | The health insurance for drivers is done by providing some health supplies monthly (e.g., milk, honey, vitamin, medical checkup). |
| | | PA10 | Periodical direction and evaluation. | This strategy is done to build characters and integrity of drivers. |
| | | PA11 | Tolerance of total stop duration. | The management sets the maximum total duration for drivers stopping during delivery. |
| | | PA12 | Increase the intensity of monitoring and controlling. | In delivery, this strategy is done by optimizing tracking activity via GPS. The Transport Control Team should be more often in monitoring the position of the transport. |
| A19 | Lack of knowledge related to problem solving | PA13 | Increase the standard in recruitment. | There are several positions in the company which are more frequently interact with the customer, such as admin and marketing team. In recruiting and allocating human resources in these positions, the company must increase the standard of qualification, especially last education (must be min.S1), since education highly contributes to people's knowledge. |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| | | PA04 | Training to upgrade skill. | Training is necessary to be conducted in order to enhance the required skills of staffs, according to their job/tasks. |
| | | PA14 | Periodical evaluation and simulation. | This strategy aims to evaluate staffs' performance and give case study in the form of FGD and simulation, done monthly. |
| | | PA15 | Survey to customer. | Survey is done periodically to customer to know their satisfaction of the service given. From this survey, the company could know about how far the service performance, followed up by the evaluation and improvement. |
| A20 | Lack of ability in handling the problem or complaint | PA13 | Increase the standard in recruitment. | There are several positions in the company which are more frequently interact with the customer, such as admin and marketing team. In recruiting and allocating human resources in these positions, the company must increase the standard of qualification, especially last education (must be min.S1), since education highly contributes to people's knowledge. |
| | | PA04 | Training to upgrade skill. | Training is necessary to be conducted in order to enhance the required skills of staffs, according to their job/tasks. |
| | | PA14 | Periodical evaluation and simulation. | This strategy aims to evaluate staffs' performance and give case study in the form of FGD and simulation, done monthly. |
| | | PA15 | Survey to customer. | Survey is done periodically to customer to know their satisfaction of the service given. From this survey, the company could know about how far the service performance, followed up by the evaluation and improvement. |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| A18 | Lack of friendliness in customer service | PA16 | Re-evaluate the allocation of employee. | The HRD Team re-evaluates whether the allocation of employees who interact directly with customer is already fulfill "the right man in the right place". Since the customer service has important role in service provider company, and not every people has high level of patient and friendliness. |
| | | PA03 | Reward and punishment system. | Reward (e.g., incentive) is given to the staff who fulfills certain target, as the achievement The punishment (e.g., warning, retribution) is given to the staff who cannot fulfill the target or even causes the loss for company. It also consists of "Staff of the Month" announcement (for both the highest and lowest achievement) monthly to motivate employee to do their tasks better. |
| | | PA04 | Training to upgrade skill. | Training is necessary to be conducted in order to enhance the required skills of staffs, according to their job/tasks. |
| | | PA15 | Survey to customer. | Survey is done periodically to customer to know their satisfaction of the service given. From this survey, the company could know about how far the service performance, followed up by the evaluation and improvement. |
| P2 | POD is not sent to the due date | PA17 | Increase the qualification standard of vendor. | In the next vendor selection, the company must increase and determine qualification, especially in delivery duration and the due date in returning POD. It also written in an agreement between company and vendor. |
| | | PA18 | Establish good relationship with vendors. | Good relationship and communication between the company and vendor may |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| | | | | affect the performance of the vendor itself. The vendors will give the best performance for their customers having good relationship and communication to them. |
| | | PA19 | Periodical evaluation with vendors. | The company conducting evaluation periodically with the vendors to inform their performance and improvement required to do in the next period. |
| | | PA12 | Increase the intensity of monitoring and controlling. | In POD return, this strategy is done by contacting the vendor more frequently to monitor and control the POD return to be submitted quickly. |
| P3 | Orders are not delivered to the due date | PA20 | Forecasting in air-freight and sea-freight shipment. | This strategy is done to have data forecast about shipment duration when the port or airport has high, peak season, and is in normal condition. Thus, the company can be more flexible in promising days of delivery to the customer, considering to the data of high and peak season. |
| | | PA21 | Order forecasting. | This strategy is done especially for consolidated service, about how long it takes for an optimal utilization of truck. This data becomes one of considerations in determining delivery LT for consolidated service, more accurately. |
| | | PA22 | Lead time forecasting. | The delivery LT, especially in consolidated service, is also necessary to forecast, according to the destination. This data becomes one of considerations in determining delivery LT for consolidated service, more accurately. |
| | | PA23 | Reset delivery lead time. | This strategy is done especially for consolidated service by more considering the actual condition. |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| | | PA07 | Optimization of maintenance scheduling and periodical checkup. | The maintenance scheduling is optimized by conducting the most proper maintenance method (e.g., preventive maintenance). The truck checkup is also done periodically to minimize problem related to vehicle during shipment. |
| | | PA24 | Addition and rejuvenation of vehicles. | The increase of order requires the company to add some vehicles in the future. The rejuvenation is also important to replace the vehicles every 10 years with the new ones. |
| | | PA12 | Increase the intensity of monitoring and controlling. | In delivery, this strategy is done by optimizing tracking activity via GPS. The Transport Control Team should be more often in monitoring the position of the transport. |
| | | PA25 | Training for skill in planning optimization route. | This training is important for Transport Planner Team to enhance skill in optimizing route and minimizing error in routing. It also includes the skill in utilizing software available for routing. |
| A8 | Human error in inputting data | PA26 | Administration skill and ability test. | This test is done in recruiting human resource for administration team. An admin must have ability and skill in filing and processing data, including the speed and accuracy. |
| | | PA05 | The coordinator makes plan, target, and gives directions. | The coordinator or supervisor makes clear, written plans and target to the staff about according to the tasks to do. Besides, the coordinator also gives directions about how to do task efficiently. Thus, the staff can be more motivated to do their task faster and more focus. |
| | | PA01 | The implementation | The implementation of "Zero Error" principle requires the direct controlling done by |

| Risk Agent or Problem | | Improvement Strategy | | Description |
|---|---|---|---|---|
| | | | of "Zero Error" principle. | manager to ensure that each staff is focus to the job description/task. It is done in order to minimize error in every task/activity. |
| | | PA04 | Training to upgrade skill. | Training is necessary to be conducted in order to enhance the required skills of staffs, according to their job/tasks. |
| | | PA06 | Periodical evaluation. | The evaluation of employees' performance in each team is done periodically led by supervisor or team coordinator. |
| P1 | Targeted lead time cannot be fulfilled | PA27 | Make clear and written timeline/lead time of each activity | The target lead time must be written clearly and displayed so everyone can see it. |
| | | PA05 | The coordinator makes plan, target, and gives directions. | The coordinator or supervisor makes clear, written plans and target to the staff about according to the tasks to do. Besides, the coordinator also gives directions about how to do task efficiently. Thus, the staff can be more motivated to do their task faster and more focus. |
| | | PA28 | Timer system in every activity. | Every people must push the button of timer provided in every start and finish of an activity. From this strategy, it can be known which activity and personal who cannot fulfill the target LT. |
| | | PA06 | Periodical evaluation. | The evaluation of employees' performance in each team is done periodically led by supervisor or team coordinator. |

#### 4.3.2.3 Determination of Correlation between Improvement Strategy and Risk Agent

The alternatives of improvement strategy listed in Table 4.30 are then assessed for each correlation (notated with Ejk) with each risk agent or indicator

problem using HOR phase II. This determination process is done by assigning correlation scale shown and described in Table 4.31.

Table 4.31 Correlation Scale between Risk Agent or Problem and Strategy

| Scale | Description |
|---|---|
| 9 | the risk agent or problem has high correlation with strategy |
| 3 | the risk agent or problem has moderate correlation with strategy |
| 1 | the risk agent or problem has weak correlation with strategy |

This step is done through the discussion with the Branch Manager, thus the strategy can be validated by considering the real condition in the company. The recapitulation of correlation value between each risk agent or indicator problem and each strategy is shown in Table 4.32

Table 4.32 Correlation between Risk Agent or Problem and Improvement Strategy

| Risk Agent or Problem | | Improvement Strategy | | (Ejk) |
|---|---|---|---|---|
| A4 | Staff carelessness | PA01 | The implementation of "Zero Error" principle. | 9 |
| | | PA02 | Inspection/quality control. | 3 |
| | | PA03 | Reward and punishment system. | 3 |
| | | PA04 | Training to upgrade skill. | 9 |
| A9 | Staff indiscipline | PA01 | The implementation of "Zero Error" principle. | 9 |
| | | PA03 | Reward and punishment system. | 3 |
| | | PA05 | The coordinator makes plan, target, and gives directions. | 3 |
| | | PA06 | Periodical evaluation. | 9 |
| A7 | Goods are not properly packed | PA01 | The implementation of "Zero Error" principle. | 9 |
| | | PA02 | Inspection/quality control. | 9 |
| A10 | Staffs are not responsive | PA02 | Inspection/quality control. | 1 |
| | | PA03 | Reward and punishment system. | 3 |
| | | PA04 | Training to upgrade skill. | 9 |
| A6 | Goods are not properly arranged into the truck | PA05 | The coordinator makes plan, target, and gives directions. | 9 |
| | | PA06 | Periodical evaluation. | 9 |
| A5 | Human error in physical checking | PA01 | The implementation of "Zero Error" principle. | 9 |
| | | PA02 | Inspection/quality control. | 9 |
| A12 | Truck tarpaulins or box leakage | PA07 | Optimization of maintenance scheduling and periodical checkup. | 9 |

| Risk Agent or Problem | | Improvement Strategy | | (Ejk) |
|---|---|---|---|---|
| A15 | Driver stops repeatedly / too often | PA08 | More selective in recruiting driver and co-driver. | 9 |
| | | PA09 | Provide health insurance. | 3 |
| | | PA10 | Periodical direction and evaluation. | 9 |
| | | PA11 | Tolerance of total stop duration. | 9 |
| | | PA12 | Increase the intensity of monitoring and controlling. | 9 |
| A19 | Lack of knowledge related to problem solving | PA04 | Training to upgrade skill. | 9 |
| | | PA13 | Increase the standard in recruitment. | 9 |
| | | PA14 | Periodical evaluation and simulation. | 9 |
| | | PA15 | Survey to customer. | 1 |
| A20 | Lack of ability in handling the problem or complaint | PA04 | Training to upgrade skill. | 9 |
| | | PA13 | Increase the standard in recruitment. | 9 |
| | | PA14 | Periodical evaluation and simulation. | 9 |
| | | PA15 | Survey to customer. | 1 |
| A18 | Lack of friendliness in customer service | PA03 | Reward and punishment system. | 3 |
| | | PA04 | Training to upgrade skill. | 9 |
| | | PA15 | Survey to customer. | 1 |
| | | PA16 | Re-evaluate the allocation of employee. | 3 |
| P2 | POD is not sent to the due date | PA12 | Increase the intensity of monitoring and controlling. | 9 |
| | | PA17 | Increase the qualification standard of vendor. | 9 |
| | | PA18 | Establish good relationship with vendors. | 3 |
| | | PA19 | Periodical evaluation with vendors. | 9 |
| P3 | Orders are not delivered to the due date | PA07 | Optimization of maintenance scheduling and periodical checkup. | 9 |
| | | PA12 | Increase the intensity of monitoring and controlling. | 9 |
| | | PA20 | Forecasting in air-freight and sea-freight shipment. | 9 |
| | | PA21 | Order forecasting. | 9 |
| | | PA22 | Lead time forecasting. | 9 |
| | | PA23 | Reset delivery lead time. | 3 |
| | | PA24 | Addition and rejuvenation of vehicles. | 9 |
| | | PA25 | Training for skill in planning optimization route. | 9 |
| A8 | Human error in inputting data | PA01 | The implementation of “Zero Error” principle. | 9 |
| | | PA04 | Training to upgrade skill. | 9 |
| | | PA05 | The coordinator makes plan, target, and gives directions. | 1 |
| | | PA06 | Periodical evaluation. | 9 |
| | | PA26 | Administration skill and ability test. | 9 |
| P1 | Targeted lead time cannot be fulfilled | PA05 | The coordinator makes plan, target, and gives directions. | 3 |
| | | PA06 | Periodical evaluation. | 9 |

| Risk Agent or Problem | | Improvement Strategy | | (Ejk) |
|---|---|---|---|---|
| | | PA27 | Make clear and written timeline/lead time of each activity | 9 |
| | | PA28 | Timer system in every activity. | 9 |

4.3.2.4 Evaluation of Improvement Strategy

The evaluation of improvement strategy alternatives is done by firstly calculate the Total Effectiveness of Action (TEk) of each improvement strategy using Formula 2.2. Here is the example of calculation.

$$TE_k = \sum_j ARP_j E_{jk} \qquad \forall k$$

$$TE_{PA01} = (\mathrm{ARP}_4\ x\ \mathrm{E}_{41}) + (\mathrm{ARP}_9\ x\ \mathrm{E}_{91}) + (\mathrm{ARP}_7\ x\ \mathrm{E}_{71}) + (\mathrm{ARP}_5\ x\ \mathrm{E}_{51}) + (\mathrm{ARP}_8\ x\ \mathrm{E}_{81})$$

$$TE_{PA01} = (3078\ x\ 9) + (2430\ x\ 9) + (1890\ x\ 9) + (1512\ x\ 9) + (560\ x\ 9)$$

$$TE_{PA01} = 85{,}230$$

After calculation TEk value for each improvement strategy, the next step is to determine the Difficulty of Performing Action k (Dk). This value refers to the level of difficulty in performing every strategy. The scale of Dk is represented in Table 4.33.

Table 4.33 Description of Dk Scale

| Scale | Level | Description |
|---|---|---|
| 3 | Low | Easy to be implemented |
| 4 | Medium | Moderate to be implemented |
| 5 | High | Hard to be implemented |

The determination of Dk value is then continued by the calculation of Effectiveness to Difficulty Ratio of Action (ETDk). This value refers to the ratio between effectiveness of strategy implementation and the difficulty of strategy. ETDk value is calculated by using Formula 2.3. Here is the example of calculation

$$ETD_k = TE_k / D_k.$$

$$ETD_{01} = TE_{01} / D_{01}$$

$$ETD_{01} = 85{,}230/3$$

$ETD_{01} = 28{,}410$

From the result, the strategy alternatives are then ranked from the largest value of ETDk to the smallest one. The recapitulation of calculation and rank (Rk) is represented in Table 4.34.

Table 4.34 Recapitulation of Improvement Strategy Evaluation

| (PAk) | Improvement Strategy | (TEk) | (Dk) | (ETDk) | Rk |
|---|---|---|---|---|---|
| PA01 | The implementation of "Zero Error" principle. | 85,230 | 3 | 28,410 | 1 |
| PA06 | Periodical evaluation. | 44,406 | 3 | 14,802 | 2 |
| PA04 | Training to upgrade skill. | 68,049 | 5 | 13,610 | 3 |
| PA02 | Inspection/quality control. | 41,651 | 5 | 8,330 | 4 |
| PA03 | Reward and punishment system. | 23,703 | 3 | 7,901 | 5 |
| PA05 | The coordinator makes plan, target, and gives directions. | 23,402 | 3 | 7,801 | 6 |
| PA13 | Increase the standard in recruitment. | 13,770 | 3 | 4,590 | 7 |
| PA12 | Increase the intensity of monitoring and controlling. | 17,982 | 4 | 4,496 | 8 |
| PA14 | Periodical evaluation and simulation. | 13,770 | 4 | 3,443 | 9 |
| PA07 | Optimization of maintenance scheduling and periodical checkup. | 16,281 | 5 | 3,256 | 10 |
| PA08 | More selective in recruiting driver and co-driver. | 7,776 | 3 | 2,592 | 11 |
| PA10 | Periodical direction and evaluation. | 7,776 | 3 | 2,592 | 12 |
| PA11 | Tolerance of total stop duration. | 7,776 | 3 | 2,592 | 13 |
| PA26 | Administration skill and ability test. | 5,040 | 3 | 1,680 | 14 |
| PA17 | Increase the qualification standard of vendor. | 5,103 | 4 | 1,276 | 15 |
| PA19 | Periodical evaluation with vendors. | 5,103 | 4 | 1,276 | 16 |
| PA20 | Forecasting in air-freight and sea-freight shipment. | 5,103 | 4 | 1,276 | 17 |
| PA21 | Order forecasting. | 5,103 | 4 | 1,276 | 18 |
| PA22 | Lead time forecasting. | 5,103 | 4 | 1,276 | 19 |
| PA24 | Addition and rejuvenation of vehicles. | 5,103 | 5 | 1,021 | 20 |
| PA25 | Training for skill in planning optimization route. | 5,103 | 5 | 1,021 | 21 |
| PA27 | Make clear and written timeline/lead time of each activity | 2,916 | 3 | 972 | 22 |
| PA09 | Provide health insurance. | 2,592 | 4 | 648 | 23 |

| (PAk) | Improvement Strategy | (TEk) | (Dk) | (ETDk) | Rk |
|---|---|---|---|---|---|
| PA16 | Re-evaluate the allocation of employee. | 1,782 | 3 | 594 | 24 |
| PA28 | Timer system in every activity. | 2,916 | 5 | 583 | 25 |
| PA23 | Reset delivery lead time. | 1,701 | 3 | 567 | 26 |
| PA15 | Survey to customer. | 2,125 | 4 | 531 | 27 |
| PA18 | Establish good relationship with vendors. | 1,701 | 4 | 425 | 28 |

Based on the calculation the greater value of ETDk will have greater impact to the company. Based on the calculation, from 28 alternatives of improvement strategy, 10 first ranked improvement strategies will be chosen and analyzed in Chapter 5. These strategies has great impact in increasing Logistics Service Quality (LSQ) and mitigate risks that potentially happen in the company.

# CHAPTER 5
# ANALYSIS OF DETAILED STRATEGY

This chapter consists of the result of strategies proposed to be implemented. The detailed strategies will be analyzed to mitigate risks and increase the Logistics Service Quality in the company. There are 28 strategies generated in previous chapter, 10 of them are chosen to be analyzed in this chapter.

## 5.1 Implementation of "Zero Error" Principle

The "Zero Error" principle is actually adapted from the principle of "Zero Defect". The implementation of this strategy will take a quite long time until it gives impact to the improvement in the company. At the other side, it doesn't require high cost in implementation.

This strategy requires high commitment from every person in the company to do their tasks with the attempts to the zero error. The attempt in achieving zero error in every task includes the carefulness, the precision or accuracy, 5R system (*ringkas, rapi, resik, rawat, dan rajin*). Actually, 5R system/culture is already implemented in Tiga Permata Group, yet it is not optimized and seems like just a written motto. The implementation of this strategy is not out of control from supervisor. The supervisor is responsible in monitoring to ensure that the staff is focus in finishing their tasks. Moreover, the supervisor is responsible in motivating staff or employees. By implementing this strategy, any defect or error can be reduced preventively.

## 5.2 Periodical Evaluation

Periodical Evaluation is required to be done not only in every division, but also in every team. This kind of evaluation is done each team for example in Inbound Team, Inventory Team, and Outbound Team in Warehouse Division. In Transport Division, this evaluation can be done in Transport Planning Team, Transport Control Team, and Admin. Basically, this strategy does not require high cost in implementation and also is easy to do, yet effective in improving the

performance in doing activity. If it is done routinely, it will give good impact to the company improvement.

This evaluation can be done at least monthly led by supervisor or team coordinator. From this strategy, every staff's performance may be evaluated based on the assessment done by supervisor, such as staff discipline, staff responsiveness, any error occurs in each activity, the achievement of Lead Time, etc. Moreover, the important things to do in order to increase the working performance can be discussed in this evaluation. This strategy also can be a follow up method from the previous strategy, which is the implementation of "zero defect" principle.

### 5.3 Training Implementation

As the company which concerns in service, human resources have important role for company's sustainable. Training is necessary to be implemented in order to develop human resources and to increase employees' both soft skill and hard skill required in every position or job. For the implementation, training can be held once in four until six months, according to company's policy. In conducting training, the company is required to invest some high amount of money. However, the result of training highly impact to the overall performance of company. Here are several example of trainings that can be done in PT. Tiga Permata Group and PT. Tiga Permata Logistik.

- Intrapersonal and Interpersonal Skill Training: motivation, integrity, attitude commitment, leadership, conflict management, team-working, communication, etc.
- Training for Customer Service: communication, negotiation, handling complaint, problem solving, friendliness and responsiveness, etc.
- Hard Skill Training: Administration, Route Optimization, Software, etc.

### 5.4 Inspection/Quality Control

In a logistics service provider, quality control or inspection process is also required. There are several operations that require a quality control or an inspection to ensure that there is no error in the operation result. The company required to

allocate few people to do inspection or quality control. It also can even use automated quality control system in some operations.

Inspection and quality control are also required to be implemented in PT. Tiga Permata Logistik and PT. Tiga Permata Group. Tiga Permata Group needs to allocate or make inspection and quality control team consisting of at least two persons at the end of each operation that requires inspection or quality control. Here are several operations in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspress that require inspection or quality control.

- Goods and material unloading
- Goods and material physical checking
- Packaging coloring
- Labelling
- Goods and material storage based on GRN
- Location put away recording
- Goods and material picking
- Goods and material packing
- Goods and material loading

## 5.5 Reward and Punishment System

As already mentioned before that in the service provider company, human resources hold the most important role. Reward is an appreciation form given by company to the employees that fulfill certain targets set by the company. The company can give a reward in a form of incentive. Besides as an appreciation, reward is also given to motivate the employee to keep doing good performance at work. In running an organization, there should be rules and laws as the control so that the organization can perform well. If the rules and laws is not going well, there will be a conflict, both among individuals and between organizations. In some conditions, punishment can be an effective way to change employee behavior. Punishment is given to prevent a repetition of unexpected behavior and to strengthen the motivation to refrain from unexpected behavior. In the company, punishment is given in the form of warning or even retribution.

As an example, an incentive can be given to the most discipline staff while retribution as a punishment can be given to the staff who breaks the goods. The retributions from customer will be saved and allocated for training fee. Another example of reward and punishment is “Staff of the Month”. It is the method of displaying staff’s photo who can fulfill certain criteria, e.g., the most 5R and not 5R, the most discipline and indiscipline, the most friendly and unfriendly, etc. The photo of staffs who fulfill some criteria are displayed somewhere where every employee can see, e.g., canteen. This ways can affect employee to give their best performance in working and doing tasks.

In implementing reward and punishment system, it requires the role of manager to actively monitor and assess the performance of staff while working or doing tasks.

### 5.6 Plan, Target, and Direction

This strategy becomes a responsibility for all supervisor. In this strategy, the supervisor makes the plan and target for staff in every task/activity. As an example, the division and allocation of tasks for each staff in each team or division, the target of achievement, fulfillment, or time to finish. Other examples are; in goods loading activity, there must be a plan about the allocation of goods or material loaded into truck to reduce goods and material damage. In warehouse, there should be good allocation or management of goods storage. For direction, the supervisor or team coordinator could give advice to do tasks well, motivation, and other things that could make the staff fulfill or achieve the target. This strategy can reduce imbalance task division among employees in a team, increase the relationship between supervisor or coordinator and staff which lead to create a good working environment, increase staff passion in working, staff can be more focus and directed in doing tasks.

### 5.7 Increasing the Qualification Standard in Recruitment

This strategy may be implemented especially for customer service staff and admin. The problem of customer dissatisfaction to the customer service in a company can be caused by the lack of knowledge, the lack of problem solving

ability, lack of politeness, etc. These problems may be overcome by training program held by company. However, it will be more effective if there is a preventive action to solve those problems. As an example, the company can increase the qualification of longer working experience or higher education since it will affect a person's way of thinking. This also can be implemented in recruiting admin. To be an admin, it is not enough to just have ability in operating excel, for example. However, an admin must have skill in filing and processing data, high speed yet high accuracy in doing administration task, high ability in tidying file, etc.

### 5.8 Increasing the Intensity of Monitoring and Controlling

In PT. Tiga Permata Logistik ad PT. Tiga Permata Ekspress, the most frequently happen problems are orders are not delivered to the due date or within a predetermined lead time (especially in consolidated service) and POD is not sent to the due date. These problems may affect the achievement of reliability indicator.

In delivery, the late arrival problem is mostly caused by the driver stops too often. Actually, GPS is already used in tracking the fleet position, but the monitoring activity itself is not maximized yet. For the delivery that takes several days, Transport Control Team only check the position daily. They are supposed to actively monitor the fleet position, especially if it stops in suspicious places.

Late POD return is mostly caused by the late submission from vendors. In delivery, this company also frequently cooperate with port-to-port vendors. These vendors usually wait until there is enough POD gathered to be then sent to their customer since the cost consideration in sending POD document. To overcome this problem, Tiga Permata Group should be actively monitor and control the submission of POD. It should be more often in contacting vendor, thus the vendor have willingness to submit POD as fast as possible.

### 5.9 Periodical Evaluation and Simulation

There is a division in this company that mostly interacts with customer and may affect the customer dissatisfaction. This problem is mostly caused by staff ability and knowledge in problem solving and handling complaint from customer.

In order to overcome these problems, evaluation and simulation have to be conducted at least monthly. In implementing this strategy, there should be a meeting special to evaluate staffs' performance, discuss case study through Focus Group Discussion (FGD), and simulation or presentation. It will enhance the ability and knowledge in problem solving and handling complaint from customer.

## 5.10 Maintenance Scheduling and Periodical Check-up Optimization

Besides human resources, vehicles or fleets have the most important role in logistics service provider. If there is any problem related with vehicles, it will affect the running of service given. As a company concerning in warehousing operation and expedition, there should be a proper maintenance schedule to maintain vehicles owned in a good condition. The company are not supposed to do corrective maintenance only in which the vehicle is repaired whenever it is break or has problem. However, the company should have a division which is special in determining the interval of preventive maintenance and conducting preventive maintenance scheduled. Besides that, it should make a plan for vehicle periodical check-up. Here is the example of the plan of periodical check-up for vehicle that should be filled with the date of check-up by maintenance staff.

Table 5.1 Example of Vehicle Periodical Check-up Plan Form

| No. | Police Number | Periodical Check-up | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Tune-up | Engine Oil Change | Transmission Oil Change | Tires Appropriateness | Braking System | KIR Test | STNK |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| … | | | | | | | | |
| 10 | | | | | | | | |

# ATTACHMENTS

## QUESTIONNAIRE OF LOGISTICS SERVICE QUALITY (LSQ) ACHIEVEMENT

**Position : _____**

This questionnaire aims to know the achievement of several indicators aligned with the actual condition in the company in order to increase Logistics Service Quality (LSQ).

Fill out the table that has been provided, in accordance with the conditions of the company.

### 1. Lead Time

| Operations | Activities | Targeted Lead Time | Average Achievement of all Occurrences (%) |
|---|---|---|---|
| Inbound | Time occurred in order processing process. | | |
| | Time occurred in material/goods unloading process, including physical checking, coloring, packaging, etc. | | |
| | Time occurred in material/goods storage. | | |
| | Time occurred in location recording process. | | |
| Outbound | Time occurred in documents preparation, until picking list created. | | |
| | Time occurred material/goods picking and checking process. | | |
| Transport | Time occurred in documents and transportation preparation. | | |
| | Time occurred in material/goods loading process. | | |
| Return | Time occurred from receiving Return Note until transportation departure. | | |
| | Time occurred in material/goods checking. | | |
| | Time occurred in updating database. | | |

| Operations | Activities | Targeted Lead Time | Average Achievement of all Occurrences (%) |
|---|---|---|---|
| Expedition | Time occurred from request arrival until documents preparation. | | |
| | Time occurred in goods loading process. | | |
| | Time occurred in delivery (around Java). | | |
| | Time occurred in POD receipt process. | | |
| **Average** | | | |

2. **Reliability**
   ***a.*** **The ability to send POD (Proof of Delivery) to the customer, after the distribution activity, within the agreed timeline.**

$$Reliability = \frac{number\ of\ POD\ sent\ to\ the\ due\ date}{number\ of\ POD\ required\ to\ the\ due\ date}\ x\ 100\%$$

| Months | Number of POD sent to the due date | | Number of POD required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | | | | | | |
| February | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | | | |
| **Average** | | | | | | |
| **Grand Average** | | | | | | |

   ***b.*** **The ability to deliver orders to the due date.**

$$Reliability = \frac{number\ of\ orders\ delivered\ to\ the\ due\ date}{number\ of\ orders\ required\ to\ the\ due\ date}\ x\ 100\%$$

| Months | Number of orders delivered to the due date | | Number of orders required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | | | | | | |
| February | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | | | |
| **Average** | | | | | | |

| Months | Number of orders delivered to the due date | | Number of orders required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| Grand Average | | | | | | |

3. **Completeness**
   *a.* **The ability of the company to deliver full orders in accordance with customer's order.**

$$Completeness = \frac{number\ of\ full\ orders\ delivered\ in\ a\ period}{total\ number\ of\ orders\ delivered\ in\ the\ same\ period}\ x\ 100\%$$

| Months | Number of orders delivered fully | | Number of full orders required to the due date | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | | | | | | |
| February | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | | | |
| Average | | | | | | |

4. **Flexibility**
   *a.* **The ability of the company to confirm and handle special request or urgent orders.**

$$Flexibility = \frac{number\ of\ special/urgent\ orders\ confirmed\ to\ the\ customer}{number\ of\ special/urgent\ orders\ required\ by\ customer}\ x\ 100\%$$

| Month | Number of special/urgent orders confirmed | Number of special/urgent orders required | Achievement (%) |
|---|---|---|---|
| January | | | |
| February | | | |
| March | | | |
| April | | | |
| May | | | |
| Average | | | |

5. **Correctness**
   *a.* **The ability to sustain the warehouse accuracy.**

$$Correctness = \frac{number\ of\ match\ lines\ in\ actual\ condition}{number\ of\ match\ lines\ recorded\ by\ system}\ x\ 100\%$$

| Month | Number of match lines in actual condition | Number of match lines recorded by system | Achievement (%) |
|---|---|---|---|
| January | | | |
| February | | | |
| March | | | |
| April | | | |
| May | | | |
| **Average** | | | |

***b.*** **The ability to dispatch the right goods or order.**

$$Correctness = 100\% - \left(\frac{number\ of\ orders\ dispatched\ incorrectly\ in\ a\ period}{number\ of\ orders\ dispatched\ in\ that\ period}\ x\ 100\%\right)$$

| Months | Number of orders dispatched incorrectly | | Total number of orders dispatched | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | | | | | | |
| February | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | | | |
| **Average** | | | | | | |

**6. Carefulness**

***a.*** **The ability to keep orders undamaged (in a good condition) during the whole process in shipping.**

$$Carefulness = \frac{number\ of undamaged\ orders\ during\ shipping}{total\ number\ of\ orders\ delivered\ in\ a\ period}\ x\ 100\%$$

| Months | Number of orders keep undamaged during shipping | | Total number of orders delivered | | Achievement (%) | |
|---|---|---|---|---|---|---|
| | T | C | T | C | T | C |
| January | | | | | | |
| February | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | | | |
| **Average** | | | | | | |
| **Grand Average** | | | | | | |

## QUESTIONNAIRE OF RISK AND LSQ INDICATOR SEVERITY

**Position : _____**

This questionnaire aims to give value to each risk event and LSQ indicator that potentially occurs in PT. Tiga Permata Logistik and PT. Tiga Permata Ekspres, that has been identified and validated. The weight is available in scale of 1 to 10 defined and described in Table below.

| Rating | Definition | Description |
|---|---|---|
| 1 | Not Noticeable | No effect at all related to customer relationships. |
| | | No effect at all in the process of warehousing, logistics and expedition. |
| | | No effect at all on the lead time. |
| 2 | Very Minor | There is very little effect associated with customer relations, but they can be ignored |
| | | There is very little influence in the process of warehousing, logistics and expeditions, but they can be ignored |
| | | There is very little effect on the lead time, but they can be ignored. |
| 3 | Minor | Customers feel a little disturbed by the quality of services, but they can be ignored. |
| | | The process of warehousing, logistics and expedition slightly disturbed, but they can be ignored. |
| | | Lead time slightly disturbed, but the whole process can still run smoothly. |
| 4 | Slight | Customers feel quite annoyed with the quality of service. |
| | | The process of warehousing, logistics and expedition quite disturbed, but little can be ignored. |
| | | Lead time is quite disturbed, so that the whole process is also a little disturbed. |
| 5 | Moderate | Customers feel disturbed about the quality of service. |
| | | The process of warehousing, logistics and expedition disturbed, but little can be ignored. |
| | | Lead time is interrupted, so that the whole process is also a little disturbed. |
| 6 | Significant | Customers feel uncomfortable about the quality of service. |
| | | The process of warehousing, logistics and expedition very disturbed, but the process is still running normally. |
| | | Lead time is very disturbed, but the process is still running normally. |
| 7 | Major | Customers are disappointed to the quality of service. |

| Rating | Definition | Description |
|---|---|---|
| | | The process of warehousing, logistics and expedition very disturbed, the bit does not run normally. |
| | | Lead time is very disturbed, a bit not run normally. |
| 8 | Extreme | Customers are very disappointed with the quality of service. |
| | | The process of warehousing, logistics and expedition very disturbed, not quite normal walking process. |
| | | Lead time is very disturbed, the process is not quite running normally. |
| 9 | Critical | Customers cannot tolerate the quality of services provided. |
| | | The process of warehousing, logistics and expedition severely disrupted, the process is not running normally. |
| | | Lead time is very disturbed, the process is not running normally. |
| 10 | Hazardous | Many companies lose customers. |
| | | The process of warehousing, logistics and expedition cannot be run. |
| | | The process is not running because the lead time is chaotic, causing losses. |

Fill out the questionnaire by giving a check mark (√) in one of the columns of the scale (the definition and description scale previously attached) in accordance with the conditions of the company.

| Division | Stage | (Ei) | Risk Event | Severity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Warehouse** | Inbound | E1 | Insufficient space | | | | | | | | | | |
| | | E2 | Incomplete supporting documents | | | | | | | | | | |
| | | E3 | Damaged material/goods | | | | | | | | | | |
| | | E4 | Incorrect project color code packaging | | | | | | | | | | |
| | | E5 | Quantity discrepancy | | | | | | | | | | |
| | | E6 | Boxes are not properly labeled | | | | | | | | | | |
| | | E7 | Material/goods are not stored based on GRN | | | | | | | | | | |
| | | E8 | Incorrect put away location recording | | | | | | | | | | |
| | | E9 | Inaccurate inventory data entry | | | | | | | | | | |
| | | E10 | Delay in filling related documents after inbound process | | | | | | | | | | |
| | Outbound | E11 | Incorrect picking list | | | | | | | | | | |
| | | E12 | Incorrect material/goods picked | | | | | | | | | | |
| | | E13 | Damaged material/goods | | | | | | | | | | |
| | | E14 | Quantity discrepancy | | | | | | | | | | |
| | | E15 | Delay in generating dispatch documents | | | | | | | | | | |
| | | E16 | Delay in sending outbound report | | | | | | | | | | |
| | Transportation | E17 | Receiver cannot be contacted | | | | | | | | | | |
| | | E18 | Receiver/site is not ready | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | Severity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | E19 | Incomplete/incorrect supporting documents in transport operation | | | | | | | | | | |
| | | E20 | Incorrect material/goods loaded to truck | | | | | | | | | | |
| | | E21 | Late in updating DN Tracking Report status | | | | | | | | | | |
| | | E22 | Incorrect shipment status | | | | | | | | | | |
| | | E23 | Delay in distribution | | | | | | | | | | |
| | | E24 | Late in submitting POD to the customer | | | | | | | | | | |
| | Return | E25 | Damaged material/goods | | | | | | | | | | |
| | | E26 | Incorrect material or labelling checking | | | | | | | | | | |
| | | E27 | Late in updating material database in WMS | | | | | | | | | | |
| | | E28 | Incorrect update of material database | | | | | | | | | | |
| | | E29 | Customer dissatisfaction | | | | | | | | | | |
| **Expedition** | Pre-delivery | E30 | Late in confirming or replying customer request | | | | | | | | | | |
| | | E31 | Incorrect information in Supporting documents | | | | | | | | | | |
| | | E32 | Error in planning the route | | | | | | | | | | |
| | | E33 | Error in assigning fleet | | | | | | | | | | |
| | Delivery | E34 | Damaged goods | | | | | | | | | | |
| | | E35 | Late delivery | | | | | | | | | | |
| | | E36 | Late arrival at destination | | | | | | | | | | |
| | | E37 | Late in updating delivery status | | | | | | | | | | |
| | Post-delivery | E38 | Late in submitting documents to TA | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | Severity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | E39 | Incomplete documents submitted to TA | | | | | | | | | | |
| | | E40 | Incorrect information in invoice | | | | | | | | | | |
| | | E41 | Late in updating the system | | | | | | | | | | |
| | | E42 | Customer disatisfaction | | | | | | | | | | |
| | | E43 | Late payment from customer | | | | | | | | | | |

| (Ii) | Indicator | Severity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I1 | Lead Time | | | | | | | | | | |
| I2 | Reliability | | | | | | | | | | |
| I3 | Completeness | | | | | | | | | | |
| I4 | Flexibility | | | | | | | | | | |
| I5 | Correctness | | | | | | | | | | |
| I6 | Carefulness | | | | | | | | | | |

## QUESTIONNAIRE OF RISK AND PROBLEM OCCURRENCE

**Position : _____**

This questionnaire aims to assess the probability/frequency of occurrence of each risk agent and indicator problem that cause risk event identified. The assessment of probability/frequency of occurrence available in a scale of 1 to 10 defined and described below.

| Rating | Description | One Occurrence |
|---|---|---|
| 1 | Extremely Remote | In 5+ years |
| 2 | Highly Unlikely | In 3-5 years |
| 3 | Very Slight Chance | In 1-3 years |
| 4 | Slight Chance | Per year |
| 5 | Occasional | In 6 months |
| 6 | Moderate | In 3 months |
| 7 | Fairly Frequent | Per month |
| 8 | High | Per week |
| 9 | Very High | Every few days |
| 10 | Extremely High | Per day |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Warehouse** | Inbound | E1 | Insufficient space | A1 | Customer does not send pre alert (sudden request) | | | | | | | | | | |
| | | | | A2 | Unoptimized space arrangement | | | | | | | | | | |
| | | E2 | Incomplete supporting documents | A3 | Customer does not know information about required documents | | | | | | | | | | |
| | | E3 | Damaged material/goods | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A5 | Human error in physical checking | | | | | | | | | | |
| | | | | A6 | Goods are not properly arranged into the truck | | | | | | | | | | |
| | | | | A7 | Goods are not properly packed | | | | | | | | | | |
| | | E4 | Incorrect project color code packaging | A4 | Staff carelessness | | | | | | | | | | |
| | | E5 | Quantity discrepancy | A5 | Human error in checking | | | | | | | | | | |
| | | E6 | Boxes are not properly labeled | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A5 | Human error in checking | | | | | | | | | | |
| | | E7 | Material/goods are not stored based on GRN | A4 | Staff carelessness | | | | | | | | | | |
| | | E8 | Incorrect put away location recording | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A8 | Human error in inputting data | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | E9 | Inaccurate inventory data entry | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A8 | Human error in inputting data | | | | | | | | | | |
| | | E10 | Delay in filling related documents after inbound process | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A11 | System error | | | | | | | | | | |
| | Outbound | E11 | Incorrect picking list | A4 | Staff carelessness | | | | | | | | | | |
| | | E12 | Incorrect material/goods picked | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A5 | Human error in checking | | | | | | | | | | |
| | | E13 | Damaged material/goods | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A6 | Goods are not properly arranged into the truck | | | | | | | | | | |
| | | | | A7 | Goods are not properly packed | | | | | | | | | | |
| | | | | A12 | Truck tarpaulins or box leakage | | | | | | | | | | |
| | | E14 | Quantity discrepancy | A5 | Human error in checking | | | | | | | | | | |
| | | E15 | Delay in generating dispatch documents | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A11 | System error | | | | | | | | | | |
| | | E16 | Delay in sending outbound report | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A11 | System error | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Transportation | E17 | Receiver cannot be contacted | A13 | No coordination between customer and receiver | | | | | | | | | | |
| | | E18 | Receiver/site is not ready | A13 | No coordination between customer and receiver | | | | | | | | | | |
| | | E19 | Incomplete/incorrect supporting documents in transport operation | A9 | Staff indiscipline | | | | | | | | | | |
| | | E20 | Incorrect material/goods loaded to truck | A5 | Human error in checking | | | | | | | | | | |
| | | E21 | Late in updating DN Tracking Report status | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | E22 | Incorrect shipment status | A8 | Human error in inputting data | | | | | | | | | | |
| | | | | A9 | Staff indiscipline | | | | | | | | | | |
| | | E23 | Delay in distribution | A14 | Vehicle problems related to the maintenance | | | | | | | | | | |
| | | | | A15 | Driver stops repeatedly / too often | | | | | | | | | | |
| | | | | A16 | Force majeure | | | | | | | | | | |
| | | E24 | Late in submitting POD to the customer | A9 | Staff indiscipline | | | | | | | | | | |
| | Return | E25 | Damaged material/goods | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A6 | Goods are not properly arranged into the truck | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | A7 | Goods are not properly packed | | | | | | | | | | |
| | | | | A12 | Truck tarpaulins or box leakage | | | | | | | | | | |
| | | E26 | Incorrect material or labelling checking | A5 | Human error in checking | | | | | | | | | | |
| | | | | A17 | Incorrect material information | | | | | | | | | | |
| | | E27 | Late in updating material database in WMS | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A11 | System error | | | | | | | | | | |
| | | E28 | Incorrect update of material database | A8 | Human error in inputting data | | | | | | | | | | |
| | | E29 | Customer dissatisfaction | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A18 | Lack of friendliness in customer service | | | | | | | | | | |
| | | | | A19 | Lack of knowledge related to problem solving | | | | | | | | | | |
| | | | | A20 | Lack of ability in handling the problem or complaint | | | | | | | | | | |
| **Expedition** | Pre-delivery | E30 | Late in confirming or replying customer request | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A21 | Staff is not stand by | | | | | | | | | | |
| | | E31 | Incorrect information in supporting documents | A8 | Human error in inputting data | | | | | | | | | | |
| | | | | A22 | Incorrect information from customer | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | E32 | Error in planning the route | A23 | Human error in marking destination | | | | | | | | | | |
| | | | | A24 | Lack of route optimization knowledge | | | | | | | | | | |
| | | E33 | Error in assigning fleet | A25 | Unoptimized fleet assignment | | | | | | | | | | |
| | | | | A26 | Human error in fleet assignment | | | | | | | | | | |
| | Delivery | E34 | Damaged goods | A4 | Staff carelessness | | | | | | | | | | |
| | | | | A6 | Goods are not properly arranged into the truck | | | | | | | | | | |
| | | | | A7 | Goods are not properly packed | | | | | | | | | | |
| | | | | A12 | Truck tarpaulins or box leakage | | | | | | | | | | |
| | | E35 | Late delivery | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A25 | Unoptimized fleet assignment | | | | | | | | | | |
| | | | | A27 | Lack number of fleet available | | | | | | | | | | |
| | | E36 | Late arrival at destination | A14 | Vehicle problems related to the maintenance | | | | | | | | | | |
| | | | | A15 | Driver stops repeatedly / too often | | | | | | | | | | |
| | | | | A16 | Force majeure | | | | | | | | | | |
| | | | | A28 | Error in planning the multidrop route | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | A29 | Long queue in the port | | | | | | | | | | |
| | | | | A30 | Overload cargo | | | | | | | | | | |
| | | | | A31 | Change in ship departure schedule | | | | | | | | | | |
| | | | | A32 | Airline embargo | | | | | | | | | | |
| | | E37 | Late in updating delivery status | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A33 | Transporter cannot be contacted | | | | | | | | | | |
| | | | | A34 | Transporter is not responsive | | | | | | | | | | |
| | Post-delivery | E38 | Late in submitting documents to TA | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | E39 | Incomplete documents submitted to TA | A8 | Human error in inputting data | | | | | | | | | | |
| | | | | A35 | Lack of information about documents required | | | | | | | | | | |
| | | E40 | Incorrect information in invoice | A8 | Human error in inputting data | | | | | | | | | | |
| | | E41 | Late in updating the system | A9 | Staff indiscipline | | | | | | | | | | |
| | | | | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A11 | System error | | | | | | | | | | |
| | | E42 | Customer dissatisfaction | A10 | Staffs are not responsive | | | | | | | | | | |
| | | | | A18 | Lack of friendliness in customer service | | | | | | | | | | |

| Division | Stage | (Ei) | Risk Event | (Ai) | Risk Agent | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | A19 | Lack of knowledge related to problem solving | | | | | | | | | | |
| | | | | A20 | Lack of ability in handling the problem or complaint | | | | | | | | | | |
| | | E43 | Late payment from customer | A36 | There is no good communication between admin and customers | | | | | | | | | | |
| | | | | A37 | Lack of information about payment | | | | | | | | | | |
| | | | | A38 | Unclear SOP related to the payment | | | | | | | | | | |

| (Ii) | Indicator | (Pi) | Problem | Occurrence | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I1 | Lead Time | P1 | Targeted lead time cannot be fulfilled | | | | | | | | | | |
| I2 | Reliability | P2 | POD is not sent to the due date | | | | | | | | | | |
| | | P3 | Orders are not delivered to the due date | | | | | | | | | | |
| I3 | Completeness | P4 | Orders are not fully delivered | | | | | | | | | | |
| I4 | Flexibility | P5 | Special/urgent request is not confirmed and handled | | | | | | | | | | |
| I5 | Correctness | P6 | Low warehouse accuracy | | | | | | | | | | |
| | | P7 | Goods/orders are not sent correctly | | | | | | | | | | |
| I6 | Carefulness | P8 | Goods are damaged during shipping | | | | | | | | | | |

**QUESTIONNAIRE OF CORRELATION BETWEEN RISK EVENT AND RISK AGENT OR LSQ INDICATOR AND PROBLEM**

**Position : _____**

This questionnaire aims to assess the correlation between risk event and risk agent or between LSQ indicator and problem. The correlation represented in value of 1, 3, and 9 described in table below.

| Scale | Description |
|---|---|
| 9 | the risk event has high correlation with risk agent |
| 3 | the risk event has moderate correlation with risk agent |
| 1 | the risk event has weak correlation with risk agent |

Fill out the questionnaire by assigning with 1,3, or 9 (description attached previously) in available **Correlation** column.

| (Ei) | Risk Event | Correlation | (Ai) | Risk Agent |
|---|---|---|---|---|
| E1 | Insufficient space | | A1 | Customer does not send pre alert (sudden request) |
| | | | A2 | Unoptimized space arrangement |
| E2 | Incomplete supporting documents | | A3 | Customer does not know information about required documents |
| E3 | Damaged material/goods | | A4 | Staff carelessness |
| | | | A5 | Human error in physical checking |
| | | | A6 | Goods are not properly arranged into the truck |
| | | | A7 | Goods are not properly packed |
| E4 | Incorrect project color code packaging | | A4 | Staff carelessness |
| E5 | Quantity discrepancy | | A5 | Human error in checking |
| E6 | Boxes are not properly labeled | | A4 | Staff carelessness |
| | | | A5 | Human error in checking |
| E7 | Material/goods are not stored based on GRN | | A4 | Staff carelessness |
| E8 | Incorrect put away location recording | | A4 | Staff carelessness |
| | | | A8 | Human error in inputting data |
| E9 | Inaccurate inventory data entry | | A4 | Staff carelessness |
| | | | A8 | Human error in inputting data |
| E10 | Delay in filling related documents after inbound process | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| | | | A11 | System error |
| E11 | Incorrect picking list | | A4 | Staff carelessness |

| (Ei) | Risk Event | Correlation | (Ai) | Risk Agent |
|---|---|---|---|---|
| E12 | Incorrect material/goods picked | | A4 | Staff carelessness |
| | | | A5 | Human error in checking |
| E13 | Damaged material/goods | | A4 | Staff carelessness |
| | | | A6 | Goods are not properly arranged into the truck |
| | | | A7 | Goods are not properly packed |
| | | | A12 | Truck tarpaulins or box leakage |
| E14 | Quantity discrepancy | | A5 | Human error in checking |
| E15 | Delay in generating dispatch documents | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| | | | A11 | System error |
| E16 | Delay in sending outbound report | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| | | | A11 | System error |
| E17 | Receiver cannot be contacted | | A13 | No coordination between customer and receiver |
| E18 | Receiver/site is not ready | | A13 | No coordination between customer and receiver |
| E19 | Incomplete/incorrect supporting documents in transport operation | | A9 | Staff indiscipline |
| E20 | Incorrect material/goods loaded to truck | | A5 | Human error in checking |
| E21 | Late in updating DN Tracking Report status | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| E22 | Incorrect shipment status | | A8 | Human error in inputting data |
| | | | A9 | Staff indiscipline |
| E23 | Delay in distribution | | A14 | Vehicle problems related to the maintenance |

| (Ei) | Risk Event | Correlation | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | | A15 | Driver stops repeatedly / too often |
| | | | A16 | Force majeure |
| E24 | Late in submitting POD to the customer | | A9 | Staff indiscipline |
| E25 | Damaged material/goods | | A4 | Staff carelessness |
| | | | A6 | Goods are not properly arranged into the truck |
| | | | A7 | Goods are not properly packed |
| | | | A12 | Truck tarpaulins or box leakage |
| E26 | Incorrect material or labelling checking | | A5 | Human error in checking |
| | | | A17 | Incorrect material information |
| E27 | Late in updating material database in WMS | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| | | | A11 | System error |
| E28 | Incorrect update of material database | | A8 | Human error in inputting data |
| E29 | Customer dissatisfaction | | A10 | Staffs are not responsive |
| | | | A18 | Lack of friendliness in customer service |
| | | | A19 | Lack of knowledge related to problem solving |
| | | | A20 | Lack of ability in handling the problem or complaint |
| E30 | Late in confirming or replying customer request | | A9 | Staff indiscipline |
| | | | A21 | Staff is not stand by |
| E31 | Incorrect information in supporting documents | | A8 | Human error in inputting data |
| | | | A22 | Incorrect information from customer |
| E32 | Error in planning the route | | A23 | Human error in marking destination |
| | | | A24 | Lack of route optimization knowledge |

| (Ei) | Risk Event | Correlation | (Ai) | Risk Agent |
|---|---|---|---|---|
| E33 | Error in assigning fleet | | A25 | Unoptimized fleet assignment |
| | | | A26 | Human error in fleet assignment |
| E34 | Damaged goods | | A4 | Staff carelessness |
| | | | A6 | Goods are not properly arranged into the truck |
| | | | A7 | Goods are not properly packed |
| | | | A12 | Truck tarpaulins or box leakage |
| E35 | Late delivery | | A10 | Staffs are not responsive |
| | | | A25 | Unoptimized fleet assignment |
| | | | A27 | Lack number of fleet available |
| E36 | Late arrival at destination | | A14 | Vehicle problems related to the maintenance |
| | | | A15 | Driver stops repeatedly / too often |
| | | | A16 | Force majeure |
| | | | A28 | Error in planning the multidrop route |
| | | | A29 | Long queue in the port |
| | | | A30 | Overload cargo |
| | | | A31 | Change in ship departure schedule |
| | | | A32 | Airline embargo |
| E37 | Late in updating delivery status | | A9 | Staff indiscipline |
| | | | A33 | Transporter cannot be contacted |
| | | | A34 | Transporter is not responsive |
| E38 | Late in submitting documents to TA | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| E39 | Incomplete documents submitted to TA | | A8 | Human error in inputting data |

| (Ei) | Risk Event | Correlation | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | | A35 | Lack of information about documents required |
| E40 | Incorrect information in invoice | | A8 | Human error in inputting data |
| E41 | Late in updating the system | | A9 | Staff indiscipline |
| | | | A10 | Staffs are not responsive |
| | | | A11 | System error |
| E42 | Customer dissatisfaction | | A10 | Staffs are not responsive |
| | | | A18 | Lack of friendliness in customer service |
| | | | A19 | Lack of knowledge related to problem solving |
| | | | A20 | Lack of ability in handling the problem or complaint |
| E43 | Late payment from customer | | A36 | There is no good communication between admin and customers |
| | | | A37 | Lack of information about payment |
| | | | A38 | Unclear SOP related to the payment |

| (Ii) | Indicator | Correlation | (Pi) | Problem |
|---|---|---|---|---|
| I1 | Lead Time | | P1 | Targeted lead time cannot be fulfilled |
| I2 | Reliability | | P2 | POD is not sent to the due date |
| | | | P3 | Orders are not delivered to the due date |
| I3 | Completeness | | P4 | Orders are not fully delivered |
| I4 | Flexibility | | P5 | Special/urgent request is not confirmed and handled |
| I5 | Correctness | | P6 | Low warehouse accuracy |
| | | | P7 | Goods/orders are not sent correctly |
| I6 | Carefulness | | P8 | Goods are damaged during shipping |

## SEVERITY RECAPITULATION

| (Ei) | Risk Event | Respondent | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| E1 | Insufficient space | 4 | 2 | 7 | 3 | 4 | 3 | 3 | 3 | 7 | 7 | 3 |
| E2 | Incomplete supporting documents | 5 | 3 | 5 | 4 | 5 | 3 | 4 | 3 | 5 | 5 | 5 |
| E3 | Damaged material/goods | 7 | 6 | 8 | 6 | 7 | 3 | 7 | 7 | 8 | 5 | 7 |
| E4 | Incorrect project color code packaging | 3 | 6 | 3 | 8 | 3 | 2 | 7 | 8 | 3 | 5 | 3 |
| E5 | Quantity discrepancy | 7 | 10 | 6 | 8 | 7 | 2 | 7 | 7 | 10 | 9 | 7 |
| E6 | Boxes are not properly labeled | 3 | 6 | 3 | 5 | 3 | 2 | 6 | 6 | 3 | 5 | 3 |
| E7 | Material/goods are not stored based on GRN | 7 | 6 | 4 | 7 | 7 | 4 | 7 | 7 | 9 | 9 | 7 |
| E8 | Incorrect put away location recording | 4 | 6 | 4 | 2 | 4 | 3 | 7 | 9 | 4 | 9 | 4 |
| E9 | Inaccurate inventory data entry | 6 | 7 | 3 | 4 | 6 | 2 | 8 | 6 | 9 | 9 | 6 |
| E10 | Delay in filling related documents after inbound process | 3 | 7 | 4 | 4 | 3 | 4 | 7 | 4 | 4 | 7 | 4 |
| E11 | Incorrect pick list | 4 | 10 | 5 | 3 | 5 | 5 | 7 | 10 | 5 | 9 | 5 |
| E12 | Incorrect material/goods picked | 6 | 10 | 5 | 5 | 10 | 3 | 6 | 6 | 10 | 9 | 6 |
| E13 | Damaged material/goods | 8 | 10 | 8 | 9 | 10 | 3 | 7 | 10 | 8 | 9 | 8 |
| E14 | Quantity discrepancy | 6 | 9 | 6 | 6 | 9 | 3 | 6 | 6 | 9 | 9 | 6 |
| E15 | Delay in generating dispatch documents | 3 | 7 | 7 | 3 | 3 | 3 | 6 | 7 | 3 | 7 | 3 |
| E16 | Delay in sending outbound report | 2 | 6 | 5 | 4 | 6 | 4 | 6 | 6 | 6 | 6 | 6 |
| E17 | Receiver cannot be contacted | 3 | 7 | 3 | 2 | 2 | 2 | 2 | 8 | 2 | 8 | 2 |
| E18 | Receiver/site is not ready | 4 | 7 | 3 | 4 | 3 | 1 | 2 | 4 | 7 | 8 | 4 |
| E19 | Incomplete/incorrect supporting documents in transport operation | 3 | 6 | 5 | 3 | 5 | 1 | 2 | 8 | 3 | 8 | 3 |
| E20 | Incorrect material/goods loaded to truck | 5 | 6 | 5 | 7 | 5 | 3 | 3 | 5 | 10 | 10 | 5 |

| (Ei) | Risk Event | Respondent | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| E21 | Late in updating DN Tracking Report status | 5 | 6 | 4 | 7 | 3 | 3 | 3 | 9 | 3 | 9 | 3 |
| E22 | Incorrect shipment status | 3 | 6 | 4 | 8 | 4 | 3 | 2 | 3 | 9 | 9 | 3 |
| E23 | Delay in distribution | 4 | 6 | 7 | 8 | 7 | 2 | 3 | 10 | 7 | 10 | 7 |
| E24 | Late in submitting POD to the customer | 6 | 6 | 6 | 8 | 6 | 2 | 3 | 6 | 10 | 10 | 6 |
| E25 | Damaged material/goods | 7 | 7 | 8 | 7 | 7 | 1 | 3 | 10 | 7 | 10 | 7 |
| E26 | Incorrect material or labelling checking | 6 | 7 | 7 | 6 | 6 | 1 | 3 | 6 | 9 | 9 | 6 |
| E27 | Late in updating material database in WMS | 4 | 7 | 5 | 6 | 6 | 2 | 4 | 9 | 4 | 9 | 4 |
| E28 | Incorrect update of material database | 4 | 7 | 5 | 8 | 8 | 2 | 4 | 4 | 10 | 10 | 4 |
| E29 | Customer dissatisfaction | 8 | 7 | 9 | 9 | 9 | 2 | 3 | 10 | 9 | 10 | 9 |
| E30 | Late in confirming or replying customer request | 2 | 5 | 9 | 7 | 1 | 1 | 2 | 2 | 9 | 10 | 2 |
| E31 | Incorrect information in Supporting documents | 2 | 5 | 6 | 5 | 1 | 1 | 2 | 6 | 2 | 10 | 2 |
| E32 | Error in planning the route | 3 | 5 | 7 | 6 | 1 | 1 | 2 | 7 | 7 | 10 | 7 |
| E33 | Error in assigning fleet | 3 | 5 | 7 | 3 | 1 | 1 | 2 | 3 | 7 | 10 | 3 |
| E34 | Damaged goods | 8 | 7 | 8 | 6 | 3 | 1 | 3 | 8 | 8 | 10 | 8 |
| E35 | Late delivery | 6 | 7 | 8 | 5 | 4 | 2 | 4 | 8 | 8 | 10 | 8 |
| E36 | Late arrival at destination | 5 | 7 | 8 | 5 | 4 | 1 | 4 | 5 | 8 | 10 | 5 |
| E37 | Late in updating delivery status | 4 | 7 | 7 | 5 | 4 | 2 | 4 | 7 | 4 | 9 | 4 |
| E38 | Late in submitting documents to TA | 2 | 2 | 5 | 5 | 4 | 2 | 4 | 2 | 5 | 9 | 2 |
| E39 | Incomplete documents submitted to TA | 3 | 3 | 5 | 5 | 4 | 1 | 4 | 5 | 3 | 7 | 3 |
| E40 | Incorrect information in invoice | 4 | 10 | 4 | 6 | 4 | 1 | 4 | 4 | 10 | 10 | 4 |
| E41 | Late in updating the system | 2 | 6 | 5 | 7 | 4 | 1 | 4 | 4 | 5 | 10 | 4 |
| E42 | Customer dissatisfaction | 8 | 10 | 9 | 8 | 8 | 1 | 3 | 10 | 8 | 10 | 8 |
| E43 | Late payment from customer | 8 | 3 | 3 | 9 | 8 | 2 | 7 | 3 | 4 | 9 | 3 |

| (Ii) | Indicator | Respondent | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| I1 | Lead Time | 4 | 6 | 4 | 2 | 4 | 3 | 7 | 9 | 4 | 9 | 4 |
| I2 | Reliability | 7 | 6 | 4 | 7 | 7 | 4 | 7 | 7 | 9 | 9 | 7 |
| I3 | Completeness | 7 | 10 | 6 | 8 | 7 | 2 | 7 | 7 | 10 | 9 | 7 |
| I4 | Flexibility | 3 | 7 | 4 | 4 | 3 | 4 | 7 | 4 | 4 | 7 | 4 |
| I5 | Correctness | 4 | 10 | 5 | 3 | 5 | 5 | 7 | 10 | 5 | 9 | 5 |
| I6 | Carefulness | 2 | 6 | 5 | 7 | 4 | 1 | 4 | 4 | 5 | 10 | 4 |

## OCCURRENCE RECAPITULATION

| (Ai) | Risk Agent | Respondent | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| A1 | Customer does not send pre alert (sudden request) | 6 | 8 | 1 | 9 | 4 | 6 | 5 | 7 | 7 | 9 | 6 |
| A2 | Unoptimized space arrangement | 6 | 10 | 3 | 6 | 5 | 6 | 4 | 5 | 4 | 1 | 6 |
| A3 | Customer does not know information about required documents | 6 | 7 | 3 | 2 | 5 | 7 | 4 | 3 | 8 | 1 | 7 |
| A4 | Staff carelessness | 5 | 9 | 5 | 4 | 9 | 6 | 3 | 9 | 7 | 2 | 9 |
| A5 | Human error in physical checking | 5 | 9 | 6 | 2 | 5 | 7 | 7 | 8 | 7 | 1 | 7 |
| A6 | Goods are not properly arranged into the truck | 2 | 6 | 4 | 5 | 6 | 9 | 6 | 4 | 3 | 1 | 6 |
| A7 | Goods are not properly packed | 3 | 7 | 4 | 2 | 7 | 7 | 5 | 6 | 4 | 1 | 7 |
| A8 | Human error in inputting data | 3 | 7 | 4 | 4 | 5 | 7 | 6 | 3 | 7 | 2 | 7 |
| A9 | Staff indiscipline | 4 | 5 | 8 | 7 | 9 | 6 | 7 | 9 | 9 | 1 | 9 |
| A10 | Staffs are not responsive | 3 | 9 | 5 | 6 | 5 | 7 | 4 | 7 | 7 | 2 | 7 |
| A11 | System error | 5 | 6 | 2 | 5 | 4 | 7 | 3 | 2 | 5 | 2 | 5 |
| A12 | Truck tarpaulins or box leakage | 5 | 6 | 4 | 6 | 5 | 5 | 6 | 3 | 6 | 2 | 6 |
| A13 | No coordination between customer and receiver | 3 | 6 | 4 | 6 | 6 | 7 | 5 | 5 | 7 | 2 | 6 |
| A14 | Vehicle problems related to the maintenance | 4 | 6 | 4 | 8 | 6 | 5 | 6 | 6 | 5 | 2 | 6 |
| A15 | Driver stops repeatedly / too often | 3 | 5 | 4 | 10 | 8 | 5 | 7 | 8 | 8 | 1 | 8 |
| A16 | Force majeure | 4 | 4 | 2 | 1 | 4 | 6 | 6 | 3 | 5 | 3 | 4 |
| A17 | Incorrect material information | 4 | 6 | 4 | 9 | 3 | 5 | 6 | 4 | 2 | 1 | 4 |
| A18 | Lack of friendliness in customer service | 2 | 4 | 2 | 3 | 6 | 6 | 5 | 6 | 5 | 1 | 6 |
| A19 | Lack of knowledge related to problem solving | 4 | 2 | 4 | 5 | 5 | 6 | 7 | 5 | 3 | 1 | 5 |
| A20 | Lack of ability in handling the problem or complaint | 3 | 2 | 4 | 5 | 4 | 6 | 5 | 3 | 5 | 1 | 5 |

| (Ai) | Risk Agent | Respondent | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| A21 | Staff is not stand by | 4 | 2 | 2 | 1 | 1 | 6 | 7 | 2 | 3 | 2 | 2 |
| A22 | Incorrect information from customer | 3 | 5 | 2 | 4 | 3 | 7 | 7 | 4 | 7 | 2 | 7 |
| A23 | Human error in marking destination | 4 | 3 | 2 | 4 | 1 | 7 | 6 | 5 | 6 | 1 | 4 |
| A24 | Lack of route optimization knowledge | 2 | 3 | 2 | 3 | 3 | 7 | 6 | 2 | 4 | 1 | 2 |
| A25 | Unoptimized fleet assignment | 6 | 6 | 2 | 4 | 5 | 7 | 6 | 4 | 2 | 1 | 6 |
| A26 | Human error in fleet assignment | 3 | 6 | 2 | 2 | 3 | 7 | 6 | 4 | 2 | 1 | 2 |
| A27 | Lack number of fleet available | 4 | 4 | 3 | 9 | 3 | 7 | 6 | 4 | 5 | 3 | 4 |
| A28 | Error in planning the multidrop route | 3 | 3 | 2 | 1 | 5 | 7 | 7 | 6 | 7 | 2 | 7 |
| A29 | Long queue in the port | 5 | 3 | 6 | 6 | 5 | 9 | 8 | 4 | 6 | 3 | 6 |
| A30 | Overload cargo | 2 | 3 | 4 | 8 | 2 | 8 | 6 | 2 | 8 | 2 | 2 |
| A31 | Change in ship departure schedule | 4 | 3 | 7 | 5 | 6 | 7 | 7 | 8 | 4 | 5 | 7 |
| A32 | Airline embargo | 3 | 2 | 4 | 2 | 4 | 7 | 5 | 4 | 5 | 4 | 4 |
| A33 | Transporter cannot be contacted | 5 | 5 | 3 | 6 | 4 | 7 | 6 | 3 | 6 | 2 | 6 |
| A34 | Transporter is not responsive | 3 | 5 | 4 | 7 | 4 | 8 | 8 | 7 | 8 | 2 | 8 |
| A35 | Lack of information about documents required | 3 | 7 | 3 | 4 | 5 | 7 | 7 | 6 | 8 | 1 | 7 |
| A36 | There is no good communication between admin and customers | 2 | 5 | 3 | 4 | 4 | 7 | 3 | 2 | 3 | 1 | 3 |
| A37 | Lack of information about payment | 4 | 5 | 3 | 3 | 4 | 7 | 5 | 6 | 3 | 1 | 3 |
| A38 | Unclear SOP related to the payment | 3 | 5 | 5 | 1 | 6 | 7 | 5 | 4 | 4 | 1 | 5 |

| (Pi) | Problem | Respondent | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| P1 | Targeted lead time cannot be fulfilled | 5 | 9 | 5 | 4 | 9 | 6 | 3 | 9 | 7 | 2 | 9 |
| P2 | POD is not sent to the due date | 8 | 7 | 9 | 9 | 9 | 2 | 3 | 10 | 9 | 10 | 9 |
| P3 | Orders are not delivered to the due date | 5 | 9 | 5 | 4 | 9 | 6 | 3 | 9 | 7 | 2 | 9 |
| P4 | Orders are not fully delivered | 2 | 3 | 4 | 8 | 2 | 8 | 6 | 2 | 8 | 2 | 2 |
| P5 | Special/urgent request is not confirmed and handled | 3 | 7 | 3 | 4 | 5 | 7 | 7 | 6 | 8 | 1 | 7 |
| P6 | Low warehouse accuracy | 4 | 3 | 7 | 5 | 6 | 7 | 7 | 8 | 4 | 5 | 7 |
| P7 | Goods/orders are not sent correctly | 3 | 6 | 2 | 2 | 3 | 7 | 6 | 4 | 2 | 1 | 2 |
| P8 | Goods are damaged during shipping | 6 | 6 | 2 | 4 | 5 | 7 | 6 | 4 | 2 | 1 | 6 |

## CORRELATION RECAPITULATION

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| E1 | Insufficient space | 9 | A1 | Customer does not send pre alert (sudden request) |
| | | 1 | A2 | Unoptimized space arrangement |
| E2 | Incomplete supporting documents | 9 | A3 | Customer does not know information about required documents |
| E3 | Damaged material/goods | 9 | A4 | Staff carelessness |
| | | 9 | A5 | Human error in physical checking |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| E4 | Incorrect project color code packaging | 9 | A4 | Staff carelessness |
| E5 | Quantity discrepancy | 9 | A5 | Human error in checking |
| E6 | Boxes are not properly labeled | 1 | A4 | Staff carelessness |
| | | 1 | A5 | Human error in checking |
| E7 | Material/goods are not stored based on GRN | 1 | A4 | Staff carelessness |
| E8 | Incorrect put away location recording | 1 | A4 | Staff carelessness |
| | | 1 | A8 | Human error in inputting data |
| E9 | Inaccurate inventory data entry | 9 | A4 | Staff carelessness |
| | | 1 | A8 | Human error in inputting data |
| E10 | Delay in filling related documents after inbound process | 1 | A9 | Staff indiscipline |
| | | 1 | A10 | Staffs are not responsive |
| | | 3 | A11 | System error |
| E11 | Incorrect pick list | 3 | A4 | Staff carelessness |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| E12 | Incorrect material/goods picked | 3 | A4 | Staff carelessness |
| | | 3 | A5 | Human error in checking |
| E13 | Damaged material/goods | 9 | A4 | Staff carelessness |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| | | 9 | A12 | Truck tarpaulins or box leakage |
| E14 | Quantity discrepancy | 1 | A5 | Human error in checking |
| E15 | Delay in generating dispatch documents | 9 | A9 | Staff indiscipline |
| | | 9 | A10 | Staffs are not responsive |
| | | 1 | A11 | System error |
| E16 | Delay in sending outbound report | 1 | A9 | Staff indiscipline |
| | | 1 | A10 | Staffs are not responsive |
| | | 3 | A11 | System error |
| E17 | Receiver cannot be contacted | 3 | A13 | No coordination between customer and receiver |
| E18 | Receiver/site is not ready | 9 | A13 | No coordination between customer and receiver |
| E19 | Incomplete/incorrect supporting documents in transport operation | 3 | A9 | Staff indiscipline |
| E20 | Incorrect material/goods loaded to truck | 9 | A5 | Human error in checking |
| E21 | Late in updating DN Tracking Report status | 9 | A9 | Staff indiscipline |
| | | 9 | A10 | Staffs are not responsive |
| E22 | Incorrect shipment status | 1 | A8 | Human error in inputting data |
| | | 9 | A9 | Staff indiscipline |
| E23 | Delay in distribution | 1 | A14 | Vehicle problems related to the maintenance |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | 9 | A15 | Driver stops repeatedly / too often |
| | | 3 | A16 | Force majeure |
| E24 | Late in submitting POD to the customer | 1 | A9 | Staff indiscipline |
| E25 | Damaged material/goods | 1 | A4 | Staff carelessness |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| | | 9 | A12 | Truck tarpaulins or box leakage |
| E26 | Incorrect material or labelling checking | 3 | A5 | Human error in checking |
| | | 3 | A17 | Incorrect material information |
| E27 | Late in updating material database in WMS | 9 | A9 | Staff indiscipline |
| | | 3 | A10 | Staffs are not responsive |
| | | 1 | A11 | System error |
| E28 | Incorrect update of material database | 9 | A8 | Human error in inputting data |
| E29 | Customer dissatisfaction | 3 | A10 | Staffs are not responsive |
| | | 3 | A18 | Lack of friendliness in customer service |
| | | 9 | A19 | Lack of knowledge related to problem solving |
| | | 9 | A20 | Lack of ability in handling the problem or complaint |
| E30 | Late in confirming or replying customer request | 9 | A9 | Staff indiscipline |
| | | 9 | A21 | Staff is not stand by |
| E31 | Incorrect information in supporting documents | 9 | A8 | Human error in inputting data |
| | | 3 | A22 | Incorrect information from customer |
| E32 | Error in planning the route | 9 | A23 | Human error in marking destination |
| | | 9 | A24 | Lack of route optimization knowledge |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| E33 | Error in assigning fleet | 9 | A25 | Unoptimized fleet assignment |
| | | 1 | A26 | Human error in fleet assignment |
| E34 | Damaged goods | 9 | A4 | Staff carelessness |
| | | 9 | A6 | Goods are not properly arranged into the truck |
| | | 9 | A7 | Goods are not properly packed |
| | | 9 | A12 | Truck tarpaulins or box leakage |
| E35 | Late delivery | 3 | A10 | Staffs are not responsive |
| | | 1 | A25 | Unoptimized fleet assignment |
| | | 9 | A27 | Lack number of fleet available |
| E36 | Late arrival at destination | 3 | A14 | Vehicle problems related to the maintenance |
| | | 9 | A15 | Driver stops repeatedly / too often |
| | | 9 | A16 | Force majeure |
| | | 3 | A28 | Error in planning the multidrop route |
| | | 9 | A29 | Long queue in the port |
| | | 9 | A30 | Overload cargo |
| | | 9 | A31 | Change in ship departure schedule |
| | | 9 | A32 | Airline embargo |
| E37 | Late in updating delivery status | 3 | A9 | Staff indiscipline |
| | | 3 | A33 | Transporter cannot be contacted |
| | | 3 | A34 | Transporter is not responsive |
| E38 | Late in submitting documents to TA | 9 | A9 | Staff indiscipline |
| | | 1 | A10 | Staffs are not responsive |
| E39 | Incomplete documents submitted to TA | 3 | A8 | Human error in inputting data |

| (Ei) | Risk Event | C | (Ai) | Risk Agent |
|---|---|---|---|---|
| | | 3 | A35 | Lack of information about documents required |
| E40 | Incorrect information in invoice | 1 | A8 | Human error in inputting data |
| E41 | Late in updating the system | 9 | A9 | Staff indiscipline |
| | | 3 | A10 | Staffs are not responsive |
| | | 9 | A11 | System error |
| E42 | Customer dissatisfaction | 9 | A10 | Staffs are not responsive |
| | | 9 | A18 | Lack of friendliness in customer service |
| | | 9 | A19 | Lack of knowledge related to problem solving |
| | | 9 | A20 | Lack of ability in handling the problem or complaint |
| E43 | Late payment from customer | 9 | A36 | There is no good communication between admin and customers |
| | | 9 | A37 | Lack of information about payment |
| | | 3 | A38 | Unclear SOP related to the payment |

| (Ii) | Indicator | C | (Pi) | Problem |
|---|---|---|---|---|
| I1 | Lead Time | 9 | P1 | Targeted lead time cannot be fulfilled |
| I2 | Reliability | 9 | P2 | POD is not sent to the due date |
| | | 9 | P3 | Orders are not delivered to the due date |
| I3 | Completeness | 9 | P4 | Orders are not fully delivered |
| I4 | Flexibility | 9 | P5 | Special/urgent request is not confirmed and handled |
| I5 | Correctness | 9 | P6 | Low warehouse accuracy |
| | | 3 | P7 | Goods/orders are not sent correctly |
| I6 | Carefulness | 9 | P8 | Goods are damaged during shipping |

# CHAPTER 6
# CONCLUSION AND SUGGESTION

This chapter consists of the conclusion that will answer the objective of this research. Besides, there are also some suggestions provided for the company and further research studies.

## 6.1 Conclusion

Based on the overall information presented in this research, there are some conclusions that can be concluded as follows.

1. By considering the actual condition, the existing KPI, the whole processes and operations done in this company, there are six Logistics Service Quality (LSQ) indicators which align with the aforementioned considerations. These six LSQ indicators are Lead Time, Reliability, Completeness, Flexibility, Correctness, and Carefulness. Lead Time is measured from how long certain activities or processes will take to be completed. Reliability is measured from the percentage of POD returned to the due date and orders sent to the due date (the measurement of reliability is presented in Formula 4.1 and 4.2). Completeness is measured from the percentage of orders fully delivered (the measurement of completeness is presented in Formula 4.3). Flexibility is measured from how many the special/urgent request confirmed by the company (the measurement of flexibility is presented in Formula 4.4). Correctness is measured from the percentage of warehouse accuracy and orders sent correctly (the measurement of correctness is presented in Formula 4.5 and 4.6). Carefulness is measured from how many damaged goods (the measurement of carefulness is presented in Formula 4.7).
2. Based on the measurement of six LSQ indicators, the indicator of Completeness and Correctness in delivery have the highest achievement which is 100%. It is followed by Carefulness indicator having almost perfect value which is 99.57% and Correctness indicator in warehouse which is 99.10%. It is then followed by Flexibility indicator which is 95.10%, Lead

Time 91%, then the lowest indicator which is Reliability having a value of 74.86% in delivery and 50.87% in POD return.

3. Based the calculation of Aggregate Risk Potential (ARP) and Pareto concept, there are 12 risk agents and 3 indicator problems prioritized to be improved using strategies that have been made. These risk agents are staff carelessness (A4), staff indiscipline (A9), goods are not properly packed (A7), staffs are not responsive (A10), goods are not properly arranged into the truck (A6), human error in physical checking (A5), truck tarpaulins or box leakage (A12), driver stops repeatedly / too often (A15), lack of knowledge related to problem solving (A19), lack of ability in handling the problem or complaint (A20), lack of friendliness in customer service (A18), and human error in inputting data (A8). While the critical indicator problems are POD is not sent to the due date (P2), orders are not delivered to the due date (P3), and targeted lead time cannot be fulfilled (P1)
4. There are 28 improvement strategies developed for each critical risk agent and indicator problems. From all strategies, 10 strategies are prioritized since they have highest Effectiveness to Difficulty Ratio (ETD). These 10 strategies are
    - PA01 – The implementation of "Zero Error" principle.
    - PA06 – Periodical evaluation.
    - PA04 – Training to upgrade skill.
    - PA02 – Inspection/quality control.
    - PA03 – Reward and punishment system.
    - PA05 – The coordinator makes plan, target, and gives directions.
    - PA13 – Increase the standard in recruitment.
    - PA12 – Increase the intensity of monitoring and controlling.
    - PA14 – Periodical evaluation and simulation.
    - PA07 – Optimization of maintenance scheduling and periodical checkup.

## 6.2 Suggestion

There are some suggestions given that are expected to be beneficial for the company and also further researches, as follows.

1. All the improvement strategies can be implemented, not only limited with the strategies that have highest value.
2. The use of House of Risk (HOR) periodically to develop improvement strategy can continuously increase the LSQ indicators and mitigate risks potentially occur in the company.
3. For the further research, cost factor can be considered in developing strategy.

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