FINAL PROJECT – TI 141501

ANALYSIS OF SUPPLY CHAIN RISK MANAGEMENT IN SUPPLY CHAIN ACTIVITIES AT PERUM BULOG DIVRE JATIM

Nabila Silmina Hakim
NRP 2511.100.094

Supervisor:
Dr. Imam Baihaqi, S.T., M.Sc

DEPARTMENT OF INDUSTRIAL ENGINEERING
Faculty of Industrial Technology
Institut Teknologi Sepuluh Nopember
Surabaya 2015

APPROVAL SHEET

ANALYSIS OF SUPPLY CHAIN RISK MANAGEMENT IN SUPPLY CHAIN ACTIVITIES AT PERUM BULOG DIVRE JATIM

FINAL PROJECT

Submitted to Acquire the Requirement of Bachelor Degree:

Department of Industrial Engineering

Faculty of Industrial Technology

Institut Teknologi Sepuluh Nopember

Surabaya

Author:

NABILA SILMINA HAKIM

NRP. 2511 100 094

Approved by Final Project Supervisor

Supervisor

Dr. Imam Baihaqi, S.T., M.Sc

NIP. 197007211997021001

SURABAYA, 13 JULY 2015

ANALYSIS OF SUPPLY CHAIN RISK MANAGEMENT IN SUPPLY CHAIN ACTIVITIES AT PERUM BULOG DIVRE JATIM

Name : Nabila Silmina Hakim
NRP : 2511100094
Department : Industrial Engineering
Supervisor : Dr. Imam Baihaqi, S.T., M.Sc

ABSTRACT

Perum BULOG Divre Jatim has complex supply chain system that makes the process of sourcing and distribution of rice is difficult to achieve optimal service level. This study aims to identify the risks occurred along the supply chain activities at Perum BULOG Divre Jatim. This research uses SCOR to map the supply chain activities and assesses the risk using FMEA (Failure Mode and Effect Analysis). There are 3 risks in the planning process, 13 risks in the sourcing process, 6 risks on the making process, and 13 risks in the delivering process. Based on the result of FMEA, the Risk Priority Number (RPN) is determined to get the risk priority. Results of risk evaluation showed that 6 events are in the category of high risk, 8 events are in the category of medium risk and 21 events are in the category of low risk. The risk mitigation strategies designed to 6 risk events which are in the high category. Mitigation is performed by analyzing the root cause of the problem using RCA.

Keywords—Supply Chain Risk Management, SCOR, FMEA, RCA

(This page is intentionally left blank)

PREFACE

This undergraduate thesis is the result of my four years of studying at Institut Teknologi Sepuluh Nopember. Alhamdulillah, all praises are belonging to Allah SWT. By whose grace, guidance, and blessing the author can finish this undergraduate thesis entitled "Analysis of Supply Chain Risk Management in Supply Chain Activities at Perum BULOG Divre Jatim" by the end of fourth year study in Department of Industrial Engineering of Institut Teknologi Sepuluh Nopember Surabaya.

This undergraduate thesis is conducted as a requisite to finish Industrial Engineering major and to achieve Bachelor degree from Institut Teknologi Sepuluh Nopember (ITS). The road leading to this part was all but easy. There were hardships and struggles, times of resignation and lack of confidence. Nevertheless, I will always remember this period as one full of joy, laughter and solid friendships. Yet most of all, the time at Institut Teknologi Sepuluh Nopember will be marked with hard work rewarded with decent results, not only regarding the studying, but also regarding shaping of the personality. During the completion of this research, author receives countless support, motivation, inspiration, and help from various people and communities. Therefore, in this opportunity, the author would like to express his biggest appreciation and gratitude sincerely to those who contribute most and play important part during the completion of this final research, namely:

1. All the effort put into this undergraduate thesis would not be enough, if I did not have the support of my loving family and friends around me. Therefore, I would like to thank my mother, Sih Minarni, for being strict when I needed it and her priceless advice and support she was always ready to give. This support would not be complete without the helping hand of my father, Luqman Al Luqman Hakim Masyhuri who did not hesitate to help me with any difficulties I encountered., and my sister Nadia Hanifah Hakim, who have always been there for me to support in any kind and in every situation.
2. Dr. Imam Baihaqi, S.T., M.Sc as supervisor, the best lecturer for the author, under whose great motivation, clear direction, patient supervision in tutoring the author for the whole time, this final research can finish on time.
3. Mr. Yudha Andrian Saputra, S.T., MBA, as the Academic Advisor, whose support and advice have helped the author for the last couple years.

4. Prof. Suparno, MSIE, Ph.D, Mrs. Effi Latiffianti, S.T., M.Sc, and Mr. Yudha Andrian Saputra, S.T., MBA who have given many recommendations for the author to finish this final project.
5. All faculty members and academic staffs of Department of Industrial Engineering of Institut Teknologi Sepuluh Nopember, for all knowledge, experience, and help for the author and other friends and students during the years of study.
6. Mr. Prasetyono, Mr. Teguh, Ms. Dinda from Perum BULOG Divre Jatim for assistance and supporting data for the research.
7. UTeM Batch 1 Family: Fathici, Kak Elsa, Satria, Willy, Rian, Troy, and Kak Bity, thank you for the support and the prayers during accomplishing this final project.
8. Fathici, Kak Elsa, Cinduy and Mbak Dellis who have fight together for this final project. Thank you for patience, support, motivation, and inspiration for the author, so that this final project can be accomplished on time.
9. Industrial Engineering 2011 "Veresis", especially friends from Q-Class, who have spent 4 years during the study as the family and the best fellows. Thank you for the precious experience, togetherness, and help for the entire 4 years of study.
10. My beloved Daehan, Minguk, and Manse, thank you for your cute acts, smiles, and laughs which never fail to make happy. Love you, Triplets.
11. Everyone else whom the author cannot mention explicitly due to the limit of this acknowledgement. Deepest gratitude is expressed towards you all.

The author realizes that this research is far from perfect. Therefore, the author welcomes positive suggestion and constructive critics from anyone. May this research contribute to academic world and provide improvement for better future. Thereby I would like to close one chapter of my life and open up a different one, hopefully as interesting and rewarding as the four years of studying at Institut Teknologi Sepuluh Nopember.

Surabaya, 13 July 2015

Author

Table of Contents

(This page is intentionally left blank)

List of Tables

List of Figures

(This page is intentionally left blank)

CHAPTER 1
INTRODUCTION

In this chapter, there are background of the research, problem statement, purposes and benefits from this research as well as the scope of the research that consists of limitation and assumption.

1.1 Background

Rice is the basic grain of daily consumption in Indonesia, it always has the significant demand which indicates a seasonal growing trend especially at the time of festivals and during the seasons of cultural events e.g. Ramadhan, Eid al-Fitr. Comprehensive study of rice supply chain is needed to identify the complex structure of supply and demand. A proper supply chain management framework is very essential for efficient sourcing, processing, distribution, and retailing and hence meeting the customer demands without facing a situation of lost sales. Production and business of rice has been one of the most traditional and major concerns of Indonesia Economy, but still no proper supply chain framework for it has been developed, which very often causes unfulfilled demands, stock outs and overstocking, and distribution issues. Most of its operations are very traditional which need to be reformed if it has to gain competitive advantage in the era of globalization.

Risk of supply chain structure is very complex involve various actors including: Farmers as the basic supplier of grain, middlemen or agents, rice processing industries, distribution agents, and retailers; as the interlinked upstream and downstream stages. During the long supply chain process many activities take place at every stage which affect the function of next stage and requires it to co-operate in the customized manner. However, in each supply chain activities cannot be separated from the uncertainty that may cause risks. Effective risk management can fosters policy makers in matching demand and supply.

In risk management, there are several frameworks that can be used to accommodate the risk reduction, corporate risk management and risk assessment as well as taking action on risk. Therefore we need an integrated approach using a study of Supply Chain Risk Management (SCRM) in managing the risk from risk

identification phase to the design of risk mitigation strategies in supply chain companies.

Perum BULOG Divre Jatim, part of Perum BULOG Indonesia, is a state-owned company engaged in the field of logistic, distribution, and price control of basic commodities i.e. rice, sugar, soybean, meat, fishes etc. However in this study, we only focus on rice commodity in East Java Regional. Production of Perum BULOG Divre Jatim aims to meet domestic rice needs, especially for fulfilling demand for rice in East Java. The issue of rice in the country cannot be separated from the imbalance between demand and supply.

Based on data from Perum BULOG Divre Jatim in the procurement of rice from 2010 until 2014 that the average grain production amounted to 14,716,669 tons, however Perum BULOG Divre Jatim only able to realize the procurement of rice with an average of 968,418 tons. Indonesia government, therefore, is forced to import rice from other countries such as Vietnam, Thailand, Myanmar, India, and Pakistan. According to the opinion of Minister of State Owned Enterprise, in fact Indonesia does not need to import rice as long as there is a guarantee of the accuracy of time can be determined based on the data. However, problems often arise when the production data are not presented in a transparent manner, so often there is a difference production data between the Ministry of Agriculture and the Ministry of Trade.

Table 1. 1 the Productivity of Perum BULOG Divre Jatim

Year	Production (Ton Grain)	Target Acquisition (Equivalent Tons of Rice)	Procurement Realization (Equivalent Tons of Rice)	Productivity
2010	11,643,773	650,000	615,301	5.28%
2011	10,576,543	700,000	411,762	3.89%
2012	12,198,707	1,110,000	1,097,493	8.99%
2013	12,049,342	1,100,000	1,007,118	8.36%
2014	12,398,312	1,100,000	741,996	5.98%

Source: Perum BULOG Divre Jatim

Table 1.1 shows the productivity of Perum BULOG Divre Jatim from 2010 to 2014. Based on the data, it is known that productivity decreased in 2011, 2013, and 2014 which also affects the stability of the national food security. The decreasing productivity is due to the realization of procurement under the set target. Realization of procurement is not in accordance with the target because of the amount of rice production decreased, the performance of suppliers of grain / rice is not optimal, most

of suppliers are small-scale rice milling unit. In addition, most of people are skeptical about the sustainability of the program *Raskin* due to frequent cases of delays in distributing *Raskin* to the public.

Perum BULOG Divre Jatim has quite complex supply chain system that makes the process of sourcing and distribution of rice is quite difficult to achieve optimal service level. There are some risk occurred along the supply chain activities at Perum BULOG Divre Jatim as explained in the previous paragraph. Therefore we need improvement in order to make Perum BULOG Divre Jatim can improve supply chain performance in meeting the needs of domestic rice. Identifying risks along the supply chain could help Perum BULOG Divre Jatim identify the critical points that cause problem in rice distribution.

The method used in this study is the Failure Mode and Effect Analysis (FMEA). In this study using FMEA method because the method can be used to perform the analysis of the potential causes of the occurrence of a failure or risk. In the execution of FMEA is conducted analysis to rank and priority risks. In this method should notice to the value of severity, occurrence, and detection. Value severity, occurrence, and detection results are obtained from interview and group discussions with some managers that have the authority, competence and overall understanding of the condition of the company. The purpose of the risk assessment of the risks identified is to know where the most influential risk to the company's supply chain activities. Risk value can be determined by looking at the value of the Risk Priority Number (RPN). Then the Risk Priority Number (RPN) sorted from largest to smallest. Highest value Risk Priority Number (RPN) indicates the most critical risks. The purpose of the critical risk is the risk that the event can disrupt the activities of the company in achieving its goals.

The use of those methods is aimed to help Perum BULOG Divre Jatim evaluates the risks in the supply chain activities in Perum BULOG Divre Jatim that occurred during this time. Hopefully for the future is to create supply chain performance better and optimized therefore Perum BULOG Divre Jatim can increase productivity and can meet the needs of domestic rice.

1.2 Problem Statement

The problems statements of this research are: what the potential risks in the business process of rice sourcing, stocking, and distribution in Perum BULOG Divre Jatim are and what the appropriate strategies to mitigate the risks are.

1.3 Purposes of the Research

Based on the research background and problem formulation, this research is aimed to:

1. Identify the business process of sourcing, stocking, and distribution at Perum BULOG Divre Jatim.
2. Identify the risks that may arise in process of sourcing, stocking, and distribution at Perum BULOG Divre Jatim
3. Assess the risks to determine the order of priority of the risk occurring.
4. Develop risk mitigation strategy.

1.4 Benefits of the Research

By reaching the research objectives, the benefits which can be gained from this research are, as follows:

1. The company may determine risks disrupting the supply chain, so as to classify the risks that need to be prioritized and there is way of handling risk.
2. The company may increase rice production and decrease rice imports.

1.5 Scopes of the Research

The scopes of this research consist of limitations and assumptions during conducting this research.

1.5.1 Limitations

The limitations for this research are, as follows:

1. Data collection was performed in the company's internal supply chain associated with the activity of Perum BULOG Divre Jatim i.e sourcing, stocking and maintaining, distributing process.
2. Mitigation of risk was limited to the provision of recommendations for the company.

1.5.2 Assumptions

The assumptions used in this research are, as follows:

1. The business processes at Perum BULOG Divre Jatim does not undergo change of policy during the research conducted.
2. Activity supply chain at Perum BULOG Divre Jatim runs normally during the research conducted.
3. Stocking and maintaining as the core process at Perum BULOG Divre Jatim is assumed as 'Make' process in SCOR.

1.6 Outline of the Proposed Research

This proposal writing outline is made to ease the making of the proposal. The outline of this research proposal is described below:

CHAPTER 1 INTRODUCTION

In this chapter will present about research background, problem statement, research purposes, research benefits, research scopes, and outline of the proposed research.

CHAPTER 2 LITERATURE REVIEW

In this chapter will be explaining about several theories related to the research including references which are used to support the research. This literature review consists of theories about supply chain and supply chain management, procurement management, agricultural supply chain, the concept of risk, Supply Chain Risk Management (SCRM), Supply Chain Operations Reference (SCOR), Failure Mode and Effect Analysis (FMEA), and Root Cause Analysis (RCA).

CHAPTER 3 RESEARCH METHODOLOGY

The methodology of this research and its stages will be explained in this chapter including the research proposal flowchart and the explanation in order to ease the proposal composing.

CHAPTER 4 COMPANY DESCRIPTION AND BUSINESS PROCESS

This chapter explains the brief description of Perum BULOG Divre Jatim and its business process. Company description sub chapter includes a general description of

the company, its vision and mission, organizational structure, and the existing condition of supply chain activity in the company. While the business process sub chapter includes the identification of the company's supply chain activities i.e. sourcing, stocking, distribution, risk identification, risk assessment and risk evaluation.

CHAPTER 5 RISK ASSESSMENT AND ANALYSIS

This chapter is divided into two sub chapters, which are sub-chapter risk assessment and risk analysis. Risk assessment section describes the identification of supply chain activities, risk identification, risk assessment, and risk evaluation. While risk analysis explains the analysis each section from the previous sub chapter, also the mitigation strategy for the high risk category.

CHAPTER 6 CONCLUSION AND SUGGESTION

In this chapter, conclusions will be made to answer the research purposes that written in the previous sub chapter. Also, suggestions will be made to support the following research.

CHAPTER 2
LITERATURE REVIEW

This chapter describes the main theories and concept of this research. The theories and concepts provided in this chapter are concept of risk, supply chain and supply chain management, agriculture supply chain, supply chain risk management, Supply Chain Operations Reference (SCOR), Failure Mode and Effect Analysis (FMEA), and Root Cause Analysis (RCA).

2.1 Supply Chain and Supply Chain Management

Waters (2008) described a supply chain as the series of activities and organizations that materials move through on their journey from initial suppliers to final customers. Other views are more focused, such as Pujawan & Erawan (2010) Supply chain is a network of companies that work together to create and deliver a product into end customers. These companies typically include suppliers, manufacturers, distributors, stores or retail, as well as companies such as supporting logistic services company.

There are three layers of supply chain structure which are:

1. Upstream supply chain, a layer consisting of a series of suppliers ranging from first -tier suppliers to the final level before entering into manufacture.
2. Internal supply chain, a layer consisting of a whole series of processes that occurred in manufacture or organization to change or transform inputs into outputs from suppliers who have added value.
3. Downstream supply chain, which is the highest layer of the whole process to make deliveries of products to the final consumer.

Every product has its own unique supply chain; it can be both long and complicated. Therefore, it is necessary to manage the flow in a supply chain. The concept of managing supply chain is defined as ‘Supply Chain Management’. There are three flows which should be managed: 1) the flow of goods that flows from upstream to downstream (raw materials sent from the supplier to the factory, and then shipped to distributors, retailers, and final consumers), 2) the flow of money that flows from upstream to downstream, 3) the information flow occurs from upstream to downstream and vice versa. The aims of supply chain management are helping the

company to achieve high customer satisfaction and using resources efficiently to give low cost.

There is common definition about the aims of supply chain management in terms of getting 'the right materials, to the right place, at the right time, from the right source, with the right quality, at the right price'. This probably corrects, however it clearly depends on the definition of 'right'. In different circumstances, customers value different types of performance; therefore supply chain management might aim at fast deliveries, low costs, little wastage, quick response, high productivity, low stocks, and no damage.

2.2 Procurement Management

Procurement management is one of the main components of the supply chain. There are some activities undertaken in procurement management such as providing inputs (goods or services) required in production activities and other activities within the company.

The role of procurement within a company is very important especially in manufacturing companies. At manufacturing material costs could reach 40%-70% of the cost of a final product. In other words, the cost of raw materials exceeds the given value added during the production process. This suggests that the efficiency of the procurement section could provide a significant contribution to the improvement of corporate profits.

According Pujawan & Erawan (2010), the general tasks performed by the procurement section are, as follows:

1. Designing a proper relationship with the supplier. Relationships with suppliers can be long term partnerships as well as short-term transactional relationship. Supplier relationship model between the company depends on many things, including whether or not critical goods purchased from the supplier, and whether a large purchase value.
2. Select suppliers. Activity choosing suppliers can be time consuming and resource that does little if the supplier in question is a key supplier. The difficulty will be higher if the suppliers are to be selected is a global supplier. To supplier-key potential suppliers to establish long-term relationships, the selection process could involve an initial evaluation,

inviting them to presentations, field trips and so on. Preferably, the supply chain that competes on the basis of price, suppliers who offer goods at low prices should be prioritized.

3. Select and implement suitable technology. Procurement activities always need the help of technology. With the advent of the Internet, today many companies are using electronic procurement (e-procurement), i.e. applications for procurement activities. E-procurement can help companies in the supplier selection process through e-auction or e-bidding.
4. Maintain the required item data and supplier data. Procurement division must have complete data about the items required and the data about their suppliers.
5. Conducting the purchasing process. This is the most routine work done by the procurement section. The purchase process can be done in several ways, for example, regular purchases and purchases by means of tender.
6. Evaluate the performance of the supplier. Supplier performance assessment is also very important work done to create sustainable competitiveness. The assessment results are used as input for the supplier to improve their performance.

Procurement division not only served to make routine purchases but also have a role in creating strategic relationships with suppliers, determining the technology investment decisions for procurement activities, developing supplier capabilities, a bridge in involving suppliers in new product development, and other activities.

2.3 Agricultural Supply Chain

Agricultural Supply Chain Management refers to supply chain management between food and agricultural production sector, the entire agricultural supply chain between all the entities that participants in the logistics, information flow and capital flow plan and design, etc. Using planning, coordination, organization and control of other functions, so make agricultural products supply chain between each node achieve effective coordination, and establish mechanisms for benefit distribution mechanisms and performance. To achieve strategic alliance of agricultural supply chain, and further improve the efficiency of the entire agricultural supply chain.

It is only during the last ten years that the agriculture industry has recognized and started embracing SCM as a key concept for its competitiveness. The rapid industrialization of agricultural production, the oligopoly in the food distribution sector, the advancement of Information and Communication Technologies (ICT) in logistics, customer concerns and governmental food safety regulations, the establishment of specialized food quality requirements, the emergence of modern food retailer forms, the increasing significance of vertical integration and horizontal alliances, as well as the emergence of a plethora of multinational corporations are just a few of the real-world challenges that have led to the adoption of SCM in the agriculture sector (Tsolakis, et al., 2014).

Agricultural production in the production process obviously depends on the forces of nature, natural conditions and crop individual life. In order to develop the agricultural supply chain, therefore, it is necessary to actively enhance agricultural products wholesale markets and farmers market infrastructure, increase market service functions. It is need to develop brands led farmers to increase, promote agricultural restructuring, to promote farmers' awareness of standardized production, establishment of a unified standard system of agricultural production. Continue to strengthen the supply chain, information development and use of computer networks and other advanced technologies and means, establish unified national agricultural supply chain information sharing system, to achieve the smooth circulation of agricultural products, the farmers into the supply chain, from supply chain to farmers and processing enterprises trade benefit sharing. Improve the regulations and policies related to agriculture and the supply chain, regulations and policies combined with agricultural and supply chain, lower production costs and improve prenatal means of production investment, establish a healthy and orderly supply system to increase the competitiveness of agricultural products, and thus contributing to rural economic development and farmers' incomes.

2.4 The Concept of Risk

Concept of risk has been studied in plenty of business contexts and even in the field of science and engineering (Anggara, 2008; Badariah, et al., 2011; Lavastre, 2012; Curkovic, et al., 2013). The essential investigation of corporate functions has been promised by the study of risk, e.g. operations, strategic management tools, and

decision-making tools. Companies are waking up to the need for risk management implementation for some significant time and there exists an extensive body of literature from such as diverse areas as economics, finance, strategic management, and international management (Anggara, 2008).

Previous studies have suggested many definition of risk, such as (Badariah, et al., 2011), who defined risk as "*the probability of an event that resulted in losses when the incident occurred within a certain time. The influence of risk can be measured by multiplying the frequency of occurrence and impact of the incident. Risks may arise from any incident, but can be managed based on the needs of the organization. Approach to managing risk is called risk management. The approach is generally used to avoid, reduce, transfer, share or accept the risk*". On the other hand, Lavastre (in March and Saphira, 2012) described risk as "*a variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective values*".

Moreover, Anggara (in Richard and Brindley, 2007) cited that risk has three dimensions: 1) probability of occurrence of certain outcomes/ likelihood; 2) consequences/ severity from the occurrence of particular events; 3) causal pathways leading to the events. Failure Mode and Effect Analysis, as the tool used in this research, also defined risk as the multiplication of likelihood of a risk event, the severity of risk event, and the ability to detect the risk. It is formulated in the notation below:

$$Risk = Likelihood\ x\ Severity\ x\ Detection$$

Considering the fact that risk management always relates to those three dimensions of risk, this research intends to use this definition in order to analyze the source of risk, understand the forces which might create the occurrence of undesired event, and manage these three dimensions to enhance the possibility of positive outcomes and avoid negative outcomes.

2.5 Supply Chain Risk Management (SCRM)

Supply chain management has responsibility for the movement of materials all the way from the supplier to the final customers. Supply chain risks could affect this

movement and disrupt the planned flow of materials. These risks possibly will cause delays, damage goods, or affect smooth operations.

Nowadays, managing supply chains in a very competitive, high uncertainty and turbulent market is really challenging. There are some problem that should be faced such as the frequent occurrence of natural disasters, labor disputes, uncertain supply and demand, supplier bankruptcy, political changes, war and terrorism have led to deeper concerns about risk management for the supply chain (Christopher & Lee, 2004). Hence, the biggest challenge in supply chains today is managing and mitigating the risks that are inherent in every business situation. Company needs to know and understand the category of the risks as well as the condition that drives the risks (Chopra & Sodhi, 2004). There are numerous definitions of risk, one of them being that offered by (Waters, 2008), who describe it as the process of systematically identifying, analyzing, and dealing with risks to supply chain. The understanding of risk in the supply chain should accommodate each of these three components:

1. The knowledge of a risk event
2. The probability of occurrence of a risk event
3. The impact of a risk event

The first component is the initiative for increasing knowledge of risk as the prerequisite to reduce the probability of risk and the effect of it. The second component is related to reducing the probability of occurrence by implementing a set of actions such as increased influence in behavior of third party (suppliers), joint collaboration, supplier development, and managing the relationships with them. The last component is trying to reduce the impact of the risk event, which can be done by preparing the supply strategy such as increasing inventory, capacity, risk sharing, being responsive and agile, etc. (Chopra & Sodhi, 2004). In conclusion, previous research has stated that the development of supply chain risk management, as the main key role in supply chain management in today's business, should take into account these components:

1. The identification of risk type and the drivers
2. The action to seek deep knowledge about risk events
3. The well-planned strategy to reduce probability of risk events

The preparedness for risk impact by developing a set of actions is related to the supply chain strategy in order to enhance sustainability in the system.

2.6 Supply Chain Operations Reference (SCOR)

The SCOR model "*provides a unique framework that links business processes, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities*" (Supply Chain Council, 2009). According to the SCC, SCOR is used to identify, measure, reorganize and improve supply chain processes through a cyclical process that includes:

1. Capturing the configuration of a supply chain.
2. Measuring the performance of the supply chain and comparing against internal and external industry goals.
3. Re-aligning supply chain processes and best practices to fulfill unachieved or changing business objectives.

SCOR model aims to integrate well-known concepts such as business process reengineering, benchmarking, and process measurement into a cross functional framework through the completion of the steps outlined above.

2.7 Failure Mode and Effect Analysis

Failure Mode and Effect Analysis (FMEA) is methodology for analyzing potential reliability problem or unwanted events early in the development cycle where it is easier to take actions to overcome the problems, thereby enhancing reliability through design. Implementation of FMEA is accustomed to identify potential failure forms, determine impacts on production, and identify actions to mitigate the risks. Failure Mode and Effect Analysis is a planning tool on developing the process, products, or the services and it has been developed in the deployment of products or services for troubleshooting and counteractive action. The standard of FMEA evaluation is based on three values i.e. severity, occurrence, and detection. The multiplication of these values obtains Risk Priority Number (RPN).

$$RPN = Occurrence\ x\ Severity\ x\ Detection$$

In last few decades, FMEA has been developed not merely for designing products, services, etc. However, in recent days FMEA is being used for analyzing potential risk in project management, operations, marketing, and so on. The reason why FMEA accustomed to analyze the potential risks is due to its capacity to provide a simple method for analyzing crucial steps to anticipate what might go wrong with products/ services. If there is a case where anticipating every failure mode is impossible, the development team should invent as extensive a list of potential failure modes as possible. The research implements FMEA's framework in order to achieve the main objective of this research which is identification and mitigation of risk in the supply chain activity.

2.8 Root Causes Analysis (RCA)

When some risky event has actually happened, the easiest way to identify the future risk is to repeatedly ask question about the cause of the past event and find the likelihood that it will occur (Waters, 2008). This method is called as 'five whys' or – more formally – 'root cause analysis'.

Root causes analysis is simply a tool designed to help incident investigators describe what happened during a particular incident, to determine how it happened and to understand why it happened (Livingston, et al., 2001). In the majority of cases, root causes analysis methodologies have to be used by busy personnel working within the organization where the incident occurred. The strength of this method is that it investigates real risks that have occurred and clearly shows the relationship between symptoms and causes (Waters, 2008).

2.9 Comparison with Previous Researches

In this section will be explained on previous studies that have been conducted by researchers associated with supply chain risk management. The purpose of this section is as reference materials and materials with the method comparison study to be conducted.

Table 2. 1 Comparison with Previous Researches

Author	Title	Problem	Methodology						
			Value at Risk	SCOR	RCA	FMEA	HOR	AS/NZS 4360	ISO 31000
Lisaura Dwi Kusuma (2011)	Risk assessment pada proyek pembangunan packing plant PT. Semen Gresik (Persero) Tbk menggunakan framework ISO 31000 dan Value at Risk'	How to conduct a risk assessment packing plant construction PT. Semen Gresik (Persero) Tbk in Ciwanda and the identification of the most appropriate mitigation to determine the potential gains and losses experienced by the company. Based on the results of the risk assessment in Ciwanda, the generic risks was identified throughout the packing plant PT Semen Gresik (Persero) Tbk	V						V
Yogi Adhi Satria (2012)	Pengelolaan Risiko pada Supply Chain PT Graha Makmur Cipta Pratama'	Analysis of supply chain risk management PT Cipta Graha Makmur Pratama and the identification of the most appropriate mitigation in risk management so that the company can minimize losses and achieve its objectives		V				V	
Nabila Silmina Hakim	Analysis of Supply Chain Risk Management in Perum BULOG Divre Jatim	Identify what the potential risks in the business process of rice sourcing, stocking, and distribution in Perum BULOG Divre Jatim are and what the appropriate strategies to mitigate the risks are. Therefore, the company is able to increase the rice production and reduce rice imports		V	V	V			

(This page is intentionally left blank)

CHAPTER 3
RESEARCH METHODOLOGY

Research methodology describes the stages systematically conducted in this study. This thesis consists of several stages, namely the identification and formulation of the problem; identification of events, causes and effects; collection and processing of data; recommendation solution; prioritization of solutions, as well as the conclusion and suggestions.

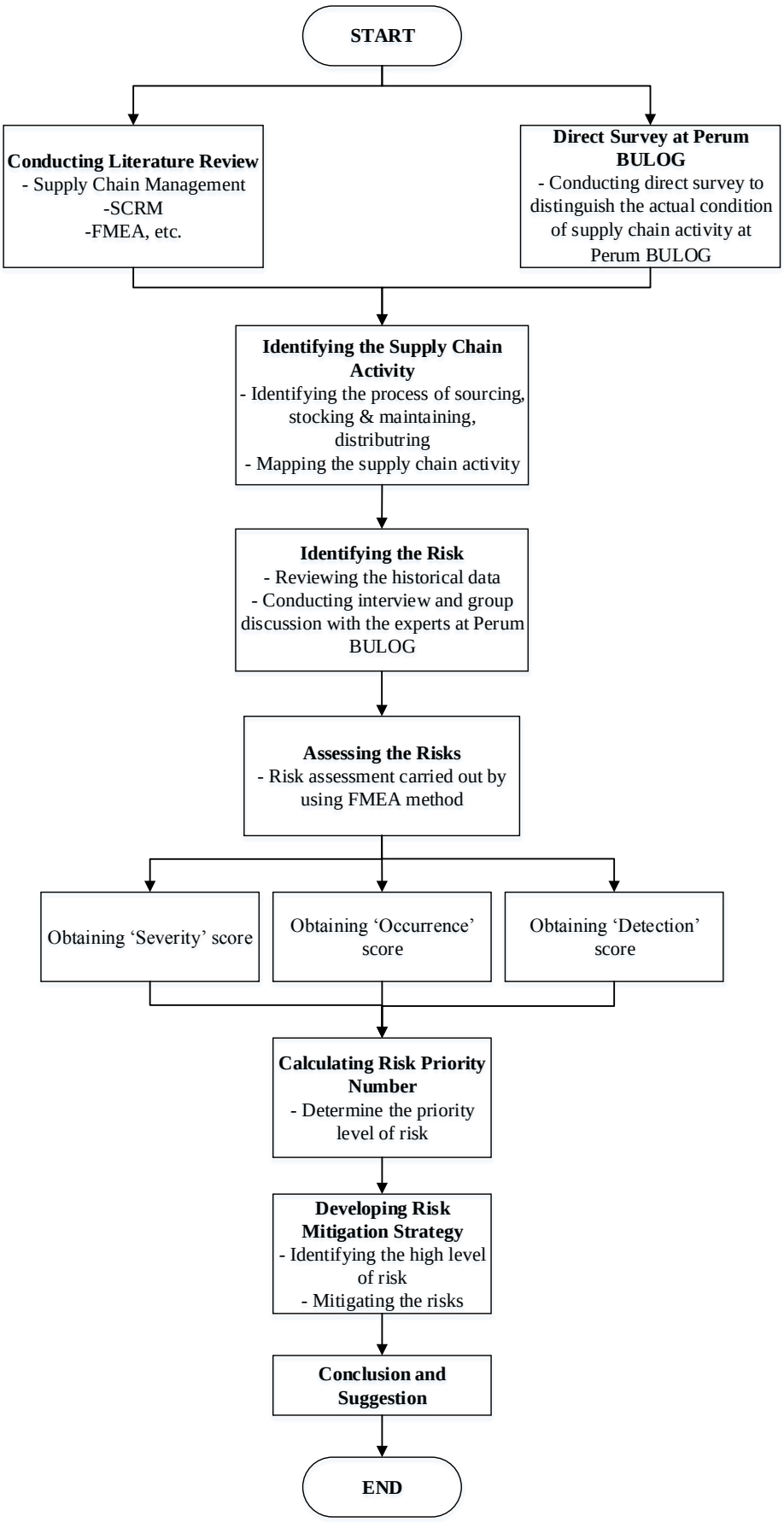

Figure 3. 1 Research Flowchart

3.1 Conducting Literature Review

Literature review stage is performed to increase the understanding and knowledge of research as well as to support the achievement of goals and problem solving with the corresponding theoretical approach. Literatures are used as guidelines in this research involved the supply chain risk management, SCRM framework, SCOR, risk mitigation strategies, FMEA, and RCA.

3.2 Identifying the Process of Sourcing, Stocking, and Distribution

Regarding to improve the way of supply chain operate, there will be a need to identify some process along the supply chain i.e. sourcing, stocking, and distribution. At this stage, therefore, direct survey is executed to identify the supply chain activity of Perum BULOG Divre Jatim. Identifying the supply chain activity in the company needs to discover who is involved, what technology is used, where the process begins and ends and who is impacted by the process. By identifying the supply chain activity, it is expected to be obtained a clear picture of the problems that occur and what approaches can be done to resolve the problem.

Furthermore, after doing identification in supply chain activity the next stage is conducting company's supply chain mapping activities using the SCOR model (Supply Chain Operations Reference). SCOR model consists of several activities i.e. plan, source, make, deliver, and return.

3.3 Identifying Risk

At this stage, the collection of data on the risks of what is going on (risk events). Data collection was done by conducting a review of historical data, interviews with company management, and direct observation of the activities of the supply chain. Risk in question is a risk that can inhibit the activity of the company's supply chain. At this stage will produce a list of risks that obtained among others, what are the risks (what), where the risk occurs (where), how these risks can happen (how), and why these risks could occur (why).

3.4 Assessing Risk

At this stage, formulating data is performed to assess the risk and find out the Risk Priority Number. Risk analysis aims to conduct a risk assessment and mapping based

on the risks that have been identified in the previous stage. The identified risk is the risk that can interfere with the activity of the company's supply chain, so that the company's goals cannot be achieved.

Risk analysis is done by identifying the incidence of risk (risk event) and agency risk (risk agents) from any risks that occur. The process of identification of risk agents can be done by identifying the cause of the problems of each risk, besides the risk identification process agents should be understood that a risk can be prohibited from some cause or agent of risk and risk otherwise that the agent may cause some risk.

Furthermore, the identification of risk analysis was also carried out the impact of the level of risk (severity), the identification rate of occurrence (occurrence) of agency risk, as well as the company's ability to detect failures (detection). Determining the value of severity, occurrence, and detection results obtained from the questionnaires were filled out by the management company as well as group discussions with experts who know the company's overall business processes.

The next stage after stage of risk analysis is the calculation of the value of risk. By using FMEA method, then the scale of severity, occurrence, and detection is obtained then be calculated to obtain the value of the RPN (Risk Priority Number). RPN is used to determine the priority level of risk. Then it will be done on a risk mitigation strategy design with high RPN value

3.5 Developing Risk Mitigation Strategy

Evaluation phase of this risk should be conducted before developing risk mitigation strategy. The risk that the value obtained from the processing of the data is then evaluated to determine the risk ratings and any risk priorities that require mitigation. In determining the risk rating, then the risk of first mapped. Mapping RPN values are sorted from the largest value to the smallest. Where risks are included in the high risk category has a great influence in achieving corporate goals.

After making the determination of the risk rating, then the next step is to determine the risk priority. The top priority risk is the risk which has the highest RPN value, where the determination of the category of high risk, medium, and low is the result of judgment as well as brainstorming with the company. Priority should take into account the risk of the most important business objectives of the company. The risk that the

highest priority is the most threatening risk company goals. The output of this stage is a list of all the risks and priorities.

At this stage will be the analysis and explanation of the proposed mitigation strategies to address each risk occurring. Before designing the proposed risk mitigation, then any risk to be identified and then mitigated risk factor analysis using the RCA (Root Cause Analysis) 5 why. After that risk mitigation strategies are implemented based on the types of risks identified.

CHAPTER 4

COMPANY DESCRIPTION AND BUSINESS PROCESS

This chapter explains the brief description of Perum BULOG Divre Jatim and its business process. Company description sub chapter includes a general description of the company, its vision and mission, organizational structure, and the existing condition of supply chain activity in the company. While the business process sub chapter includes the identification of the company's supply chain activities i.e. sourcing, stocking, distribution, risk identification, risk assessment and risk evaluation.

4.1 Company Description

Process of collecting data is conducted by reviewing the historical data of Perum BULOG Divre Jatim, interviewing with some managers of Perum BULOG Divre Jatim, and performing direct survey at Perum BULOG Divre Jatim.

4.1.1 Perum BULOG Profile

This sub chapter informs about the profile of Perum BULOG Divre Jatim.

4.1.1.1 Business Field

Perum BULOG Divre Jatim has the task of organizing the food industry, especially rice businesses along the supply chain activities in an integrated manner by utilizing all resources effectively, efficiently and synergistically so as to increase growth and efforts to achieve the aims and objectives of the company.

The purpose of the establishment of Perum BULOG Divre Jatim is contributing to Perum BULOG Indonesia in order to support the objectives of the company to participate in building the national economy. Perum BULOG Divre Jatim is ready to cooperate with the agency/ company/ the general public in rice cultivation (on farm), purchase of grain and rice at random (any quality), milled grain, trading and marketing of rice for the local market, regional and international, processing and sales by product (groats, bran, husk, etc.), and the leasing of agricultural machinery.

Perum BULOG Divre Jatim has 22 Rice Grain Processing Unit or *Unit Pengolahan Gabah Beras (UPGB)* scattered throughout the territory of East Java including the following:

1. UPGB Buduran Subdivre Surabaya Utara
2. UPGB Tunggorono Subdivre Surabaya Selatan

3. UPGB Gunung Gedangan Subdivre Surabaya Selatan
4. UPGB Sukorejo Subdivre Bojonegoro
5. UPGB Kalitidu Subdivre Bojonegoro
6. UPGB Jeruk Gulung Subdivre Madiun
7. UPGB Ngawi Subdivre Madiun
8. UPGB Candirejo Subdivre Kediri
9. UPGB Paron Subdivre Kediri
10. UPGB Kembang Subdivre Bondowoso
11. UPGB Arjasa Subdivre Bondowoso
12. UPGB Kebon Agung Subdivre Malang
13. UPGB Sumber Suko Subdivre Probolinggo
14. UPGB Klaseman Subdivre Probolinggo
15. UPGB Wonosobo Subdivre Banyuwangi
16. UPGB Kalipuro Subdivre Banyuwangi
17. UPGB Pucunglor Subdivre Tulungagung
18. UPGB Pecoro Subdivre Jember
19. UPGB Pamekasan Subdivre Madura
20. UPGB Gulun Subdivre Ponorogo
21. UPGB Ngrupit Subdivre Ponorogo
22. UPGB Pacitan Subdivre Ponorogo

4.1.1.2 Good Corporate Governance

The implementation of Good Corporate Governance (GCG) is mandatory and important basis for the success of realizing the vision and mission and business continuity of the company. GCG implementation today not only as the fulfillment of obligations only, but has become a necessity in running the company's business activities in order to maintain sustainable business growth , increase the value of the company and an effort to ensure the company is able to survive in the competition .

As one of the State Owned Enterprise, BULOG always meet the norms and rules of corporate governance established by the Ministry of State Owned Enterprise, as mandated in the Decree of the Minister of State Owned Enterprises No. KEP - 117 / MBU / 2002 dated July 31, 2002, as amended into Regulation of the Minister of State Enterprises No. Per - 01 / MBU / 2011 dated August 1, 2011 on the Implementation of Good Corporate Governance (GCG) in State Owned Enterprises. The regulatory

provisions are intended to provide more detailed guidance for companies in implementing good corporate governance based on the principles of transparency, accountability, responsibility, independence, and fairness.

Implementation of Good Corporate Governance (GCG) in Perum BULOG continues to increase and improvement in line with the developments and demands of the business and the desire of Perum BULOG to fulfill the mission of the company is the realization of the professional, honest, trustworthy human resource and applies the principles of GCG in the food sector. The implementation of corporate governance principles have been embodied by such company with the establishment of development functions under the GCG Corporate Secretary that specifically deals with and monitor the activities of GCG implementation in BULOG. The Company has issued the documents supporting the implementation of GCG i.e. GCG Code and the Code of Conduct. Board of Trustees also has a supporting organ i.e. Committees of the Board of Trustees were instrumental in helping to improve the effectiveness of supervisory functions performed by the Board of Commissioners.

In addition, in order to increase awareness and knowledge of all BULOG's employees about GCG, the company GCG socialization activities in the internal environment. Socialization activities have been conducted continuously since 2004, both in the form of socialization GCG for officials BULOG involving outside parties as a speaker; a visit to regional divisions to promote the implementation of GCG; delivery of content GCG and Code of Conduct on educational and training of internal BULOG and socialization by management routinely performed on various occasions internal meetings.

4.1.2 Vision and Mission of Perum BULOG Divre Jatim

- Vision

  'Become a Winning Company in Achieving Food Sovereignty'

- Mission

  1. Providing excellent service to the society and other stakeholders to meet basic needs food.
  2. Achieving sustainable business growth.
  3. Applying good corporate governance.

4.1.3 Organization Structure of Perum BULOG Divre Jatim

Perum BULOG Divre Jatim is part of Perum BULOG Indonesia. Perum BULOG Divre Jatim is directed by Head of Regional Division. The Head of Regional Division supervises three Heads of Department.

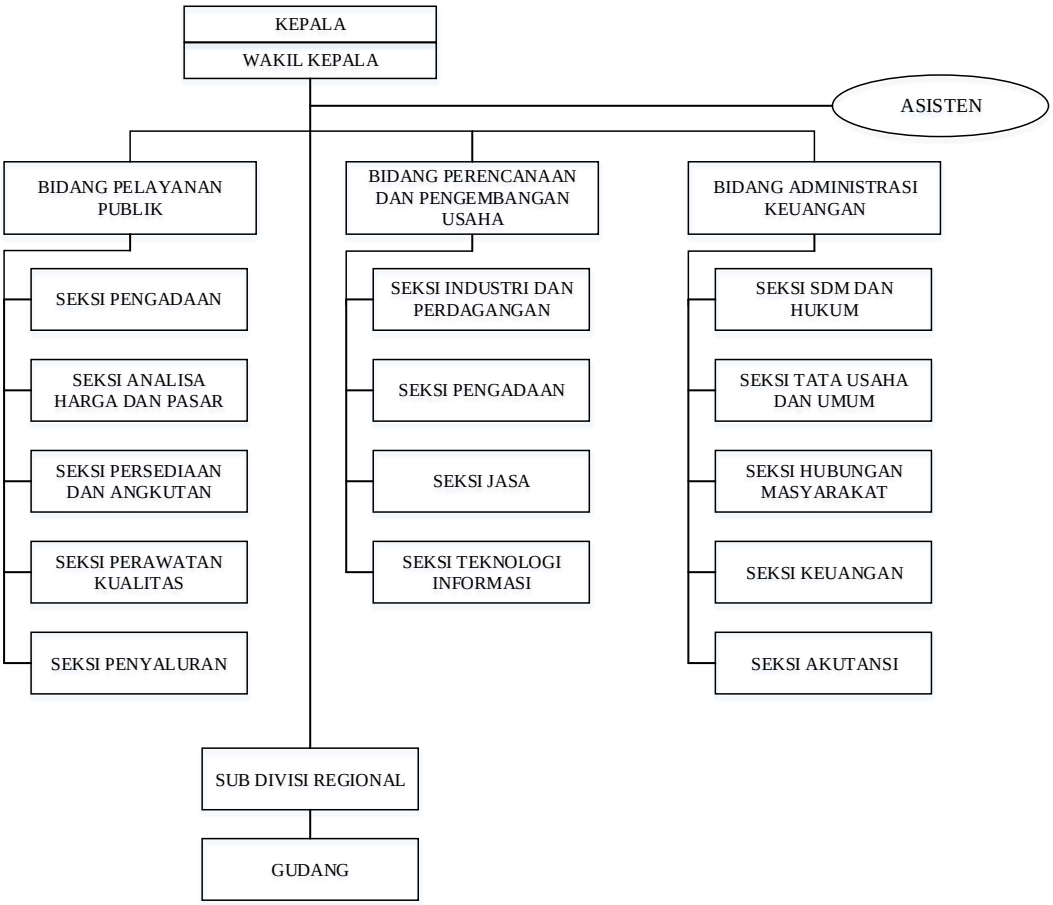

Figure 4. 1 Organization Structure of Perum BULOG Divre Jatim

4.2 Supply Chain Network of Perum BULOG Divre Jatim

BULOG public duties are the mandate of Presidential Instruction No. 3 of 2012 on '*Kebijakan Pengadaan Gabah/Berita dan Penyaluran Beras oleh Pemerintah*', which is a manifestation of government intervention in national rice to strengthen food security. Bulog public duties are interrelated and reinforce each other so as to achieve food security and national household firmer. The first task is to implement purchasing policies grain / rice in the country with the provisions of Government Purchasing Price or *'Harga Pembelian Pemerintah* (*HPP*)'. This activity is manifested in the form of procurement of domestic grain and rice by Perum BULOG. The second task is to provide and distribute subsidized rice for low income groups which are embodied in

the implementation of *'Raskin'* program. Meanwhile, the third task is to provide and distribute rice to keep prices stable, tackling emergencies, disasters and food insecurity. The third activity is undertaken by Perum BULOG in the form of management of Government Rice Reserve or '*Cadangan Beras Pemerintah* (CBP)'.

Before performing these supply chain activities, each regional division should develop procurement target grain/ rice. Head of Regional Division is responsible in preparing Target Acquisition per Division Operations/ Subdivre/ Kansilog, per commodity grain and rice, per month and per channel procurement according to the potential and the objective conditions of the area as well as the proposed breakdown of the procurement target to the Board. Based Procurement Targets proposed by the Head of Regional Division (Division), then the Board of Directors set a target of Procurement Grain and Rice Home Affairs. The Board of Directors of the Target procurement provisions specified by Division / Subdivre / Kansilog, per commodity grain and rice, per month and per channel supplying the basis for the provision of funds for procurement and manufacture of PJB / SPK Procurement of grain / rice of the Interior. Procurement Target may be revised in accordance dynamic conditions that occur in the field. If required Kadivre Target Acquisition may propose revisions to the Board. Based on the proposal of the Board of Directors set a target change Procurement Division is concerned.

In Perum BULOG Divre Jatim there are three logistic activities i.e. sourcing, stocking and maintaining, distributing. Each activity has its own sub activity. In sourcing activity, Perum BULOG Divre Jatim buys the rice from *Mitra Kerja, Kelompok Tani, Satgas ADA DN,* and *UPGB* based on Government Purchasing Price or *HPP*. In stocking and maintaining activity, Perum BULOG Divre Jatim organizes the activities in the warehouse e.g. maintain the condition of the rice; keep the rice in a good condition.

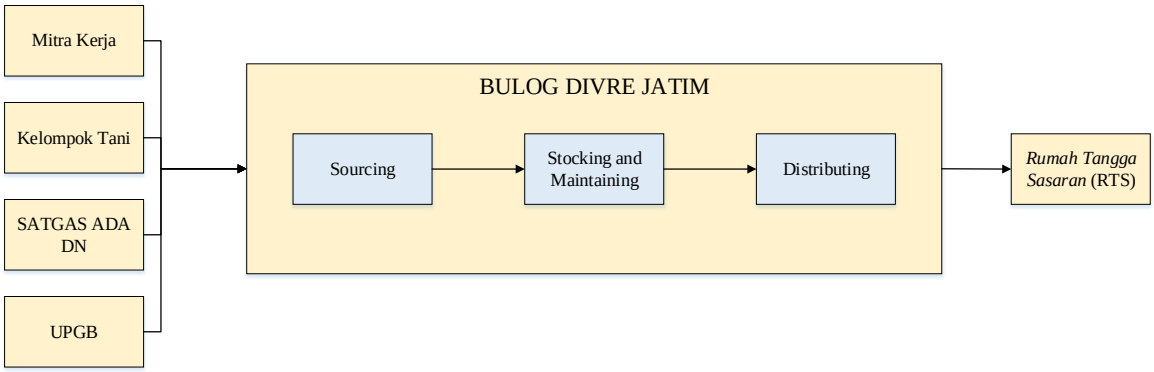

Figure 4. 2 Supply Chain Network of Perum BULOG Divre Jatim

4.2.1 Process of Rice Sourcing

Sourcing process begins with the preparation of rice procurement target of domestic rice. Head of East Java Regional Division BULOG sets procurement targets per Division Operations/ *Subdivre*/ *Kansilog*, per commodity grain and rice, per month and per channel procurement according to the potential and the objective conditions of the area as well as the proposed breakdown of the targets to the Board of Director. Under the procurement target proposed by the Head of Regional Division, then the Board of Directors set a target of procuring grain and rice in the country. Provision of Board of Director regarding the procurement target per Division/ Subdivre/ Kansilog, per commodity grain and rice, per month and per channel becomes a basis to provide procurement funds and provision of Purchase Agreement/ Work Order procurement of grain and rice in domestic level. Target acquisition could be revised in accordance dynamic conditions that occur in the field. Head of Regional Division may propose revisions to the procurement target of Directors.

Sourcing process in the Perum BULOG Divre Jatim can through these three parties, namely:

1. Sourcing process of grain and rice through Mitra Kerja/ POKTAN/ GAPOKTAN
2. Sourcing process of grain and rice through ADA SATGAS DN
3. Sourcing process of grain and rice through UPGB.

4.2.1.1 Sourcing process of grain and rice through Mitra Kerja/ POKTAN/ GAPOKTAN

Grain and rice procurement process through Mitra Kerja/ POKTAN/ GAPOKTAN must go through several stages. The first stage, Mitra Kerja/ POKTAN/ GAPOKTAN applies for procurement of grain/ rice to the Head of Regional Division. The application includes quantum and period of procurement. The second phase, the Head of Division determines the quantum, time, and place of procurement and composes '*Perjanjian Jual Beli* (PJB)*'* for procurement of grain/ rice with Mitra Kerja/ POKTAN/ GAPOKTAN, publish Delivery Order (DO) of plastic sack/ kuralon thread for Mitra Kerja/ POKTAN/ GAPOKTAN after Mitra Kerja/ POKTAN/ GAPOKTAN pledged plastic sack/ kuralon thread, and published '*Surat Perintah Terima Barang* (SPTB)' to the Head of Warehouse and '*Surat Perintah Pemeriksaan Kualitas* (SPPK)' to '*Pelaksana Pemeriksa Kualitas* (PPK)'. The third stage, Mitra Kerja/ POKTAN/ GAPOKTAN composes a statement (integrity pact) that grain/ rice is submitted/ put in the BULOG warehouse has met the quality requirements set by Perum BULOG. Integrity Pact is completed one time before starting the procurement activity and it is valid for one year. The fourth stage, Mitra Kerja/ POKTAN/ GAPOKTAN can procure outside its Sub Regional Division in the one Regional Division where Mitra Kerja registered with priority for carrying out procurement in the region of Mitra Kerja/ POKTAN/ GAPOKTAN is registered.

After going through the fourth stage, further Mitra Kerja/ POKTAN/ GAPOKTAN hands grain/ rice in accordance with PJB and SPTB to the warehouse designated to do quality inspection by PPK. Based on the SPPK, PPK checks the quality of grain/ rice in a place determined by the Head of the Division which includes: seams and labels as well as the quality of grain/ rice according to Standard Operating Procedures of Inspection Procedures Quality Grain, Rice and Its Packaging in Perum BULOG. Based on the results of quality checks by the PPK as outlined in '*Risalah Pemeriksaan Kualitas* (RPK)', then Head of Warehouse can accept, reject, or ask for a re-analysis of the quality of grain/ rice submitted by Mitra Kerja/ POKTAN/ GAPOKTAN. Grain/ rice that meet the requirements are accepted by the Head of Warehouse to be stored in warehouses BULOG. Mitra Kerja/ POKTAN/ GAPOKTAN could request payment for grain/ rice that has been received and entered the warehouse BULOG.

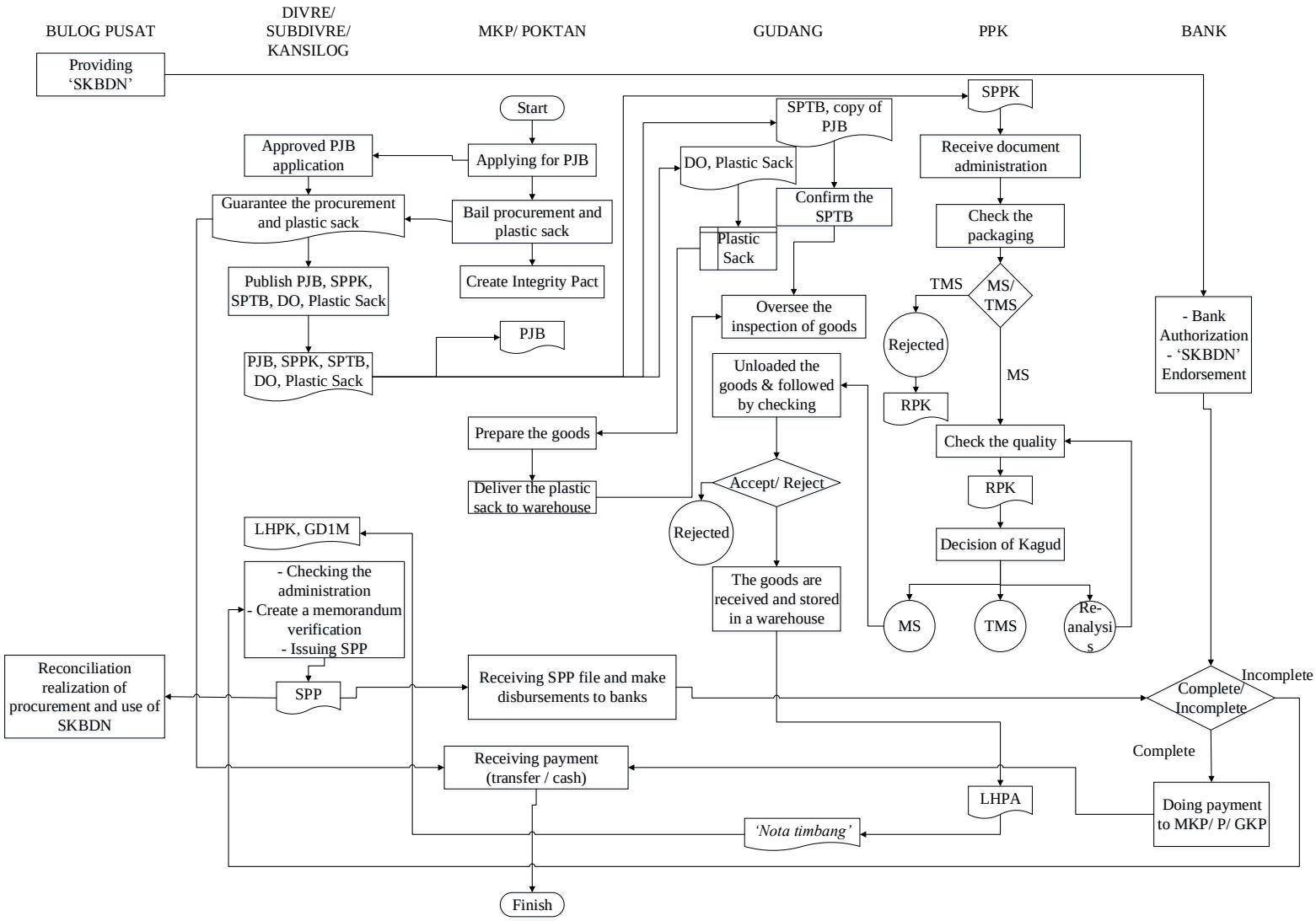

Figure 4. 3 Procurement of Grain / Rice through Mitra Kerja / POKTAN/ GAPOKTAN Chart (Source: SOP of Perum BULOG Divre Jatim)

4.2.1.2 Sourcing Process through SATGAS ADA DN

Procurement of grain / rice through SATGAS ADA DN has more stages compared to Mitra Kerja/ POKTAN/ GAPOKTAN. There are twelve steps that must be performed in conducting procurement through SATGAS ADA DN. The first stage, SATGAS ADA DN creates and submits procurement plans for approval of the Head of Division. Procurement of grain/ rice can be started after '*Surat Berdokumentasi Dalam Negeri* (SKBDN)' available centrally. SATGAS ADA DN makes a statement (integrity pact) stated that grain/ rice submitted to BULOG has met the quality requirements set by BULOG. The integrity pact is completed one time before starting the procurement activities and procurement is valid for one year. Under the procurement plan made by the SATGAS ADA DN that has been approved, the Head of Division publishes SPK to SATGAS ADA DN, Delivery Order (DO) of plastic sacks/ kuralon thread and SPTB to the Head of the designated warehouse and SPPK to PPK.

Based on the SPK, then the head of the Division publishes '*Surat Permintaan Pembayaran* (SPP)' for the disbursement of advances in stages according to the potential of absorption of grain/ rice by SATGAS ADA DN. In the procurement of grain/ rice, SATGAS ADA DN is unsecured procurement and guarantee a plastic sack/ kuralon thread. SATGAS ADA DN hands grain/ rice according SPK and SPTB to the warehouse designated to do quality checks by PPK. Based on the SPPK, PPK checks the quality of grain/ rice in a place determined by the Head of the Division which includes: seams and labels as well as the quality of grain/ rice according to Standard Operating Procedures of Inspection Procedures Quality Grain, Rice and packaging in Perum BULOG.

Based on the results of quality inspection by the PPK as outlined in '*Risalah Pemeriksaan Kualitas* (RPK)', then Head of Warehouse can accept, reject, or ask for a re-analysis of the quality of grain/ rice submitted SATGAS ADA DN. Grain/ rice that meets the requirements to be accepted by the Head of Warehouse then stored in BULOG warehouse and as proof of receipt of goods, the Head of Warehouse published '*Bukti Penerimaan Barang* (GD1M)' and PPK published LHPK to be submitted to the SATGAS ADA DN. On the transfer of grain/ rice to the Head of Warehouse, SATGAS ADA DN obtains documents and receipts in the form of GD1M and LHPK. GD1M and LHPK documents of grain/ rice on behalf of SATGAS ADA

DN are one form of accountability SATGAS ADA DN to use SKBDN Red Clause is thawed and plastic sacks are taken in the warehouse.

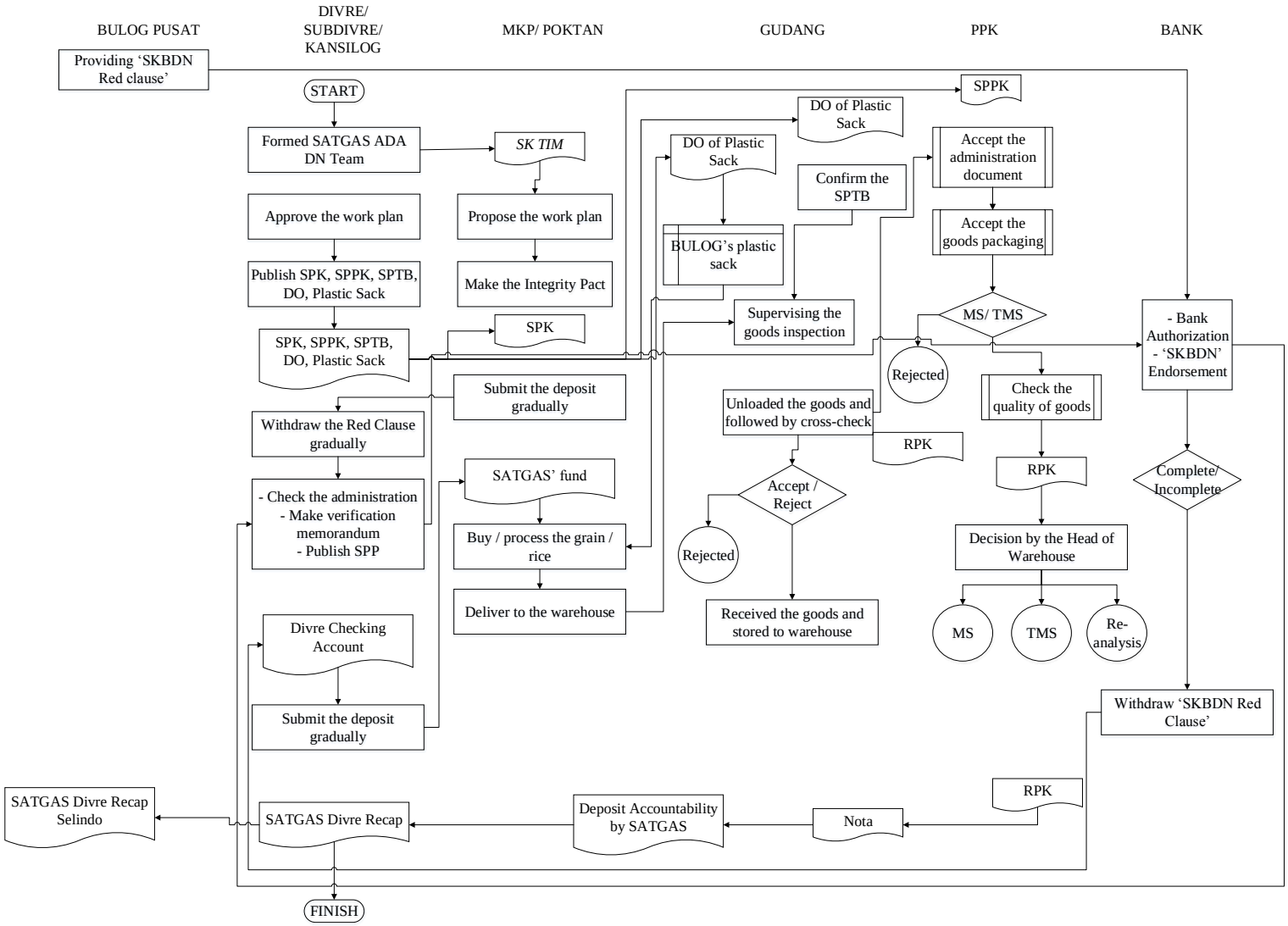

Figure 4. 4 Procurement of Grain / Rice through SATGAS ADA DN Chart (Source: SOP of Perum BULOG Divre Jatim)

4.2.1.3 Sourcing Process through UPGB

Procurement of grain/ rice through UPGB performed with several stages. UPGB applies for procurement of grain/ rice to the Head of Division, and based on the application Head of the Division determines the quantum, time, and place of implementation of the procurement. Then the Head of Division makes SPK for procurement of grain/ rice and publish Delivery Order (DO) of plastic sack/ kuralon thread for UPGB, and publishes SPTB to Head of Warehouse, and SPPK to PPK. UPGB make a statement (integrity pact) that grain/ rice submitted to BULOG's warehouses meet the requirements specified quality of Perum BULOG. The integrity pact is completed one time before starting the procurement activity is valid for one year procurement. In the procurement of grain/ rice, UPGB are unsecured procurement and guarantee a plastic sack/ kuralon thread. UPGB handed grain/ rice according SPK and SPTB to the warehouse designated to do quality checks by the PPK.

Based on the SPPK, PPK checks the quality of grain/ rice in a warehouse determined by Head of the Division which includes: seams and labels as well as the quality of grain/ rice according to Standard Operating Procedures of Inspection Procedures Quality Grain, Rice and Its Packaging in Perum BULOG. Based on the results of quality checks by the PPK as outlined in '*Risalah Pemeriksaan Kualitas* (RPK)', then Head of Warehouse can accept, reject or ask for a re-analysis of the quality of grain/ rice submitted by UPGB. Grain/ rice that meet the requirements to be accepted by the Head of Warehouse then stored in BULOG's warehouse and as proof of receipt of goods, the Head of Warehouse published GD1M and KDP published LHPK to be submitted to UPGB. UPGB requests payment for grain/ rice that have been received and entered BULOG warehouse.

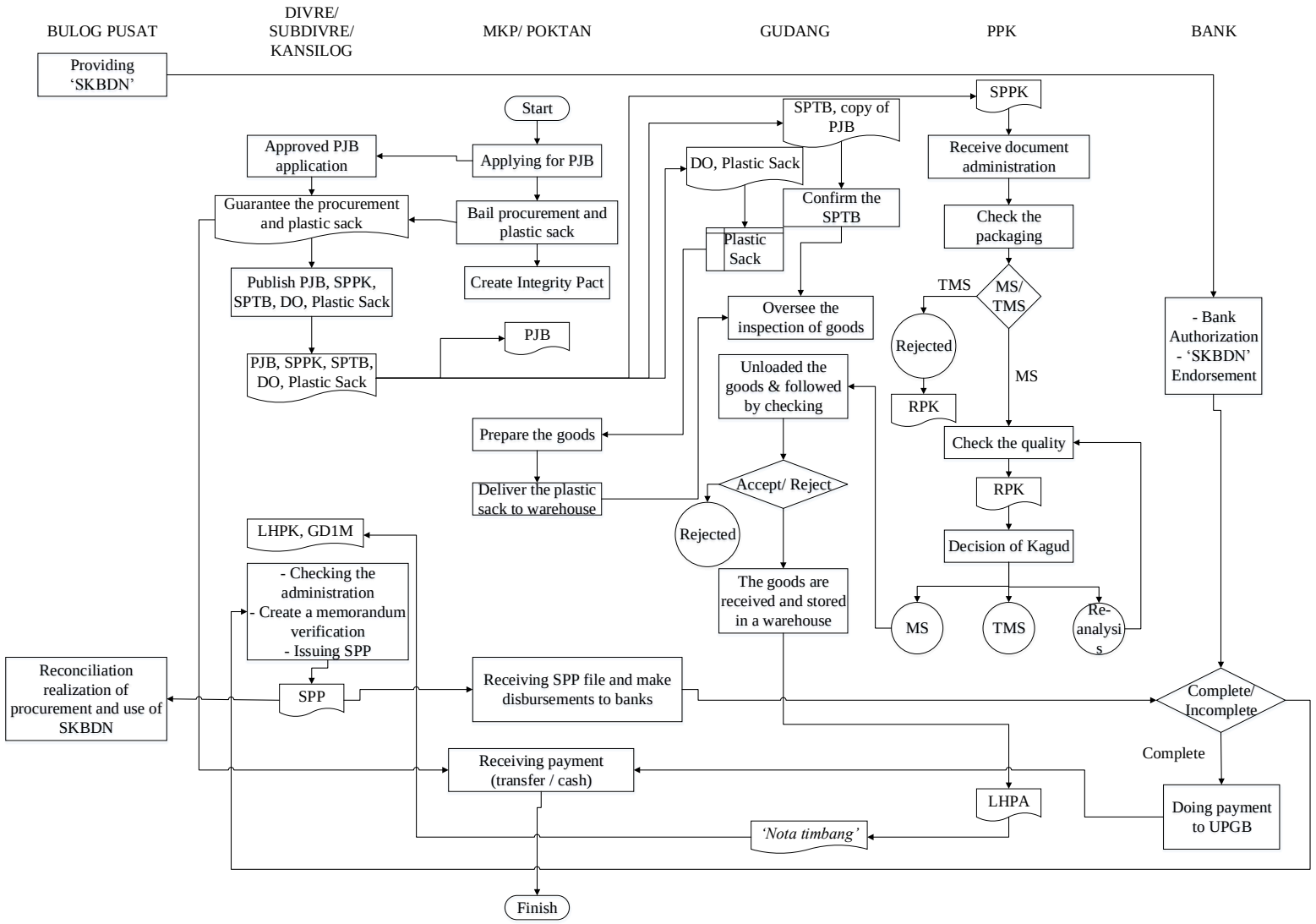

Figure 4. 5 Procurement of Grain / Rice through UPGB Chart (Source: SOP of Perum BULOG Divre Jatim)

4.2.2 Process of Rice Stocking and Maintaining

Stocking and maintaining the process begins after Head of Warehouse receives grain/ rice that meet the quality requirements. The grain/ rice is stored in the warehouse in order to grain/ rice gets the treatment and storage of Integrated Warehouse Pest Management or '*Pengelolaan Hama Gudang Terpadu* (PHGT)'.

Principles of PHGT are a key principle in the treatment of commodities in the BULOG. PHGT promote cleanliness warehouse, then monitoring the implementation of commodities and warehouse maintenance and preventive activities (spraying) and curative activities such as fumigation pest control in case of pest infestation.

In addition to applying the principles PHGT, Perum BULOG Divre Jatim also implements a method in the storage of grain and rice commodities. Storage of grain and rice in Perum BULOG Divre Jatim executed with two methods, namely conventional and unconventional methods. In the conventional method, rice and grain stacked above palette with key systems 5, 7 or 8 in order to guarantee the stack can stand firm and ensure the safety of workers in the warehouse. While unconventional methods of storage are carried BULOG a hermetic storage technology innovation, namely CO_2 stack techniques and the use of plastic Cocoon. CO_2 storage technique using stack actually been implemented by BULOG operationally since 1987. The use of CO_2 new stack can be considered to meet the economic threshold if its implementation carried out for 9 months. In this technique, staple commodities closed as tight as possible with a special plastic, and then CO_2 is injected until the concentration reaches 80 % and commodities eligibility left closed with CO_2 gas to a period long enough in hopes of commodities can be suppressed respiration and pests and fungi that may be present in the commodities can be suppressed growth.

During the second use of this storage technique (CO2 and Cocoon) is not required any treatment such as fumigation / spraying making it more environmentally friendly. Staple commodities that are stored only covered with impermeable using a special plastic material that is resistant to ultraviolet rays, water, and weather, cannot be penetrated by oxygen and carbon dioxide gas, and has an anti-rat design. Things need to be done for storage only monitor and keep the oxygen content contained in Cocoon remained low, while the stack is monitored for CO2 is CO2 gas content. At Cocoon, the increase in CO2 and a reduction in oxygen content during

storage, resulting from the respiration of commodity / organism that is in the commodity and not as a result of CO2 gas injection results

4.2.3 Process of Rice Distribution

Implementation of the distribution of rice in Perum Bulog must go through several stages. Division Operations / Subdivre / Kansilog accept SPA Raskin of the City / Regency is itemized for each sub-district and / or District / Village as the basis for the issuance SPPB / DO. Division Operations / Subdivre / Kansilog before issuing SPPB / DO must check the arrears of HP-Raskin. If there are no arrears HP-Raskin received the SPA can be directly published SPPB / DO. If there are arrears HP-Raskin for District / Village particular the allocation to District / Village are yet to be served until the repayment is done. Based on the SPA Raskin, Division Operations / Subdivre / Kansilog published SPPB / DO and prepare BAST. SPPB / DO genuine submitted to Satker Raskin and copied to the warehouse that will serve expenditure of rice and Accounting Section Division Operations / Subdivre. The period of validity SPPB / DO Raskin is a maximum of one month. If within one month of the amount disbursed unfinished Raskin then SPPB / DO can be extended up to a maximum of one time. If SPPB / DO Raskin which has been extended as much as one is not yet finished then distributed to the rest of SPPB / DO should be canceled. Further to the rest of which has not been distributed Raskin published latest SPPB / DO.

Satker Raskin receives and submits SPPB / DO native to the warehouse designated as a basis for making rice. Warehouse checking the suitability SPPB / DO copies of the Division of Operations / Subdivre / Kansilog. Warehouses do service expenditure and delivery of rice in accordance with the applicable provisions of warehousing. Satker Raskin received rice from the warehouse and shall check the quantity and quality of rice to be distributed. Satker Raskin delivered rice to distribution points and handed to the Executive rice distribution. Satker Raskin and the Executing Distribution signed BASTB Raskin.

Payment / deposit HP - Raskin preferably in the form of proof of transfer / HP - Raskin deposited in a designated bank account. If payment / deposit HP - Raskin in cash , Raskin PIU shall immediately transfer to the account of HPB – Raskin within 1x24 hours. In terms of ease of depositing HP-Raskin by Implementing Distribution, the Division can open an account at a designated bank. HP-Raskin deposit in the bank account shall be immediately transferred to the

account of the HP-Raskin by issuing a Standing Instruction (SI) within 1x24 hours. Reports Information System Management or *Informasi Sistem Management* of grain/ rice created at the end of the month.

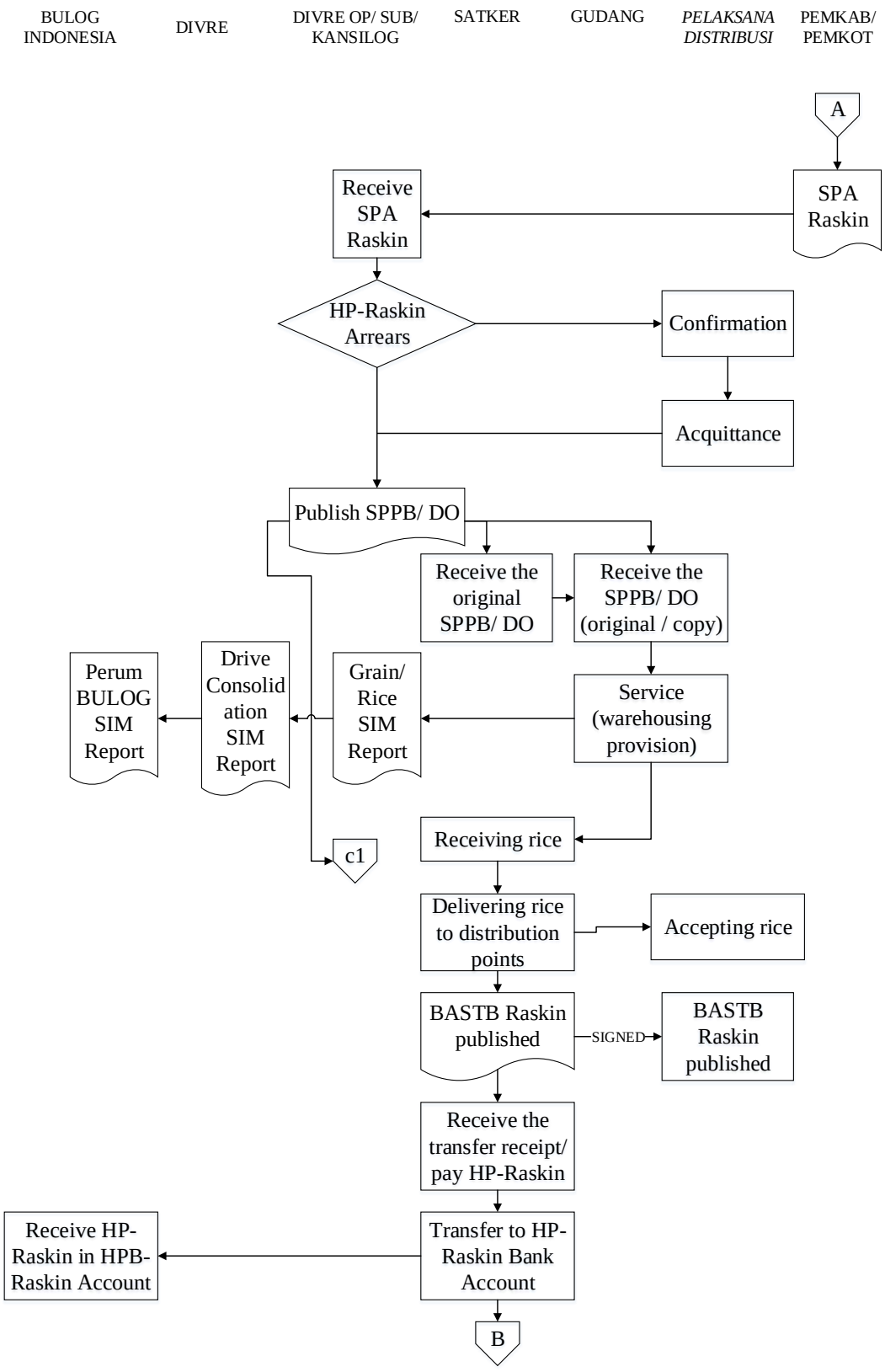

Figure 4. 6 *Raskin* Distribution Chart (Source: SOP of Perum BULOG Divre Jatim)

(This page is intentionally left blank)

CHAPTER 5
RISK ASSESSMENT AND ANALYSIS

This chapter is divided into two sub chapters, which are sub-chapter risk assessment and risk analysis. Risk assessment section describes the identification of supply chain activities, risk identification, risk assessment, and risk evaluation. While risk analysis explains the analysis each section from the previous sub chapter, also the mitigation strategy for the high risk category.

5.1 Risk Assessment

5.1.1 Identification of Supply Chain Activity at Perum BULOG Divre Jatim

The identification process was performed by mapping the company's supply chain activity using the SCOR model (Supply Chain Operations Reference). SCOR model used in this study consists of the activity plan, source, make, and deliver. Identification of supply chain activity was derived from interview, group discussions and historical data that have been verified by company. Furthermore, table 5.1 describes the supply chain activities at Perum BULOG that have been categorized by using SCOR.

Table 5. 1 Supply Chain Activity Mapping by SCOR

Level 1		**Level 2**	
Code	**SCOR**	**Code**	**Activity**
P	Plan	P.1	Prepares the Procurement Target per Division Operations / Subdivre / Kansilog by the Head of Regional Division
		P.2	Proposes breakdown of procurement target by Head of Regional Division to Director
		P.3	Determines the quantum, time, and location of procurement by Head of Regional Division
S	Source	S.1	Makes Purchase Agreement or '*Perjanjian Jual Beli* (PJB)' procurement of grain/ rice PJB with Mitra Kerja/ POKTAN/ GAPOKTAN
		S.2	Publishes Delivery Order (DO) for plastic sack/ *benang kuralon* procurement
		S.3	Publishes '*Surat Perintah Terima Barang* (SPTB)'
		S.4	Publishes '*Surat Perintah Pemeriksaan Kualitas* (SPPK)'
		S.5	Publishes '*Surat Perintah Kerja* (SPK)' for procurement
		S.6	Provides plastic sack/ *kuralon* yarn
		S.7	Conducts quality inspection on grain/ rice
		S.8	Receives grain/ rice

Table 5. 2 Supply Chain Activity Mapping by SCOR (continued)

Level 1		Level 2	
Code	**SCOR**	**Code**	**Activity**
		S.9	Publishes '*Surat Permintaan Pembayaran* (SPP)'
M	Make	M.1	Performs storage of grain/ rice in BULOG warehouse
		M.2	Performs the activity of of Integrated Warehouse Pest Management or '*Pengelolaan Hama Gudang Terpadu* (PHGT)'
		M.3	Monitors the condition of grain/ rice storage warehouse regularly
		M.4	Performs maintenance on spraying and fumigation equipment
D	Deliver	D.1	Receives Warrant Allocation or '*Surat Perintah Alokasi* (SPA)'
		D.2	Checks *Raskin* arrears
		D.3	Publishes SPPB/ DO and prepares '*Berita Acara Serah Terima* (BAST)'
		D.4	Checks the quantity and quality of rice
		D.5	Conducts service expenditure and delivery of rice in the warehouse
		D.6	*Raskin* Work Unit (Satker) delivers the rice to the distribution points
		D.7	Receives '*Berita Acara Serah Terima* (BAST)'
		D.8	Conducts payment of HP-Raskin
		D.9	Reports on Information System Management or '*Sistem Informasi Manajemen* (SMI)' at the end of the month

By mapping the company's supply chain activities using SCOR is expected to assist in the interpretation of the activities of the company in a supply chain system and provide information flow to all parts of the company. So as to use the SCOR model, it can be seen how complex the company's supply chain activities are.

5.1.2 Risk Identification

Risk identification is based on the elaboration of each activity at each supply chain process using SCOR. Each of these processes was identified per events or activities that could potentially pose a risk and the identification of risk agents that cause the risk occurs. Risk identification is performed to determine the potential risk. In conducting risk identification, group activities conducted discussions with company management knows the company's overall business processes, in addition to the identification of risk derived from historical review of the company. Based on the activities and discussion groups, identification results are obtained. Identification

results are representative of the risk of failure that could potentially occur in the company.

Table 5. 3 Risk Identification Result of Suppply Chain Activities at Perum BULOG

Level 2		**Level 3**	
Code	**Activity**	**Code**	**Risk Event**
P.1	Prepares of Procurement Target per Division Operations / Subdivre / Kansilog by the Head of Regional Division	P.1.1	Realization of procurement is not in accordance with the targets that have been prepared
P.2	Proposes breakdown of procurement target by Head of Regional Division to Director	P.2.1	There is a revised breakdown procurement target
P.3	Determines the quantum, time, and location of procurement by Head of Regional Division	P.3.1	The whole quantum of grain / rice can not be resolved at a predetermined period
S.1	Makes Purchase Agreement or 'Perjanjian Jual Beli (PJB)' procurement of grain/ rice PJB with Mitra Kerja/ POKTAN/ GAPOKTAN	S.1.1	There is manipulation against PJB that has been created and agreed in advance
		S.1.2	There is an error in the preparation of PJB
S.2	Publishes Delivery Order (DO) for plastic sack/ *benang kuralon* procurement	S.2.1	Publishing process of DO for plastic sack/ *kuralon* yarn needs quite long time
S.3	Publishes '*Surat Perintah Terima Barang* (SPTB)'	S.3.1	There is tardiness in publishing SPTB
S.4	Publishes '*Surat Perintah Pemeriksaan Kualitas* (SPPK)'	S.4.1	There is tardiness in publishing SPPK
S.5	Publishes '*Surat Perintah Kerja* (SPK)' for procurement	S.5.1	There is tardiness in publishing SPK
S.6	Provides of plastic sack/ kuralon yarn	S.6.1	The number of plastic bag / *kuralon* thread does not correspond to the amount needed
		S.6.2	Still found a plastic sack / *kuralon* thread with quality below established standards
S.7	Conducts the quality inspection on grain/ rice	S.7.1	Decreasing in the quality of grain/ rice
		S.7.2	Still found grain / rice that has not correspond to the quality standards
S.8	Receives the grain/ rice	S.8.1	Grain / rice was not accepted just in time
S.9	Publishes 'Surat Permintaan Pembayaran (SPP)'	S.9.1	There is tardiness in the process of publishing the SPP
		S.9.2	SPP declared invalid
M.1	Performs storage of grain/ rice in BULOG warehouse	M.1.1	Fillial warehouse use in large number
		M.1.2	The use of warehouse space that is not optimal
		M.1.3	Stock of grain / rice in warehouses missing

Table 5. 4 Risk Identification Result of Suppply Chain Activities at Perum BULOG (continued)

Level 2		Level 3	
Code	**Activity**	**Code**	**Risk Event**
M.2	Performs the activity of of Integrated Warehouse Pest Management or '*Pengelolaan Hama Gudang Terpadu* (PHGT)'	M.2.1	There are pests (*Rhyzoperta*) attack
M.3	Monitors the condition of grain/ rice storage warehouse regularly	M.3.1	Implementation of monitoring activities in the warehouse has not been performed optimally
M.4	Performs maintenance on spraying and fumigation equipment	M.4.1	Equipment maintenance activities have not been carried out properly
D.1	Receives Warrant Allocation or 'Surat Perintah Alokasi (SPA)'	D.1.1	Delays in the receipt of SPA Raskin
		D.1.2	Data allocation of rice needs that have been given does not correspond to real conditions
D.2	Checks Raskin arrears	D.2.1	The high arrears of *Raskin* payment
		D.2.2	Failure to collect the *Raskin* subsidy
D.3	Publishes SPPB/ DO and prepares '*Berita Acara Serah Terima* (BAST)'	D.3.1	Any delay in the issuance SPPB / DO and BAST
D.4	Checks the quantity and quality of rice	D.4.1	Still found grain / rice that has not correspond to the quality standards
D.5	Conducts service expenditure and delivery of rice in the warehouse	D.5.1	Service activities are not running optimally
D.6	Raskin Work Unit (Satker) delivers the rice to the distribution points	D.6.1	*Raskin* has not been distributed 100 %
		D.6.2	Delays in the delivery of rice to the distribution point
D.7	Receives '*Berita Acara Serah Terima* (BAST)'	D.7.1	BAST is not delivered within the specified time
D.8	Conducts payment of HP-Raskin	D.8.1	Deposit payment is not in time
		D.8.2	The amount of money paid is not in accordance with the conditions set
D.9	Reports on Information System Management or '*Sistem Informasi Manajemen* (SMI)' at the end of the month	D.9.1	The report is not completed on time

After identifying the risks at each supply chain activities with the use of SCOR, the next step was identifying the agent causing risk or risk (risk agent) in each risk event. Risk agent is a cause that can lead to a risk. Table 5.5 presents the identification of risk agent in each risk event occurring in Perum BULOG Divre Jatim.

Table 5. 5 Identification of Risk Agent in Each Risk Event at Perum BULOG

Level 3		Level 4	
Code	**Risk Event**	**Code**	**Risk Agent**
P.1.1	Realization of procurement is not in accordance with the targets that have been prepared	P.1.1.1	Performance of UPGB and SATGAS ADA DN is not optimal
		P.1.1.2	Most partners are small rice milling unit, so its performance is not optimal
		P.1.1.3	Declining in rice production
P.2.1	There is a revised breakdown procurement target	P.2.1.1	There is misscalculation of the target by the Head of Division
P.3.1	The whole quantum of grain / rice can not be resolved at a predetermined period	P.3.1.1	Mitra Kerja/ POKTAN/ GAPOKTAN cannot meet the quantum of grain / rice timely
S.1.1	There are abuses against CHD has been created and agreed upon	S.1.1.1	Second Party (*Pihak Kedua*) does not comply with the quality of grain and submission deadlines
S.1.2	There is an error in the preparation of PJB	S.1.2.1	There is missing archives
S.2.1	DO publishing process for plastic sack/ *kuralon* thread requires long enough time	S.2.1.1	Head of Regional Division does not immediately issue the DO because he has not received a guarantee prof from Mitra Kerja
S.3.1	Delays in publishing SPTB	S.3.1.1	There is an error in preparing SPTB
S.4.1	Delays in publishing SPPK	S.4.1.1	There is an error in preparing of SPPK
S.5.1	Delays in publishing SPK	S.5.1.1	There is an error in preparing of SPK
S.6.1	The number of plastic bag / thread kuralon does not correspond to the amount needed	S.6.1.1	There is an error in the calculation of plastic sacks / *kuralon* thread needs by workers
S.6.2	Still found a plastic sack / yarn kuralon with quality below established standards	S.6.2.1	PPK is less careful in the process of inspection quality plastic bags
S.7.1	The quality of grain/ rice decreased	S.7.1.1	Warehouse pests
		S.7.1.2	Rice too long kept in the warehouse
S.7.2	Still found grain / rice that has not correspond to the quality standards	S.7.2.1	PPK has not been carrying out quality checks of grain / rice optimally
S.8.1	Grain / rice was not accepted just in time	S.8.1.1	There is delay of supplier's conveyance (Mitra Kerja, UPGB, SATGAS ADA DN)
S.9.1	Delays in the process of publishing the SPP	S.9.1.1	Attachment requirements for issuing SPP document is not yet complete
S.9.2	SPP declared invalid	S.9.2.1	Signature contained incomplete in accordance with the conditions set
M.1.1	Fillial warehouse use in large number	M.1.1.1	Limitations of space in main warehouses
		M.1.1.2	Partners / Manufacturers must travel long distances to the main warehouse
M.1.2	The use of warehouse space that is not optimal	M.1.2.1	The use of warehouse space is not appropriate / less than the installed capacity
		M.1.2.2	Errors in setting the staple by warehouse workers

Table 5. 6 Identification of Risk Agent in Each Risk Event at Perum BULOG (continued)

Level 3		Level 4	
Code	**Risk Event**	**Code**	**Risk Agent**
M.1.3	Stock of grain / rice in warehouses missing	M.1.3.1	The theft of grain / rice
		M.1.3.2	Errors in the administrative process by the employees of the warehouse
M.2.1	Pests (Rhyzoperta) attack	M.2.1.1	The use of pesticides in the long term
		M.2.1.2	Implementation of fumigation is not optimal
M.3.1	Implementation of monitoring activities in the warehouse has not been performed optimally	M.3.1.1	Warehouse sanitation process has not been carried out routinely by warehouse workers
		M.3.1.2	Warehouse workers have not implement appropriate monitoring procedures
		M.3.1.3	Equipment that do not meet the standards
M.4.1	Equipment maintenance activities have not been carried out properly	M.4.1.1	Warehouse workers have not been carrying out activities in accordance with the schedule of maintenance tools
D.1.1	Delays in the receipt of SPA Raskin	D.1.1.1	An error in compiling SPA
D.1.2	Data allocation of rice needs that have been given does not correspond to real conditions	D.1.2.1	Error calculation needs of rice by Regency / City Government
D.2.1	The high arrears of *Raskin* payment	D.2.1.1	Their money is still stuck in the village clerk and Satker
D.2.2	Failure to collect the Raskin subsidy	D.2.2.1	There is a document that is incomplete
		D.2.2.2	The validity of the document is questionable
		D.2.2.3	Executing the distribution of timely and targeted
D.3.1	Any delay in the issuance SPPB / DO and BAST	D.3.1.1	An error in the preparation of SPPB / DO and BAST
D.4.1	Still found grain / rice that has not correspond to the quality standards	D.4.1.1	PPK less careful in the process of quality inspection of rice
D.5.1	Service activities are not running optimally	D.5.1.1	There is an error in the administration of the service process by officer
D.6.1	Raskin has not been distributed 100 %	D.6.1.1	Household Target (RTS) is not willing to accept Raskin
		D.6.1.2	The existence of payment arrears Raskin
D.6.2	Delays in the delivery of rice to the distribution point	D.6.2.1	Raskin haul trucks inadequate
		D.6.2.2	Bulog not have its own infrastructure for movement activities
D.7.1	BAST is not delivered within the specified time	D.7.1.1	There is an error in the preparation of BAST by the Division of Operations / Subdivre / Kansilog
D.8.1	Deposit payment is not timely	D.8.1.1	There is misappropriation of *Raskin* funds by local officers

Table 5. 7 Identification of Risk Agent in Each Risk Event at Perum BULOG (continued)

Level 3		Level 4	
Code	**Risk Event**	**Code**	**Risk Agent**
D.8.2	The amount of money paid is not in accordance with the conditions set	D.8.2.1	There is misappropriation of *Raskin* funds by local officers
D.9.1	The report is not completed on time	D.9.1.1	Increased volume of activities in each unit
		D.9.1.2	Delays in delivery of the report of Subdivre
		D.9.1.3	Number of competent human resources are still lacking

5.1.3 Risk Assessment

Having obtained the results of risk identification, risk assessment to get the results of the Risk Priority Number (RPN). The risk assessment carried out by using the method of the FMEA. However, in this method should notice to the value of severity, occurrence, and detection. Value severity, occurrence, and detection results are obtained from group discussions with management level have the authority, competence and overall understanding of the condition of the company. The purpose of the risk assessment of the risks identified is to know where the most influential risk to the company's supply chain activities. Risk value was determined by looking at the value of the Risk Priority Number (RPN). Then the Risk Priority Number (RPN) sorted from largest to smallest. Value Risk Priority Number (RPN) is highest indicates the most critical risks. The purpose of the critical risk is the risk that the event can disrupt the activities of the company in achieving its goals.

Table 5. 8 Identification of Risk Agent at Each Risk Event Occurred at Perum BULOG

Level 3		Level 4		Score		
Code	**Risk Event**	**Code**	**Risk Agent**	**S**	**O**	**D**
P.1.1	Realization of procurement is not in accordance with the targets that have been prepared	P.1.1.1	Performance of UPGB and SATGAS ADA DN is not optimal	3	3	2
		P.1.1.2	Most partners are small rice milling unit, so its performance is not optimal			
		P.1.1.3	Decline in rice production			
P.2.1	There is a revised breakdown procurement target	P.2.1.1	Errors in the calculation of the target by the Head of Division	2	2	1
P.3.1	The whole quantum of grain / rice can not be resolved at a predetermined period	P.3.1.1	Mitra Kerja/ POKTAN/ GAPOKTAN cannot meet the quantum of grain / rice timely	3	2	2

Table 5. 9 Identification of Risk Agent at Each Risk Event Occurred at Perum BULOG (continued)

Level 3		Level 4		Score		
Code	**Risk Event**	**Code**	**Risk Agent**	**S**	**O**	**D**
S.1.1	There are abuses against CHD has been created and agreed upon	S.1.1.1	Second Party (*Pihak Kedua*) does not comply with the quality of grain and submission deadlines	4	2	2
S.1.2	There is an error in the preparation of PJB	S.1.2.1	There is missing archives	2	2	1
S.2.1	DO publishing process for plastic sack/ *kuralon* thread requires long enough time	S.2.1.1	Head of Regional Division does not immediately issue the DO because he has not received a guarantee proof from Mitra Kerja	2	2	1
S.3.1	Delays in publishing SPTB	S.3.1.1	There is an error in preparing SPTB	2	2	1
S.4.1	Delays in publishing SPPK	S.4.1.1	There is an error in preparing of SPPK	2	2	1
S.5.1	Delays in publishing SPK	S.5.1.1	There is an error in preparing of SPK	2	2	1
S.6.1	The number of plastic bag / thread kuralon does not correspond to the amount needed	S.6.1.1	There is an error in the calculation of plastic sacks / *kuralon* thread needs by workers	3	2	2
S.6.2	Still found a plastic sack / yarn kuralon with quality below established standards	S.6.2.1	PPK is less careful in the process of inspection quality plastic bags	4	3	2
S.7.1	The quality of grain/ rice decreased	S.7.1.1	Warehouse pests	7	3	2
		S.7.1.2	Rice too long kept in the warehouse			
S.7.2	Still found grain / rice that has not correspond to the quality standards	S.7.2.1	PPK has not been carrying out quality checks of grain / rice optimally	5	3	2
S.8.1	Grain / rice was not accepted just in time	S.8.1.1	There is delay of supplier's conveyance (Mitra Kerja, UPGB, SATGAS ADA DN)	5	2	2
S.9.1	Delays in the process of publishing the SPP	S.9.1.1	Attachment requirements for issuing SPP document is not yet complete	3	2	2
S.9.2	SPP declared invalid	S.9.2.1	Signature contained incomplete in accordance with the conditions set	4	3	2
M.1.1	Fillial warehouse use in large number	M.1.1.1	Limitations of space in main warehouses	5	7	2
		M.1.1.2	Partners / Manufacturers must travel long distances to the main warehouse			
M.1.2	The use of warehouse space that is not optimal	M.1.2.1	The use of warehouse space is not appropriate / less than the installed capacity	4	4	2
		M.1.2.2	Errors in setting the staple by warehouse workers			
M.1.3	Stock of grain / rice in warehouses missing	M.1.3.1	The theft of grain / rice	5	4	2

Table 5. 10 Identification of Risk Agent at Each Risk Event Occurred at Perum BULOG (continued)

Level 3		Level 4		Score		
Code	**Risk Event**	**Code**	**Risk Agent**	**S**	**O**	**D**
		M.1.3.2	Errors in the administrative process by the employees of the warehouse			
M.2.1	Pests (Rhyzoperta) attack	M.2.1.1	The use of pesticides in the long term	8	5	3
		M.2.1.2	Implementation of fumigation is not optimal			
M.3.1	Implementation of monitoring activities in the warehouse has not been performed optimally	M.3.1.1	Warehouse sanitation process has not been carried out routinely by warehouse workers	7	3	2
		M.3.1.2	Warehouse workers have not implement appropriate monitoring procedures			
		M.3.1.3	Equipment that do not meet the standards			
M.4.1	Equipment maintenance activities have not been carried out properly	M.4.1.1	Warehouse workers have not been carrying out activities in accordance with the schedule of maintenance tools	5	3	3
D.1.1	Delays in the receipt of SPA Raskin	D.1.1.1	An error in compiling SPA	6	3	2
D.1.2	Data allocation of rice needs that have been given does not correspond to real conditions	D.1.2.1	Error calculation needs of rice by Regency / City Government	3	2	2
D.2.1	The high arrears of *Raskin* payment	D.2.1.1	Their money is still stuck in the village clerk and Satker	8	4	3
D.2.2	Failure to collect the Raskin subsidy	D.2.2.1	There is a document that is incomplete	8	4	3
		D.2.2.2	The validity of the document is questionable			
		D.2.2.3	Executing the distribution of timely and targeted			
D.3.1	Any delay in the issuance SPPB / DO and BAST	D.3.1.1	An error in the preparation of SPPB / DO and BAST	4	3	2
D.4.1	Still found grain / rice that has not correspond to the quality standards	D.4.1.1	PPK less careful in the process of quality inspection of rice	5	2	2
D.5.1	Service activities are not running optimally	D.5.1.1	There is an error in the administration of the service process by officer	3	2	2
D.6.1	Raskin has not been distributed 100 %	D.6.1.1	Household Target (RTS) is not willing to accept Raskin	8	6	3
		D.6.1.2	The existence of payment arrears Raskin			
D.6.2	Delays in the delivery of rice to the distribution point	D.6.2.1	Raskin haul trucks inadequate	7	4	3
		D.6.2.2	Bulog not have its own infrastructure for movement activities			

Table 5. 11 Identification of Risk Agent at Each Risk Event Occurred at Perum BULOG (continued)

Level 3		Level 4		Score		
Code	**Risk Event**	**Code**	**Risk Agent**	**S**	**O**	**D**
D.7.1	BAST is not delivered within the specified time	D.7.1.1	There is an error in the preparation of BAST by the Division of Operations / Subdivre / Kansilog	3	2	2
D.8.1	Deposit payment is not timely	D.8.1.1	There is misappropriation of *Raskin* funds by local officers	4	3	2
D.8.2	The amount of money paid is not in accordance with the conditions set	D.8.2.1	There is misappropriation of *Raskin* funds by local officers	4	3	2
D.9.1	The report is not completed on time	D.9.1.1	Increased volume of activities in each unit	3	5	3
		D.9.1.2	Delays in delivery of the report of Subdivre			
		D.9.1.3	Number of competent human resources are still lacking			

The next stage was performing the calculation of the value of the RPN based on the value of severity, occurrence, and detection known in the table above. Based on the value of RPN, the most affected risk of the company's supply chain activities is found. Table 5.12 presents RPN value for each risk event.

Table 5. 12 RPN Value for Each Risk Event

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
P.1.1	Realization of procurement is not in accordance with the targets that have been prepared	P.1.1.1	Performance of UPGB and SATGAS ADA DN is not optimal	18
		P.1.1.2	Most partners are small rice milling unit, so its performance is not optimal	
		P.1.1.3	Decline in rice production	
P.2.1	There is a revised breakdown procurement target	P.2.1.1	Errors in the calculation of the target by the Head of Division	4
P.3.1	The whole quantum of grain / rice can not be resolved at a predetermined period	P.3.1.1	Mitra Kerja/ POKTAN/ GAPOKTAN cannot meet the quantum of grain / rice timely	12
S.1.1	There are abuses against CHD has been created and agreed upon	S.1.1.1	Second Party (*Pihak Kedua*) does not comply with the quality of grain and submission deadlines	16
S.1.2	There is an error in the preparation of PJB	S.1.2.1	There is missing archives	4

Table 5. 13 RPN Value for Each Risk Event (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
S.2.1	DO publishing process for plastic sack/ *kuralon* thread requires long enough time	S.2.1.1	Head of Regional Division does not immediately issue the DO because he has not received a guarantee prof from Mitra Kerja	4
S.3.1	Delays in publishing SPTB	S.3.1.1	There is an error in preparing SPTB	4
S.4.1	Delays in publishing SPPK	S.4.1.1	There is an error in preparing of SPPK	4
S.5.1	Delays in publishing SPK	S.5.1.1	There is an error in preparing of SPK	4
S.6.1	The number of plastic bag / thread kuralon does not correspond to the amount needed	S.6.1.1	There is an error in the calculation of plastic sacks / *kuralon* thread needs by workers	12
S.6.2	Still found a plastic sack / yarn kuralon with quality below established standards	S.6.2.1	PPK is less careful in the process of inspection quality plastic bags	24
S.7.1	The quality of grain/ rice decreased	S.7.1.1	Warehouse pests	42
		S.7.1.2	Rice too long kept in the warehouse	
S.7.2	Still found grain / rice that has not correspond to the quality standards	S.7.2.1	PPK has not been carrying out quality checks of grain / rice optimally	30
S.8.1	Grain / rice was not accepted just in time	S.8.1.1	There is delay of supplier's conveyance (Mitra Kerja, UPGB, SATGAS ADA DN)	20
S.9.1	Delays in the process of publishing the SPP	S.9.1.1	Attachment requirements for issuing SPP document is not yet complete	12
S.9.2	SPP declared invalid	S.9.2.1	Signature contained incomplete in accordance with the conditions set	24
M.1.1	Fillial warehouse use in large number	M.1.1.1	Limitations of space in main warehouses	70
		M.1.1.2	Partners / Manufacturers must travel long distances to the main warehouse	
M.1.2	The use of warehouse space that is not optimal	M.1.2.1	The use of warehouse space is not appropriate / less than the installed capacity	32
		M.1.2.2	Errors in setting the staple by warehouse workers	
M.1.3	Stock of grain / rice in warehouses missing	M.1.3.1	The theft of grain / rice	40
		M.1.3.2	Errors in the administrative process by the employees of the warehouse	
M.2.1	Pests (Rhyzoperta) attack	M.2.1.1	The use of pesticides in the long term condition	120
		M.2.1.2	Implementation of fumigation is not optimal	

Table 5. 14 RPN Value for Each Risk Event (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
M.3.1	Implementation of monitoring activities in the warehouse has not been performed optimally	M.3.1.1	Warehouse sanitation process has not been carried out routinely by warehouse workers	42
		M.3.1.2	Warehouse workers have not implement appropriate monitoring procedures	
		M.3.1.3	Equipment that do not meet the standards	
M.4.1	Equipment maintenance activities have not been carried out properly	M.4.1.1	Warehouse workers have not been carrying out activities in accordance with the schedule of maintenance tools	45
D.1.1	Delays in the receipt of SPA Raskin	D.1.1.1	An error in compiling SPA	36
D.1.2	Data allocation of rice needs that have been given does not correspond to real conditions	D.1.2.1	Error calculation needs of rice by Regency / City Government	12
D.2.1	The high arrears of *Raskin* payment	D.2.1.1	Their money is still stuck in the village clerk and Satker	96
D.2.2	Failure to collect the Raskin subsidy	D.2.2.1	There is a document that is incomplete	96
		D.2.2.2	The validity of the document is questionable	
		D.2.2.3	Executing the distribution of timely and targeted	
D.3.1	Any delay in the issuance SPPB / DO and BAST	D.3.1.1	An error in the preparation of SPPB / DO and BAST	24
D.4.1	Still found grain / rice that has not correspond to the quality standards	D.4.1.1	PPK is less careful in the process of quality inspection of rice	20
D.5.1	Service activities are not running optimally	D.5.1.1	There is an error in the administration of the service process by officer	12
D.6.1	Raskin has not been distributed 100 %	D.6.1.1	Household Target (RTS) is not willing to accept Raskin	144
		D.6.1.2	The existence of payment arrears Raskin	
D.6.2	Delays in the delivery of rice to the distribution point	D.6.2.1	Raskin haul trucks inadequate	84
		D.6.2.2	Bulog not have its own infrastructure for movement activities	
D.7.1	BAST is not delivered within the specified time	D.7.1.1	There is an error in the preparation of BAST by the Division of Operations / Subdivre / Kansilog	12
D.8.1	Deposit payment is not timely	D.8.1.1	There is misappropriation of *Raskin* funds by local officers	24
D.8.2	The amount of money paid is not in accordance with the conditions set	D.8.2.1	There is misappropriation of *Raskin* funds by local officers	24
D.9.1	The report is not completed on time	D.9.1.1	Increased volume of activities in each unit	45

Table 5. 15 RPN Value for Each Risk Event (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
		D.9.1.2	Delays in delivery of the report of Subdivre	
		D.9.1.3	Number of competent human resources are still lacking	

5.1.4 Risk Evaluation

At this stage of risk evaluation, risk values obtained from the processing of the data is then evaluated to determine the risk rating and prioritization any risks that require mitigation. In the determination of the risk rating, the risk beforehand mapped to sort the largest RPN value to the smallest. Furthermore, the prioritization of risk to categorize risk into risk categories of high, medium, and low are the result of judgment as well as brainstorming with the company . The scale of the risk categories based on the value of the RPN is as follows.

- High risk = RPN 70 up to RPN 144
- Medium risk = RPN 30 up to RPN 69
- Low risk = RPN 0 up to RPN 29

The results of judgment as well as brainstorming with the company are a great way to give priority risk for further risk management. Where risks are elected in the high risk category has a great influence in achieving corporate goals. Table 5.16 presents a list of the sequence of RPN value from the largest to the smallest.

Table 5. 16 RPN Rank

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
D.6.1	Raskin has not been distributed 100 %	D.6.1.1	Household Target (RTS) is not willing to accept Raskin	144
		D.6.1.2	The existence of payment arrears Raskin	
M.2.1	Pests (Rhyzoperta) attack	M.2.1.1	The use of pesticides in the long term	120
		M.2.1.2	Implementation of fumigation is not optimal	
D.2.1	The high arrears of *Raskin* payment	D.2.1.1	Their money is still stuck in the village clerk and Satker	96
D.2.2	Failure to collect the Raskin subsidy	D.2.2.1	There is a document that is incomplete	96
		D.2.2.2	The validity of the document is questionable	

Table 5. 17 RPN Rank (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
		D.2.2.3	Executing the distribution of timely and targeted	
D.6.2	Delays in the delivery of rice to the distribution point	D.6.2.1	Raskin haul trucks inadequate	84
		D.6.2.2	Bulog not have its own infrastructure for movement activities	
M.1.1	Fillial warehouse use in large number	M.1.1.1	Limitations of space in main warehouses	70
		M.1.1.2	Partners / Manufacturers must travel long distances to the main warehouse	
M.4.1	Equipment maintenance activities have not been carried out properly	M.4.1.1	Warehouse workers have not been carrying out activities in accordance with the schedule of maintenance tools	45
D.9.1	The report is not completed on time	D.9.1.1	Increased volume of activities in each unit	45
		D.9.1.2	Delays in delivery of the report of Subdivre	
		D.9.1.3	Number of competent human resources are still lacking	
S.7.1	The quality of grain/ rice decreased	S.7.1.1	Warehouse pests	42
		S.7.1.2	Rice too long kept in the warehouse	
M.3.1	Implementation of monitoring activities in the warehouse has not been performed optimally	M.3.1.1	Warehouse sanitation process has not been carried out routinely by warehouse workers	42
		M.3.1.2	Warehouse workers have not implement appropriate monitoring procedures	
		M.3.1.3	Equipment that do not meet the standards	
M.1.3	Stock of grain / rice in warehouses missing	M.1.3.1	The theft of grain / rice	40
		M.1.3.2	Errors in the administrative process by the employees of the warehouse	
D.1.1	Delays in the receipt of SPA Raskin	D.1.1.1	An error in compiling SPA	36
M.1.2	The use of warehouse space that is not optimal	M.1.2.1	The use of warehouse space is not appropriate / less than the installed capacity	32
		M.1.2.2	Errors in setting the staple by warehouse workers	
S.7.2	Still found grain / rice that has not correspond to the quality standards	S.7.2.1	PPK has not been carrying out quality checks of grain / rice optimally	30
S.6.2	Still found a plastic sack / yarn kuralon with quality below established standards	S.6.2.1	PPK is less careful in the process of inspection quality plastic bags	24
S.9.2	SPP declared invalid	S.9.2.1	Signature contained incomplete in accordance with the conditions set	24

Table 5. 18 RPN Rank (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
D.3.1	Any delay in the issuance SPPB / DO and BAST	D.3.1.1	An error in the preparation of SPPB / DO and BAST	24
D.8.1	Deposit payment is not timely	D.8.1.1	There is misappropriation of *Raskin* funds by local officers	24
D.8.2	The amount of money paid is not in accordance with the conditions set	D.8.2.1	There is misappropriation of *Raskin* funds by local officers	24
S.8.1	Grain / rice was not accepted just in time	S.8.1.1	There is delay of supplier's conveyance (Mitra Kerja, UPGB, SATGAS ADA DN)	20
D.4.1	Still found grain / rice that has not correspond to the quality standards	D.4.1.1	PPK less careful in the process of quality inspection of rice	20
P.1.1	Realization of procurement is not in accordance with the targets that have been prepared	P.1.1.1	Performance of UPGB and SATGAS ADA DN is not optimal	18
		P.1.1.2	Most partners are small rice milling unit, so its performance is not optimal	
		P.1.1.3	Decline in rice production	
S.1.1	There are abuses against CHD has been created and agreed upon	S.1.1.1	Second Party (*Pihak Kedua*) does not comply with the quality of grain and submission deadlines	16
P.3.1	The whole quantum of grain / rice can not be resolved at a predetermined period	P.3.1.1	Mitra Kerja/ POKTAN/ GAPOKTAN cannot meet the quantum of grain / rice timely	12
S.6.1	The number of plastic bag / thread kuralon does not correspond to the amount needed	S.6.1.1	There is an error in the calculation of plastic sacks / *kuralon* thread needs by workers	12
S.9.1	Delays in the process of publishing the SPP	S.9.1.1	Attachment requirements for issuing SPP document is not yet complete	12
D.1.2	Data allocation of rice needs that have been given does not correspond to real conditions	D.1.2.1	Error calculation needs of rice by Regency / City Government	12
D.5.1	Service activities are not running optimally	D.5.1.1	There is an error in the administration of the service process by officer	12
D.7.1	BAST is not delivered within the specified time	D.7.1.1	There is an error in the preparation of BAST by the Division of Operations / Subdivre / Kansilog	12
P.2.1	There is a revised breakdown procurement target	P.2.1.1	Errors in the calculation of the target by the Head of Division	4
S.1.2	There is an error in the preparation of PJB	S.1.2.1	There is missing archives	4
S.2.1	DO publishing process for plastic sack/ *kuralon* thread requires long enough time	S.2.1.1	Head of Regional Division does not immediately issue the DO because he has not received a guarantee prof from Mitra Kerja	4
S.3.1	Delays in publishing SPTB	S.3.1.1	There is an error in preparing SPTB	4

Table 5. 19 RPN Rank (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
S.4.1	Delays in publishing SPPK	S.4.1.1	There is an error in preparing of SPPK	4
S.5.1	Delays in publishing SPK	S.5.1.1	There is an error in preparing of SPK	4

After performing the determination of the risk rating, then the next step is to determine the priority risk by dividing all the risks into each risk category has been determined. Where the determination of the risk scale based on the value obtained RPN risk a top priority is the risk that has the highest RPN value. Table 5.20 presents a list of value -risk category.

Table 5. 20 List of Risk Category

Level 3 Code	RPN Score	Risk Category
D.6.1	144	High
M.2.1	120	High
D.2.1	96	High
D.2.2	96	High
D.6.2	84	High
M.1.1	70	High
M.4.1	45	Medium
D.9.1	45	Medium
S.7.1	42	Medium
M.3.1	42	Medium
M.1.3	40	Medium
D.1.1	36	Medium
M.1.2	32	Medium
S.7.2	30	Medium
S.6.2	24	Low
S.9.2	24	Low
D.3.1	24	Low
D.8.1	24	Low
D.8.2	24	Low
S.8.1	20	Low
D.4.1	20	Low
P.1.1	18	Low
S.1.1	16	Low
P.3.1	12	Low
S.6.1	12	Low
S.9.1	12	Low

Table 5. 21 List of Risk Category (continued)

Level 3 Code	RPN Score	Risk Category
D.1.2	12	Low
D.5.1	12	Low
D.7.1	12	Low
P.2.1	4	Low
S.1.2	4	Low
S.2.1	4	Low
S.3.1	4	Low
S.4.1	4	Low
S.5.1	4	Low

5.2 Risk Analysis

This section describes the analysis and discussion of the risks that have been described in the previous section.

5.2.1 Analysis of Supply Chain Activities at Perum BULOG Divre Jatim

In this section will be carried out analysis of the supply chain activities at Perum BULOG Divre Jatim. Based on the data processing using methods SCOR, the result of identification is divided by 4 levels, namely level 1, level 2, level 3 and level 4. At level 1 describes the company's activities are divided into four core processes that plan, source, make, and deliver. Level 2 describes the activities of the core processes, based on the identification results obtained 3 activities on the plan , 9 activities at the source, 4 activities on the make process, and 9 activities in the process deliver. At level 3 describes the risks that occur in every activity at level 2. At level 4 describes the agent or cause risk of any risk events at level 3.

Identifying the company's supply chain activities with the use of SCOR can help interpret what activities by the company in a supply chain system and can provide information flow to whole companies. Therefore the use of SCOR method, it can be seen how complex the company's supply chain activities.

Perum BULOG Divre Jatim supply chain activities is divided into three main processes, namely the process of procurement of grain/ rice, the storage and treatment of commodity grain / rice, and the distribution of grain / rice. Based on the results of the classification SCOR has been done, it is known that the activity in the sourcing and distribution in Perum BULOG Divre Jatim has the highest number. That's because,

Java BULOG Division should conduct the procurement of grain / rice through three parties i.e. Partners / Poktan / Gapoktan, UPGB, and SATGAS ADA DN. While in the process of distribution, BULOG has the duty to distribute Raskin directly to Target Households (RTS).

5.2.2 Analysis of Risks Identification

In this section will explain the results of the analysis of risk identification that have been identified in the chapter on data collection and processing. A stage in conducting risk identification is to review historical data of Perum BULOG Divre Jatim with an opportunity to see some events that lead to the occurrence of risk to the company. Besides the identification of risk is also obtained from interviews and group discussions with company management knows the company's overall business processes. Interviews and discussion groups aimed to determine the risk of a potentially occur and at the same time verifying the risks identified.

Of any risks identified risk agents then searched her or cause risk. Results of this identification is the assessment of the severity (impact), occurrence (rate of occurrence), and detection (ability to control risk). Assessment is done through interviews and group discussions with company management. Table 5.22 shows the results of risk identification obtained.

Table 5. 22 Results of Risk Identification Obtained

No	Main Activity	Number of Risk Occurred
1.	Plan	3
2.	Source	13
3.	Make	6
4.	Deliver	13

From the table 5.22 it can be seen that the risk that often occurs in the source and deliver as the core processes. There are a lot of activities executed in source process covered include the procurement of grain / rice from three suppliers , the procurement of plastic bags / kuralon thread , publishing several important documents , inspection of the quality of grain / rice and so forth . Similar to deliver process which includes many activities such as service expenditure and rice checks, check arrears

Raskin, Raskin distribution at the point of distribution, making reports and so forth. Because of the many activities carried out on both of these processes, then the chances of the emergence of risk is also greater than with the plan and the make.

5.2.3 Analysis of Risks Assessment

In this section will explain the analysis of risk assessments that have been conducted on the risk assessment section. The risk assessment carried out by using the method of the FMEA. In this method should pay attention to the value of severity, occurrence, and its detection. Value severity, occurrence, and detection are obtained from the interviews and a group discussion with management level has the authority, competence and overall understanding of the condition of the company. The purpose of the risk assessment of the risks identified is to know where the most influential risk to the company's supply chain activities. Risk value can be determined by looking at the value of RPN. The most critical risk indicated by the highest RPN value. The purpose of assessing risk is to discover the critical risk that can disrupt the activities of the company in achieving its goals.

.

5.2.4 Analysis of Risks Evaluation

In this section will be carried out analysis of the risk evaluation of the risk assessment has been carried out in the previous sub chapter. The value of each risk on the supply chain process has a different value, be it for the plan, source, make, and deliver. In the picture presented graphs 5.1 RPN value of each of the risks that occur in the process plan.

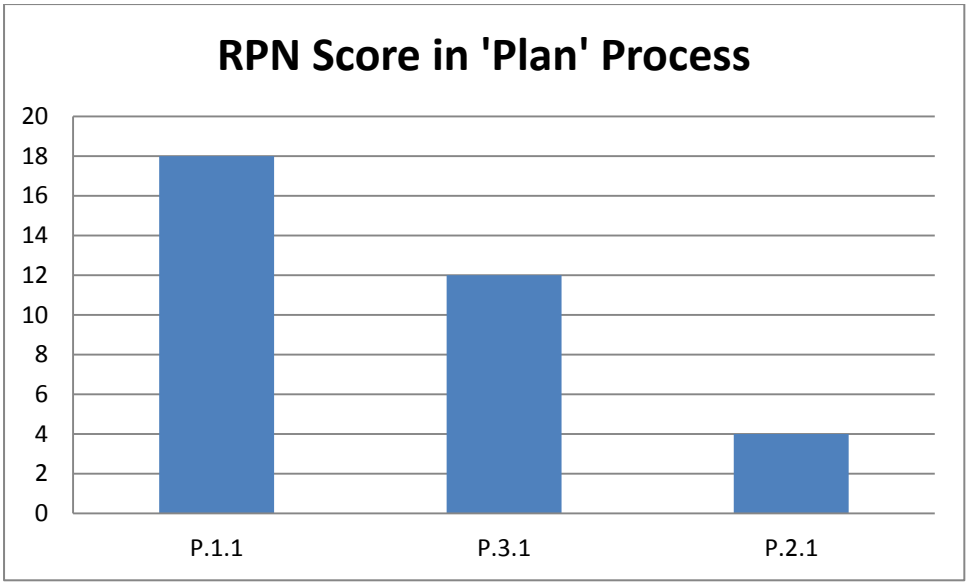

Figure 5. 1 Graphic of Risk in Plan Process

Based on the above chart we can see that the code P.1.1 has the highest RPN value at risk that occurred in the process plan. P.1.1 code is risk events that occur in Preparation Target Acquisition per Division Operations / Subdivre / Kansilog. The incidence of the risk is not in accordance with the realization of procurement targets that have been prepared. These risk events are caused by agents of risk, namely the performance UPGB and SATGAS ADA DN less than optimal. In addition, most of the Mitra Kerja is unit of small -scale rice mills that can not meet the demand for rice from BULOG optimally.

Further analysis will be done at the source of risk evaluation. In the picture presented graphs 5.2 RPN value of each risk occurring at the source.

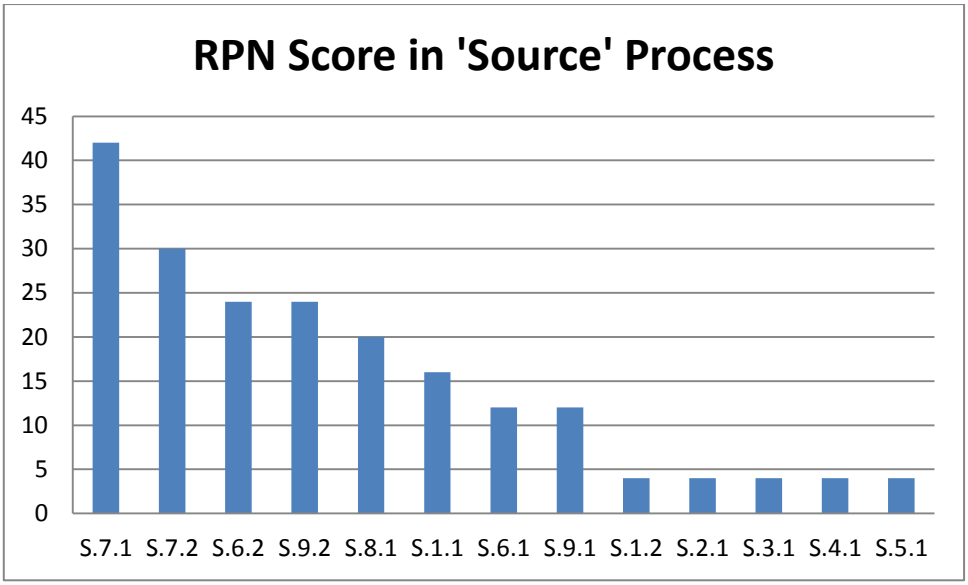

Figure 5. 2 Graphic of Risk in Source Process

Based on the above chart we can see that the code S.7.1 has the highest RPN value at risk occurring in the source. S.7.1 code is risk events that occur in grain quality inspection activity / rice. Genesis risks of this activity are the quality of grain / rice declined. This risk events due to pest attack in storage sheds and storage of rice before the rice is done for too long.

Further analysis will be conducted on a risk evaluation of the make process. In the picture presented graphs 5.3 RPN value of each risk occurring in the make process.

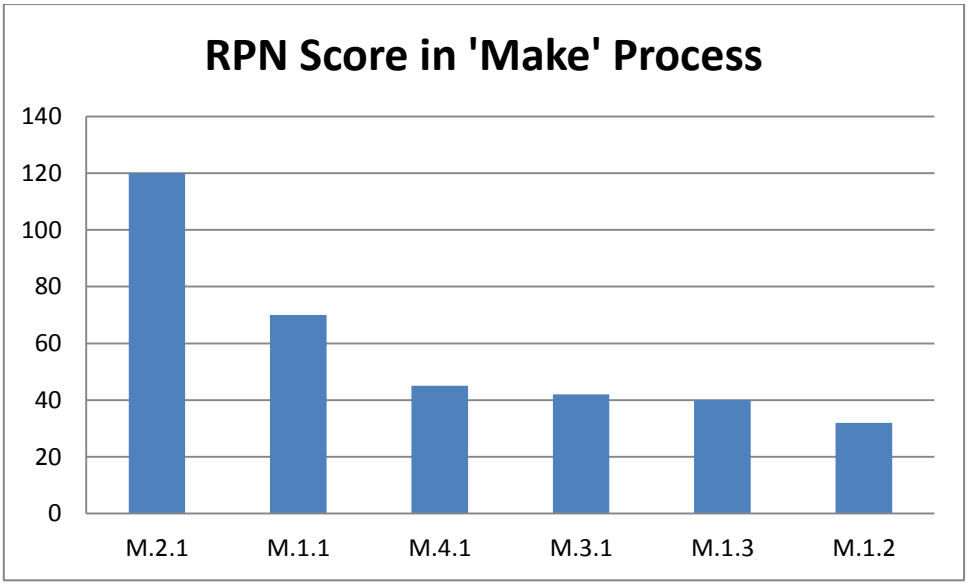

Figure 5. 3 Graphic of Risk in Make Process

Based on the above chart we can see that the code M.2.1 has the highest RPN value at risk that occured in the process of make. M.2.1 code is risk events that occur in the activity of ' Integrated Pest Management Warehouse '. Genesis risks experienced are the attack of pests Rhyzoperta. This risk event due warehouse worker is not carrying out the process of spraying and fumigation optimally. This type of risk has the highest RPN value due may result in damage to rice stored in warehouses BULOG.

Further analysis will be conducted on a risk evaluation processes deliver. In the picture presented graphs 5.4 RPN value of each of the risks that occur in the process deliver.

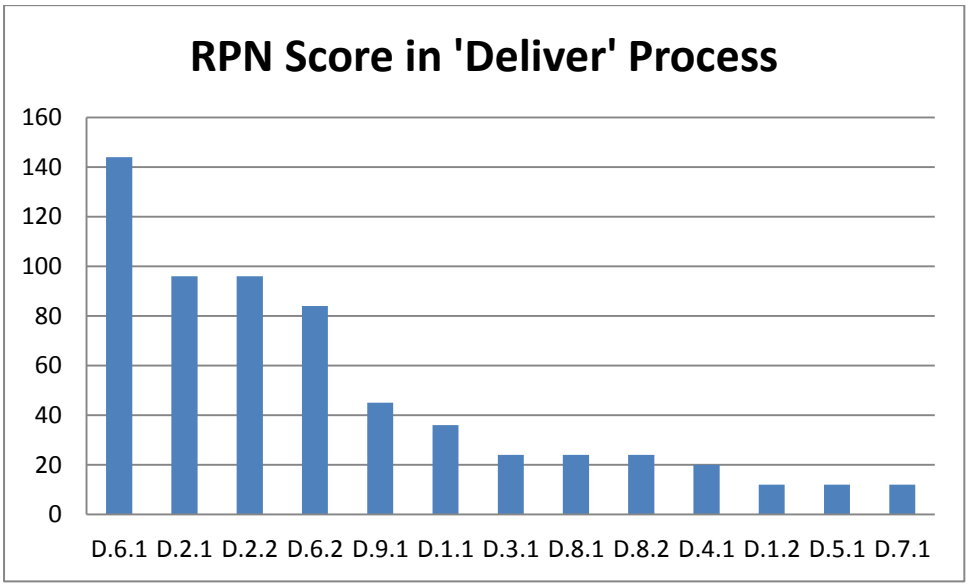

Figure 5. 4 Graphic in Deliver Process

Based on those figures, it can be seen that the code D.6.1 has the highest RPN value at risk that occur in the process deliver. D.6.1 code is risk events that occur in the activity of distribution of rice to the distribution points by Satker Raskin. Risk events on this activity is Raskin can not be distributed 100%. The cause of the incident is Target Households (RTS) is not willing to accept Raskin. In addition, the Raskin payment arrears are high.

By all the risks that occur in the process of plan, source, make, and deliver, then performed a ranking of risk. Risk mapped prior to the sort of RPN values of greatest value to the smallest. Furthermore, the determination of the risk rating scale to determine the risk category of high, medium, and low are the result of judgment as

well as brainstorming with the company. Risk that has a value of RPN from70 to 144 is categorized as high risk, the risk that has a value of RPN from 30 to 69 is categorized as medium risk, and the risks that has a value of RPN from 0 to the 29 is categorized as low risk. The top priority risk is the risk that has the highest RPN value. The results of judgment as well as brainstorming with the company are a great way to give priority risk for further risk management. Where risks are elected in the high risk category has a great influence in achieving corporate goals. Figure 5.5, figure 5.6, and figure 5.7 present the result of high risk category, medium, and low.

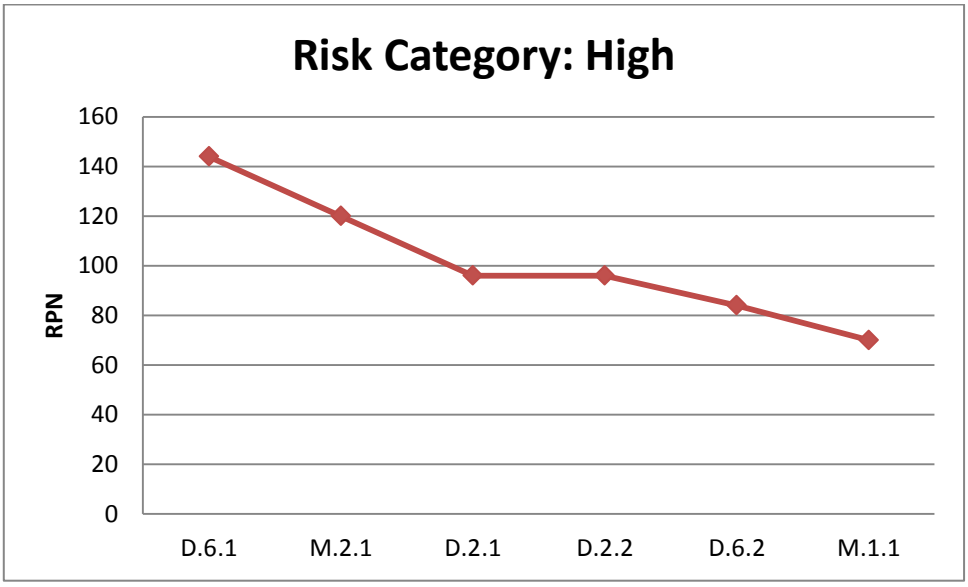

Figure 5. 5 High Risk Category Result Graph

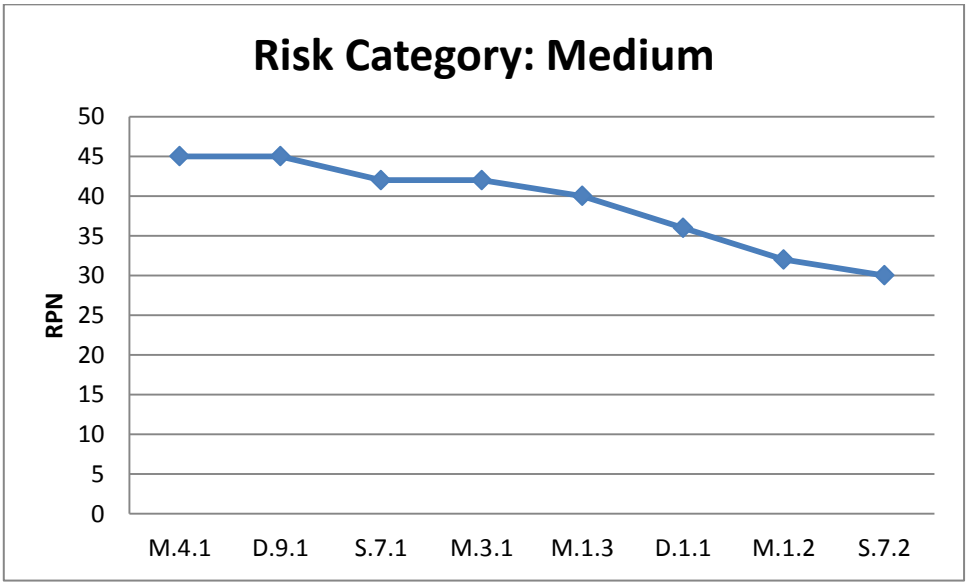

Figure 5. 6 Medium Risk Category Result Graph

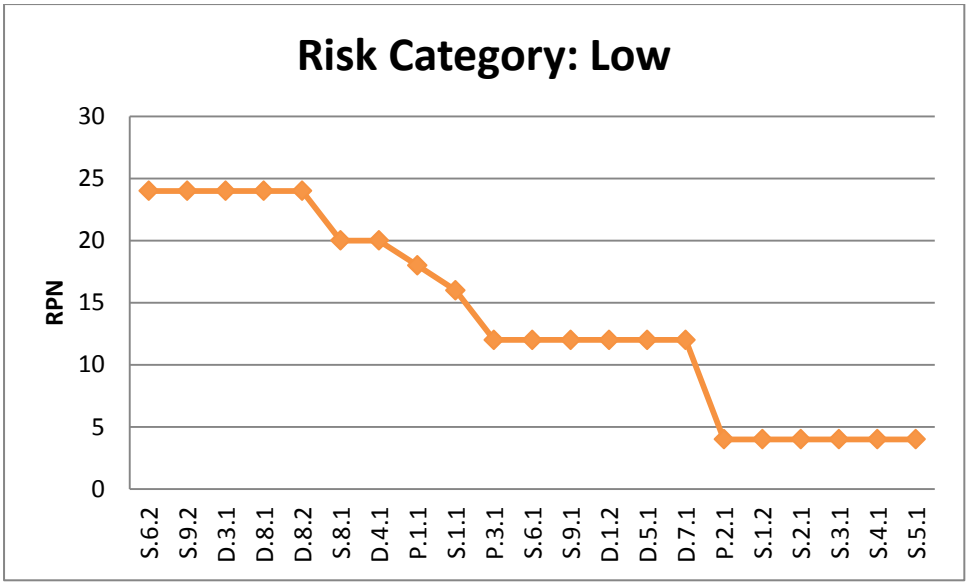

Figure 5. 7 Low Risk Category Result Graph

Based on the results of the risk categories on the chart above, then obtained as many as six risks that fall into the high risk category, 8 risks that are categorized as high risk and 21 the risk of entry into the low risk category. Risks that fall into the category of high risk is the risk that can interfere with the activity of the company in achieving its goals. So that needs to be done designing risk mitigation strategies for handling the potential risks that threaten the company. Risks that categorized in medium and low does not mean be negligible, but remains to be done as a precaution the management of risk is greater.

In this study, there are 6 risks that categorized as high risk will be mitigated. Table 5.23 presents a list of risks to be carried mitigation design in the next section.

Table 5. 23 Result of the Risk that is Mitigated

Level 3		**Level 4**		**RPN Score**
Code	**Risk Event**	**Code**	**Risk Agent**	
D.6.1	Raskin has not been distributed 100 %	D.6.1.1	Household Target (RTS) is not willing to accept Raskin	144
		D.6.1.2	The existence of payment arrears Raskin	
M.2.1	Pests (Rhyzoperta) attack	M.2.1.1	The use of pesticides in the long term	120
		M.2.1.2	Implementation of fumigation is not optimal	
D.2.1	The high arrears of *Raskin* payment	D.2.1.1	The money is still stuck in the village clerk and Satker	96

Table 5. 24 Result of the Risk that is Mitigated (continued)

Level 3		Level 4		RPN Score
Code	**Risk Event**	**Code**	**Risk Agent**	
D.2.2	Failure to collect the Raskin subsidy	D.2.2.1	There is a document that is incomplete	96
		D.2.2.2	The validity of the document is questionable	
		D.2.2.3	Executing the distribution of timely and targeted	
D.6.2	Delays in the delivery of rice to the distribution point	D.6.2.1	Raskin haul trucks inadequate	84
		D.6.2.2	Bulog not have its own infrastructure for movement activities	
M.1.1	*Fillial* warehouse use in large number	M.1.1.1	Limitations of space in main warehouses	70
		M.1.1.2	Partners / Manufacturers must travel long distances to the main warehouse	

5.2.5 Designing of Risks Mitigation Strategies

In this section will be designing risk mitigation strategies. Risk mitigation proposal is the result of discussions with the management of Perum Bulog Division Jarim among others, by the Head of Marketing and Price, Head of Warehouse, Division of Finance, and other management. Risk mitigation is expected to be the recommendations and considerations for the company for the future, so that any risk of loss can be anticipated as much as possible.

At this stage subsequent to identify factors that cause risks and proposed recommendations for improvement as mitigation measures to be undertaken. The first thing to do is to know the risk factor for each risk occurring, and then the next will be the proposed recommendations for the improvement of the factors causing the risk.

5.2.5.1 Risk Mitigation Strategy of '*Raskin* Distribution'

Risks that occur in the process of distribution decreased Raskin is a risk that has the highest RPN value

Risk	Why 1	Why 2	Why 3	Why 4	Why 5
Raskin is not distributed 100 %	Raskin payment arrears are high	There is money retained in Satker	There is money retained in district officer	There is money retained in village officer	Lack of awareness and commitment from village officer to pay arrears

Based on the above table it can be seen that the risk caused by some factors could cause sequential risk. Raskin risk can not be distributed 100% caused by four interrelated factors. The first factor is due to payment arrears Raskin. The arrears due to no money is still stuck in Unit Raskin. Unit Raskin can not make the payment because there is still some money retained in the district and village officials. This happens due to lack of awareness and commitment from village officials to pay arrears Raskin.

From the above risk factors that cause it can be done several proposals on improvement is as follows.

- Arrears billing process must be conducted intensively by forming a team of billing Raskin.
- Coordinating with the *Pemkab/ Pemkot* to continue to attempt to charge the officer of District / Village which has not made the payment.

5.2.5.2 Risk Mitigation Strategy of 'Pests (Rhyzoperta) Attack'

Risks that occur are pests on rice stored in warehouses. This risk was ranked second.

Risk	Why 1	Why 2	Why 3	Why 4	Why 5
Pests (Rhyzoperta) Attack	Application of spraying and fumigation is not optimal	Implementation of spraying and fumigation are not in accordance with the provisions that have been determined	Warehouse workers do not know the conditions set (Standar Operational Procedure)	Head of Warehouse did not provide socialization related provisions PHGT	Perum BULOG has not provided socialization to all the Head Warehouse

Pests on rice stored in warehouses due to the application of PHGT activity yatu spraying and fumigation are not optimal. Activities PHGT not run optimally because the implementation of spraying and fumigation are not in accordance with the provisions. This is because some warehouse workers do not know the implementation of the provisions of spraying and fumigation has been determined. The incident was caused by the lack of socialization of BULOG to the Head of Warehouse.

Mitigation approach has involved in information management. Based on the risk factors that cause it can be done proposed recommendations for improvement as mitigation actions that can be done by the company.

- Improve socialization and coordination between Bulog and related activities performed by PHGT workers.
- Increased activity and sanitation PHGT on rice storage shed.
- Monitoring of the implementation of fumigation and spraying carried out by warehouse personnel.
- Implementation of activities fumigation and spraying must be done according to Standard Operating Procedures (SOP) has been determined.

5.2.5.3 Risk Mitigation Strategy of 'The High Arrears of *Raskin* Payment'

Risks that occured are the high arrears of Raskin payment. This risk was ranked third.

Risk	Why 1	Why 2	Why 3	Why 4	Why 5
The high arrears of Raskin payment	Satker not make payments arrears to BULOG	The District Officers have not settled the arrears to Satker	The District Officers have not received payment of arrears of village officers	There is a diversion of Raskin money by the village officers	Lack of awareness and commitment from village officials to pay arrears

The high arrears of Raskin payment is due to the Satker has not made the payment of arrears to BULOG. This happens because the District officers have not received money from the attendant village Raskin, so the sub-district officers have not been able to make payments of Raskin money to satker. Lack of awareness,

commitment, and the misappropriation of Raskin money by village officer that led to Raskin arrears are very high and Perum Bulog suffered financial losses.

Mitigation approach has involved in downstream management. From the above risk factors that cause it can be done several proposals on improvement is as follows.

- Coordinating with the government of the District / Municipality to continue to attempt to charge the clerk District / Village which has not made the payment.
- Form a team and make the billing Raskin debt guarantees.
- Make payments arrears Raskin through Bank

5.2.5.4 Risk Mitigation Strategy of 'Failure in Collecting *Raskin* Subsidy'

The risk is a failure occurred in collecting subsidies of Raskin. This risk was ranked fourth.

Risk	Why 1	Why 2	Why 3	Why 4	Why 5
Failure in collecting Raskin subsidy	The distribution is not timely and targeted	There are obstacles in the process of completing document	Still found a document that is not completed	Daily document is not stored in a structured and systematic way	There is not any checking in document

Failure in collecting Raskin subsidies due to the distribution is not timely and targeted. This condition is resulting in financial loss to BULOG. It can happen because of the constraints on the process of settlement documents. The document can not be completed on time because they found the missing documents and not eligible completeness. Documents lost due to not stored in a structured and systematic. These factors can occur because there is no document check. Based on the above risk factors that cause it can be done proposed recommendations for improvement as mitigation actions that can be done by the company.

- Implement monitoring administration of the company.
- Checking documents in a structured daily and tersistem

5.2.5.5 Risk Mitigation Strategy of 'Delays in the Delivery of Rice'

Risk that occurred is delay in the distribution of rice. This risk is ranked fifth.

Risk	Why 1	Why 2	Why 3	Why 4	Why 5
Delays in Delivering Rice	Bulog did not have the means to carry out the distribution, so it is conducted by PT JPLB	distribution conducted by PT JPLB not run optimally	Truck transport used when distributio n is often damaged	Truck transport used is old	The absence of a new truck for transport procureme nt

Delays in the distribution of rice due to Bulog did not have the means to do, therefore BULOG has to wait for the distributio by PT JPLB as the executor of rice distribution. However, distribution process conducted by PT JPLB not optimal because transport trucks used at the time of distribution is often damaged. It happened because of age freight trucks are old and lack of provision of a new truck to make the process of distribution of Raskin. Mitigation approach has involved in downstream management. From the above risk factors that cause it can be done several proposals on improvement are as follows.

- Coordinate with PT JPLB to repair the damage trucking Raskin.
- Coordinate with PT JPLB to conduct the procurement / purchase of new freight trucks to aid distribution activities Raskin

5.2.5.6 Risk Mitigation Strategy of '*Fillial* Warehouse Use'

The risk that occurred is the use of warehouse fillial occurs in large numbers. This risk was ranked sixth.

Risk	Why 1	Why 2	Why 3	Why 4	Why 5
Fillial Warehouse Use	Limitati ons of space in main warehou ses	The use of main warehouse space is not optimal	Warehouse workers do not perform in accordance with the provisions of the arrangement warehouses	An error in setting the staple by the warehouse worker	Head of Warehouse is less provide oversight of warehouse workers

Fillial warehouse is over usage due to the limited space in the main warehouse. This happens because the use of warehouse space the parent is not optimal because warehouse workers do not perform in accordance with the provisions of the warehouse arrangement. In addition, there is an error in the setting of staple by warehouse worker. These events can occur because the cellarer less provide oversight of warehouse workers. From the above risk factors that cause it can be done several proposals on improvement are as follows.

- Improved Standard Operating Procedures (SOPs) governing the warehousing activity inside the fillial warehouse.
- Coordinating with the Head of Warehouse specifically to oversee warehouse worker.
- Optimizing space in the main warehouse.

CHAPTER 6

CONCLUSION AND SUGGESTION

This chapter included conclusions obtained from the risk assessment and analysis which done in previous chapter. This chapter also provided recommendation for the company.

6.1 Conclusion

The conclusions of the research are, as follow

1. The supply chain activites at Perum BULOG Divre Jatim are mapped by using SCOR model. The risks are identified based on the result of SCOR. There are 3 risks in the planning process, 13 risks in the sourcing process, 6 risks in the making process and 13 risks in the delivering process.
2. The risks are assessed by using FMEA method. The risk assessment is performed to find the value of RPN with the scale of severity, occurrence and detection. The determination of the risk rating is based on the value of the RPN is obtained. Results of risk evaluation showed 6 events are in the category of high risk, 8 events are in the category of medium risk and 21 events are in the category of low risk.
3. The risk mitigation strategies designed to 6 risk events which are in the high category. Mitigation is performed by analyzing the root cause of the problem using RCA method.

6.2 Suggestion

There are several recommendations for the company and future research.

1. Perum BULOG Divre Jatim may consider the events of the risks identified in a company's supply chain activities as a form of anticipation.
2. Perum BULOG Divre Jatim may consider the proposed recommendations for improvement were granted as risk mitigation measures.
3. Perum BULOG Divre Jatim could apply risk management in a supply chain activity sustainably.
4. In a subsequent study, risk management undertaken expected can consider the calculation of the cost analysis.

(This page is intentionally left blank)

REFERENCES

Anggara, R. A. (2008). *Implementation of Risk Management Framework in Supply Chain: A Tale from a Biofuel Company in Indonesia.* Manchester: Manchester Business School.

Badan Pusat Statistik. (2010). *Penduduk Indonesia Menurut Provinsi 1970, 1980, 1990, 1995, 2000, dan 2010*. Retrieved April 17, 2015, from http://www.bps.go.id/

Badariah, N., Surjasa, D., & Trinugraha, Y. (2011). *Analisa Supply Chain Risk Management Berdasarkan Metode Failure Mode and Effects Analysis (FMEA).* Jakarta: Universitas Trisakti.

Chopra, S., & Sodhi, M. S. (2004). Managing risk to avoid supply-chain breakdown. *MIT Sloan Management Review, I*(46), 52-61.

Christopher, M., & Lee, H. (2004). Mitigating supply chain risk through improved confidence. *International Journal Physics Distribution & Logistics Management, V*(34), 388-396.

Curkovic, S., Scannell, T., & Wagner, B. (2013). Using FMEA for Supply Chain Risk Management. *Modern Management Science & Engineering, I*(20), 251-265.

Food and Agricultural Organization of the United Nations. (2014). *FAO Regional Office for Asia and the Pacific*. Retrieved April 19, 2015, from http://www.fao.org/

Geraldin, L. H., Pujawan, I. N., & Dewi, D. S. (2007). *Manajemen Risiko dan Aksi Mitigasi untuk Menciptakan Rantai Pasok yang Robust.* Surabaya: Institut Teknologi Sepuluh Nopember.

Lavastre, O., Gunasekaran, A., & Spalanzani, A. (2012). Supply Chain Risk Management in French Companies. *Decision Support Systems*(52), 828-838.

Livingston, A. D., Jackson, G., & Priestley, K. (2001). *Introduction of Root Causes Analysis.* Warrington: WS Atkins Consultants Ltd.

Pujawan, I. N., & ER, M. (2010). Supply Chain dan Supply Chain Management. In I. K. Gunarta (Ed.), *Supply Chain Management* (p. 5). Surabaya: Guna Widya.

Pujawan, I. N., & Geraldin, L. H. (2009). House of risk: a model for proactive supply chain risk management. *Business Process Management*, 953-967.

Pujawan, I. N., & Geraldin, L. H. (2009). House of Risk: A Model for Proactive Supply Chain Risk Management. *Business Process Management*, 953-967.

Tsolakis, N. K., Keramydas, C. A., Toka, A. K., Aidonis, D. A., & Iakovou, E. T. (2014). Agrifood supply chain management: A comprehensive hierarchical decision-making framework and a critical taxonomy. *Biosystem Engineering, I*(20), 47-64.

Waters, D. (2008). Supply Chain Management. In *Supply Chain Risk Management: Vulnerability and Resilience in Logistics* (p. 37). Philadelphia: Kogan Page Limited.

AUTHOR'S BIOGRAPHY

Nabila Silmina Hakim was born in Trenggalek, May 5th 1993. She is the first child in her family. She was graduated from TK Dharma Wanita I in 1999, SDN 2 Durenan in 2005, MTsN Model Trenggalek in 2008, and MAN 3 Malang in 2011. She also attended on Institut Teknologi Sepuluh Nopember (ITS) Surabaya majoring Industrial Engineering and graduated in 2015.

During her study, the author joined exchange study program between TI-ITS and FKP-UTeM in Melaka, Malaysia. The author also actively join international program. She is selected as Indonesian ambassador in ASEAN Youth Friendship Network 2013 in Malaysia. She is also selected as participant in 2nd Delightful Istanbul in 2015. She can be reached through email at: nabila.silmina11@mhs.ie.its.ac.id