LOGISTICS AND SUPPLY CHAIN

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LOGISTIK DAN MATA RANTAI PASOKAN

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PREFACE

All praise to Allah SWT God, because of His blessings, the book "LOGISTICS AND SUPPLY CHAIN" can be completed. This book can be used as a reference to understand the basic principle of logistics and supply chain management.

We wrote this book in order to help the readers to understand logistics and supply chain management easily. Any critiques and suggestions are welcomed for the betterment of this book in the future.

Semarang, June 2018

Authors

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I. INTRODUCTION AND DEFINITION OF LOGISTICS

1.1. Introduction

The key components of logistics (transportation, inventory, warehousing) have been a very important factor in industrial and economic affairs for many years. However, it has been only in the last 20 years that logistics is recognized as a primer function in its own right. This relatively recent recognition is due to the nature of logistics itself. Functions that consist of many sub-functions and many sub-systems that have been and are likely to continue to be treated as distinct operations management. Academia and business now accept that there is a need to adopt a more holistic view of diversity to take into account how they relate to and interact with one another.

Knowledge of the scope and importance of logistics and supply chains has brought the adopted approach to this subject in a more scientific direction. This approach leads to a comprehensive concept of the logistics function as a whole, including the interrelationships between individuals in the sub-systems. This approach mostly addresses logistics and supply chain needs and planning, but it is worth considering some key operational issues.

1.2. Definition

Definitions from the experts:

1. According to Cristopher, Logistics Management is "the strategic process of managing the procurement, movement, and storage of

materials, spare parts and finished goods (and associated information flows), through the organization and its marketing channels, in a manner that the company's current and future profits can be maximized by cost-effective order fulfillment.

2. According to the Council of Logistics Management, logistics is a part of the supply chain process that plans, implements, and monitors the efficient and effective flow and storage of goods, services, and related information, between places of origin and places of consumption, in an effort to meet customer needs.
3. Moller (1994): Efforts to ensure the availability of a product in the adequate quantity, condition, and time.
4. Logistics Council Management (1991): Process, plan, implementation, and control of the flow and storage of products to meet customer needs
5. Ballou (1999): A collection of repetitive activities on a path which include the process of changing the raw materials into ready-to-use products and enhancing the product value seen from the consumer's point of view.

From all those expert definitions, it can be concluded that:

1. Logistics in general: flow of goods from upstream to downstream.
2. Logistics in detail: the process of planning, executing, and controlling the efficient and effective flow of goods/services and related information, from the starting point to the consumable point in order to meet customer requirements.

The development of the importance of distribution, logistics, and supply chains is in line with the development of a number of related terms and different definitions frequently used. Other terms that we commonly come across include:

1. Physical distribution.
2. Logistics.
3. Business logistics.
4. Management material/goods.
5. Procurement and supply.

6. Product flow.
7. Marketing logistics.
8. Supply chain management.
9. Demand chain management.

Realistically, there is no "correct term" or "correct definition" that can be applied scientifically to these terms, as the elements are covered very wide. Each industry has its own characteristics, and for each firm in that industry, there are major variations in strategy, size, product range, market coverage, and so on. Therefore, logistics is a diverse and dynamic function that needs to be flexible and must be able to adjust to the various constraints and demands placed on it which is also taking the work environment into account.

Thus, many different terms are used, often also interchanged in the literature and the business world. A broadly explained definition can also help explain one of the key relationships. Examples are as follows:

Logistics = Material Management + Distribution

This illustrates that supply chains cover a wider range of business areas. This includes the supply of raw materials and components, as well as the delivery of products to the final customer. Therefore:

Supply Chain = Suppliers + Logistics + Customers

In general, it can be explained that supply and material management represent the storage and inflows to and from the production process; while distribution represents storage and flow from the final point of production to the final customers and end-users.

It should also be noted that logistics and supply chain are not only concerned with the physical flow and storage of raw materials to the final distribution of the finished product, but also with the flow of information and storage. Indeed, the main emphasis is now placed on the importance of information, as well as the importance of physical flow and storage.

CHAPTER II. LOGISTIC OBJECTIVES, LOGISTIC MISSIONS, SUPPLY CHAIN MANAGEMENT, AND COMPETITIVE ADVANTAGE

2.1. Logistic Management Goals

The goal of logistic management is to support the effectiveness and efficiency of every effort taken to achieve organizational goals, including:

1. To provide logistics according to the needs, in terms of the type and specifications, quantity, time, and place, in a usable condition, from accountable sources, at a reasonable price, and by providing a good service.
2. To provide information related to the availability of logistics that can be used as a means to supervise and control logistics, and can be used as a decision-making instrument related to logistics management actions, such as procurement, distribution, and elimination.
3. To provide ready-for-use logistics to either work units and personnel, therefore, ensuring the continuity of activities and tasks of each work unit and personnel in an organization through optimal warehouse management and distribution.
4. To preserve and maintain technical conditions, efficiency and productivity of logistics, both preventively and repressively to optimally support the functional optimization and the age of goods.

5. To carry out the termination of the logistics function with considerations and arguments that can be accounted for in order to support the flowing of implementation of the activities and tasks, and prevent wasteful actions.
6. To prevent and take anticipatory actions against various deficiencies in every activity of management and utilization of logistics so that, in addition to, reducing costs, in terms of finance, energy, time, material, and thoughts. It also supports the smooth implementation of activities and tasks within the organization.
7. To provide guidelines for each work unit and personnel so that they can carry out their activities and duties optimally.
8. To build a culture of using logistics responsibly among the employees within the organization so that deficiencies and recklessness can be prevented and avoided..

2.2. Logistics Missions

This means that the company has to deliver goods/services in accordance with the customer's request without any deficiencies. It has to send products to the correct destination, and has to deliver products on time, in the right situation and conditions. Considering that logistics will always involve elements of suppliers, manufacturers, distributors, and customers, the logistics missions have to be able to deliver goods and services needed by customers efficiently.

2.3. Logistics and Supply Chain Management

The term "supply chain management" is now generally used to cover many logistics functions. The supply chain concept is an addition to the ideas that have been described in the previous chapters, given the integrated nature of logistics. The concept of total logistics supports the benefits of seeing the various elements of logistics as a unified whole. Supply chain management is similar, but it includes suppliers and end-users in the process. This is the big difference between supply chain management and traditional logistics.

There are four distinctive differences that supply chain management emphasizes against the classical view of logistics, although some of these elements have also been recognized as keys to successful logistics operations planning. The four differences are:

1. The supply chain is seen as a single entity rather than a number of separate elements such as purchasing, manufacturing, distribution, and others. This is how logistics is viewed by most far-sighted companies. In an integrated supply chain, however, suppliers and end-users are included in the planning process, therefore there are outside boundaries of an organization in the overall supply chain planning effort.
2. Supply chain management is a strategic planning process, with an emphasis on strategic decision-making rather than operational systems.
3. Supply chain management provides a very different approach when it comes to inventory. Traditionally, inventory is used as a rescue valve between separate components in pipelines, therefore it often leads to large and expensive product stocks.
4. Supply chain management wants to change that perspective so that inventory is used as a last resort in balancing the integrated flow of products through the pipeline.

The key to the success of effective supply chain management is the use of integrated information systems that are part of the entire supply chain rather than simply acting as separators for each component. This allows us to see product demand and stock levels along the pipeline. This has become possible with the latest developments in information systems technology.

2.4. Competitive Advantage

Attitudes towards distribution and logistics have changed quite dramatically in recent years. The general view is that the various elements in logistics only provide additional costs for companies selling their products in the market. While there are certain costs associated

with the movement and storage of goods, it is now also recognized that distribution and logistics make a positive contribution to the product value. This is because logistics operations provide a way for products to reach their customers or end-users, in the right conditions and right locations.

It is therefore possible for companies to compete by providing the product either at the lowest possible cost (so that the customers are able to buy it because it is affordable) or at the highest possible value for the customer (in this case if it is clearly provided where, when and how the customer wants it). Some companies may unwisely try to use both cost and value goals and may not succeed in either. It is very important to understand which competitive stance the company is trying to achieve when planning logistics operations.

The company can compete as a service leader, where the company seeks to gain value from its competitors by providing a number of key service elements to differentiate its products. Alternatively, the company could also compete as a cost leader where the company tries to utilize its resources so that it can offer products at the lowest possible cost, which eventually this will increase productivity gains.

It should also be emphasized that for many companies it is necessary to develop different logistics configuration structures to serve the various service offerings they need to provide. It is now starting to be appreciated that a one-size-fits-all logistics (one product for all) approach is usually too limited, as suppliers need to take into account the different ranges of customer requirements and ensure that their competitive advantages are understood and applied across all market segments.

As noted in a survey by the European Logistics Association (ELA) (2004): "A one-size-fits-all policy will rarely work when applied to modern and differentiated offerings. Leading companies segment their supply chains according to the services and costs required from customers.

CHAPTER III. SUPPLY CHAIN MANAGEMENT AND BUSINESS STRATEGY

The following table shows how supply chain management impacts the business strategy.

Table 1.How Supply Chain Decisions Impact Strategy

	Low-cost strategy	Response strategy	Differentiation strategy
Supplier objectives	Fulfill requests at the lowest possible cost	Respond to the changing of needs/demands quickly to avoid running out of supplies	Market share joint research to develop products and options
Main selection criteria	Choose mainly because of the cost	Choose mainly for capacity, speed and flexibility	Choose mainly because of product development skills
Process characteristics	Maintain a high average utility	Invest in excess capacity and flexible processes	Modular process leading to mass customization
Stock Characteristics	Minimize inventory across the chain to keep the costs down	Develop a responsive system, with backup supplies to ensure supply	Minimize inventory in the chain to avoid product becoming obsolete

Deutsche Post DHL has published a recent study, "Delivering tomorrow" – Customer Needs in 2020 and beyond. "Delivering Tomorrow - Customer Needs in 2020 and Beyond. (Delivering Customer Needs in 2020 and Beyond a Global Delphi study Deutsche Post AG, Headquarters; Edition June 2009). The research includes a number of expert opinions and analysis obtained from 900 international respondents, including CEOs of leading multinational companies and scientists, on issues such as globalization, economy, technology,

logistics, environment and society. This study shows trends in these areas through 2020 and forward, which also serves as a guide for future business strategies.

The content of the report covers the green product revolution, the technological transformation of broad customer habits and expectations, driven by technology; and the emergence of China as an economic and technological leader. This study shows interesting differences between countries by comparing trends presented by respondents from Asia with those presented by respondents from Western countries. Many respondents, regardless of origin, put forward hypotheses about a particular interest in companies and individuals in Asia.

The results show that issues such as sustainability, education, and social responsibility will be increasingly important for companies in the future. These issues are relevant because several programs, such as GoGreen and Teach First, are being implemented today.

Deutsche Post DHL, at the presentation of the study at the World Forum in Stockholm, the results of research and analysis for the study "Delivering Tomorrow - Customer Needs in 2020 and beyond" which was conducted from June 2008 to January 2009 were presented. Featuring 81 theses about the future which were compiled and then finally discussed by 900 participants from all over the world, including CEOs of leading international companies and scientists from economics, futurology, and logistics as well as experts presented by selected customers from various sectors. They were given a comprehensive questionnaire for evaluation. The study made use of the Delphi methodology, which has been in use since the early 1950s. The Delphi methodology consists of a multistage assessment process, in which experts are presented with various theses and asked to provide their opinions. This systematic approach helps ensure Delphi studies produce predictions that are generally more precise and consistent than studies using generic surveys. The main predictions emerging from this study

focus on the challenges of climate change, the impact of increasing Internet networks, and the growing importance of the logistics industry.

3.1. Climate Change and CO_2 Reduction

Climate change is widely recognized as one of the greatest challenges in human history. Study participants predict that, in the years to come, purchasing decisions will no longer be based solely on brand quality or price. In the future, the impact of products and services on the environment will play an important role. By 2020, it's likely the label will also show how much carbon dioxide is emitted to produce and ship the item. To some extent, consumers will be willing to pay more for eco-friendly products and services. With few service providers who care about the environment trying to overcome their competitive weaknesses as soon as possible, consumer behavior will effectively lead to an increase in environmental quality standards.

The results of the research and analysis showed slightly different responses between respondents from East and West. For example, experts from Asia are more likely to believe in the emergence of "zero-emission cities" around the world than experts from Europe, Africa, and the Americas. Asian experts also believe that customers are ready to accept longer delivery times for their orders for more eco-friendly logistics.

3.2. Logistics Company Leads the Way

Despite the current financial crisis, Delphi experts do not see a major disruption in the current social and political system – in 2020 the world will still be an economic market. Competition for the sake of growth, wealth, and resources will still take place, with countries and companies as the main players. The trend toward outsourcing production will continue, and many companies will rely on global channels to seek a competitive advantage.

On the other hand, the Delphi study also predicts that companies should work together more often and more closely. To cope with high energy

costs, logistics companies will invest more resources to develop and run a joint network. Ensuring logistics in a more environmentally friendly future is one of the company's strategic goals today. For example, there is a new carbon-neutral delivery method that is claimed as part of a climate protection program aimed at a specific emission reduction target.

3.3. Business on the Internet – Anytime, Anywhere

Customers in 2020 will be increasingly considering environmental aspects, but will still not tolerate a decrease in delivery speed. They expect all products and services to be available quickly. As a result, customers will demand greater access and real-time information from suppliers. This will make the Internet play a significant role: by 2020, most of the world's population, especially in developed and developing countries, will be online and about three billion people will be conducting their business on the World Wide Web. The speed at which this is happening will continue to increase - not only in business but in almost every sector of life. Demands for flexibility and permanent availability will increase.

3.4. Optimistic Prediction

While terrorist attacks and global pandemics will remain a threat in the future, experts believe these conditions can be monitored through financial and technological investments. Interestingly, although Asian experts are more pessimistic than Western experts regarding public security and health, they tend to have a strong belief in the ability of technology to transform practical business and play an innovative role in the business. A similar trend also applies to the increase in the world's population. Respondents from Asia believe that controlling the population by the state will be an effective tool to control population growth, and most predict that the world's population will stabilize at seven and eight billion. However, respondents from other parts of the world believe that the population will continue to increase, and thus the consumption of resources will also increase. However, logistics experts

are generally optimistic. They believe that future challenges can be controlled by the market economy.

CHAPTER IV. SCOPE OF LOGISTICS AND DISTRIBUTION

4.1. Scope of Logistics

The scope of logistics covers the entire company, from the management of raw materials to the delivery of final products. The scope of logistics consists of order processing, inventory control, purchasing, warehousing, and distribution/transportation.

The essence of logistics is the concept of integration which seeks to develop the entire enterprise system. Logistics is fundamental planning for creating a manufacturing strategy and planning framework through understanding market demands which in turn links them to the strategy and planning of procurement. Ideally, in logistics, there should be a mentality plan in the business that seeks to replace conventional strategies that are not integrated between marketing, production, distribution and procurement plans and this is the mission of logistics management.

4.2. The Importance of Logistics and Distribution

Logistics is an important activity in enhancing the quality of both human resources and material resources that affect the national economy. Due to the lack of datasets, only a limited number of studies have been carried out as attempts to estimate and compare the extensive impact of logistics on the economy. Nonetheless, in recent years it has been very difficult to find studies that present this information in detail.

A study conducted in the UK showed that around 30 percent of the working population work in logistics-related fields. Recent research by Capgemini Consulting (2012) found that total logistics expenditure as a percentage of sales revenue equals the three trading regions in North America, Europe, and the Asia Pacific at 11 percent, while in Latin America it is 14 percent.

Another study conducted by Armstrong and Associates (2007) presents similar data at the country level, indicating that the logistics of the main economy represent between 8 and 21 percent of the country's gross domestic product (GDP).

In Europe and North America, logistics represents between 8 and 11 percent of Gross Domestic Product (GDP). In developing countries, the range is higher at 12 to 21 percent, with India at 17 percent and China at 21 percent. These figures represent a large cost, and provide an illustration of how important it is to understand the nature of logistics costs and identify the importance of keeping these costs to the minimum level. The countries with the lowest costs are usually those that have long recognized the importance of logistics and have spent considerable time creating more efficient systems. Lower logistics costs in developing countries can be expected in the next few years in line with being able to take advantage of developments. About 25 years ago, had the same statistical results existed, this percentage element would certainly have been much higher across the country. In the UK, records for the past 30 years, logistics costs at that time were around 18 to 20 percent.

The Council for Professional Supply Chain Management in the UK in its Annual Country Logistics Report (2012) provides an overview indicating a continued decline in logistics costs as a percentage of GDP for America from 2007 to 2009. However, since 2009 the percentage costs have slightly increased. This is a result of the global financial crisis and rising fuel prices. In a useful discussion, the International Transport Forum (2012) provided a specific overview of the measurement and implementation of national-level logistics costs for a particular country that can be used for further information.

CHAPTER V. CUSTOMER SERVICE

5.1. Customer Service Standards

A large majority of companies consider customer service as an important aspect of their business. Under stressful conditions, many companies have difficulty explaining properly what customer service is or providing a precise definition of customer service action. Traditionally, service provision has been based on an extensive assumption about customer preferences, rather than as a record of actual customer needs or at least customer perceptions of their needs.

Therefore, it is vital for any company or organization to have a clear definition of customer service and recognize the specific steps in customer service. It is also important to understand that customer service and customer service requirements can make a difference not only between industries and companies but also between the market segments served within the business.

Another relevant factor is the recognition of the complexity of providing customer service. Customer service is closely linked to the distribution and logistics processes. In this process, there are many influences that can be relevant to customer service. This starts from the ease of ordering to availability of stock and reliability of delivery. Finally, there is a need to balance the level of service provided with the available cost. The downfall of these many services is often the unrealistically high cost of providing the services that in reality may be greater than the customer's requirements.

The key to achieve a successful customer service policy is to develop the suitable objectives through the right framework, including building a

good relationship with the customer, then monitoring, and controlling procedures that have been set before.

5.2. The Importance of Customer Service

There are some companies that do not realize the importance of providing good customer service. But, why is it so important? There are many different answers to this question, such as the growing competition in increasing customer expectations, and the similarity of the basic products being offered. One way to consider customer service is to distinguish between the core products itself and the service elements associated with the product. The core product is related to the item itself: technical content, product features, ease of use, style, and quality. The service element, which can be called the "product environment" (product surround), represents product availability, ease of ordering, speed of delivery, and after-sales support. There is a long list (we will discuss later in this chapter) that in fact, not all types of services on the list are relevant to all products.

The marketing department of many companies recognizes that the elements surrounding the product are very important in determining the final demand for the product. In addition, these aspects often represent only a small percentage of the product cost. Therefore, referring to the Pareto 80/20 rule, it is estimated that the product environment or logistics element represents about 80 percent of the impact on the product, but only 20 percent of the cost. Finally, no matter how good a product is, the element of the satisfaction of customer service is very important, and we will eventually see that logistics plays an important role in providing good customer service.

One of the definitions of logistics mentioned in Chapter I, refers to "the placement of resources at the right time, at the right place, at the right cost, and at the right quality". This definition can be expanded into what we call the seven "accuracy" in customer service.

These seven things are the adequate quantity, cost, product, customer, time, place, and condition; and concepts in applying them to service. All

of these different aspects can be the key requirements of a good customer service offered to the customer, each of which is critical to ensuring that the product achieves the expected sales levels in a variety of possible markets. It should be noted that these elements are influenced by the standards and quality of logistics operations which are very important in introducing the products to market. Therefore, these elements can provide a basis for identifying the various logistics aspects that can be possibly a part of the offered customer service. In addition, it is equally important that these elements should contribute to the basis of the key measurements used to monitor either the success or failure of the operation. This will be explained at the end of this chapter.

5.3. Components of Customer Service

The logistics component of customer service can be classified in various ways. This can be seen as an element directly related to the transaction, where the emphasis is on the specific physical services provided, such as on-time delivery, or it can be seen as a feature of indirect support (in this case non-transactional, or pre/post transactional) that relates to overall aspects of order fulfillment, such as the ease of order pick up.

The elements of customer service of logistics can be divided into three categories which reflect the nature and timing of specific service requirements (before, during, and after product delivery):

1. Element of pre-transaction: these are customer service factors that appear before the actual transaction takes place, including:
    a. Customer service written policy.
    b. Easily accessible order personnel.
    c. Single order contact.
    d. Organization structure.
    e. Methods of order.
    f. Order size constraints.
    g. System flexibility.
    h. Element of transaction.

2. Elements of transaction: these elements are directly related to the physical transaction, and commonly need to be considered in distribution and logistics. These include, among others:
    a. Order cycle time.
    b. Order preparation.
    c. Inventory availability.
    d. Delivery alternatives.
    e. Delivery time.
    f. Delivery reliability.
    g. Complete order shipment.
    h. Goods condition.
    i. Order status information.
3. Elements of post-transaction: these involves elements that might happen after the shipment. These include:
    a. Spare part availability.
    b. Call time.
    c. Invoice procedures.
    d. Invoice accuracy.
    e. Product tracking/warranty.
    f. Return policy.
    g. Procedures and customer complaints.
    h. Claim procedures.

Elements of logistics customer service can also be classified with multifunctional dimensions. The aim is to assess the different components of customer service in the overall company functions, one of which is trying to enable the provision of good service. For example, time is a requirement that covers everything from order placement to actual order delivery which is called the order cycle time.

One of the main consequences of this approach is that it is possible to derive logical measures that are entirely relevant. This will be discussed later in this chapter. The four main multifunctional dimensions include:

1. Time – usually related to the fulfillment of the order time cycle.
2. Reliability – the guarantee of order time assurance which is accurate and undamaged.
3. Communication – the convenience of order picks up or effective response to questions.
4. Flexibility – the ability to recognize and respond to the changes of customer requirements.

The total of order fulfillment cycle time can be elaborated into five time-related components, from order receipt to final delivery. In addition, there is a preliminary step of order placement up to receipt of an order, although this is periodically ignored by some companies because it is considered part of the customer's ordering process. When identifying and measuring order fulfillment cycle times, it is important to be able to describe all the key components. Thus, if there is a customer service problem, then it can be measured and traced quickly and easily and the details of the actual problem can be identified and corrected.

As explained in this chapter, there are many different elements in customer service, and their relevance and relative importance will vary greatly depending on the particular product, company and market.

CHAPTER VI.
SUPPLY CHAIN MANAGEMENT

6.1. Development of Supply Chain Management

In this highly competitive era, companies are greatly urged to uncover new ways to provide and create added value for their customers. Companies are required to be able to deliver their products effectively, faster, and more efficiently. The ability to integrate supply chains and the latest insights and knowledge of supply chain management (SCM) is recognized as being able to increase the competition.

The background of the development of the SCM concept is the acceleration of changes in the business environment due to the rapid development of important factors, including:

1. Increasingly critical consumer demand.
2. The increasingly sophisticated telecommunications, information, transportation, and banking infrastructure enables the development of new models in the flow of materials/products.
3. The product life cycle is very short due to changes in the market environment.
4. Consumer awareness of the importance of social and environmental aspects in life requires the manufacturing industry to incorporate environmentally friendly concepts starting from the product design process, production process, and distribution process.

6.2. Definition of Supply Chain Management

6.2.1. Supply Chain

The supply chain is a set of activities (in the form of entities/facilities) involved in the process of transformation and distribution of goods from the earliest raw materials from nature to finished products to the final consumer. Based on this definition, a supply chain includes the companies that transport raw materials from the earth/nature, companies that transform raw materials into semi-finished materials or components, suppliers of product support materials, assembly companies, distributors, and retailers who sell goods to the final consumer. In the supply chain there are several main players which are companies that have the same interests, namely:

1. Supplies.
2. Manufactures.
3. Distribution.
4. Retail outlet.
5. Customers.

There are 3 elements that need to be managed in a supply chain, those are:

1. First, the flow of goods from upstream to downstream, for example, raw materials sent from suppliers to factories. After production is completed, the goods are sent to distributors, retailers, then to end-users.
2. Second, the flow of money and the like that flows from downstream to upstream.
3. The third is the flow of information that can occur from upstream to downstream or vice versa.

6.2.2. Supply Chain Management

Supply Chain Management (SCM) is an integrated application that provides supporting system information for the management in terms of procurement of goods and services for companies while managing

relationships between partners to maintain the level of availability of products and services needed by the company optimally.

SCM integrates the order delivery and its process, raw material procurement, order tracking, information distribution, collaborative planning, performance measurement, after-sales service, and new product development.

Thus, the supply chain is a physical network of companies that are involved in supplying raw materials, producing goods, or sending them to end-users. Meanwhile, SCM is a method, tool, or approach to manage the network.

Another definition of supply chain management is the integration of a business process from the end-users through the original suppliers (which provide services and information that add value to consumers).

In addition, there are also some experts who say that supply chain management is a transformation activity so that it becomes a product in the process, then becomes a finished product and is forwarded to delivery to consumers through the distribution system. The activities include traditional purchasing and various important activities related to suppliers and distributors.

Supply chain management activities:

1. Predicting consumer demands.
2. Arranging production schedule.
3. Preparing transportation network.
4. Ordering replacement supplies from suppliers.
5. Managing supplies: raw materials, in-progress products and finished products.
6. Running the production.
7. Ensuring the flow of transportation of resources to the customers.
8. Tracking the flow of material, service, information, and financial resources from suppliers, within the company, and to the customers.

6.3. Objectives of SCM

There are five objectives of supply chain management (SCM), those are:

1. On-time product delivery to maintain consumers' satisfaction.
2. Cost reduction.
3. Improving all outcomes of the entire supply chain (not just one company).
4. Time reduction.
5. Centralizing planning and distribution activities.

6.4. The function of Supply Chain Management (SCM)

The functions of supply chain management (SCM) are:

Planning, organizing, coordinating, and controlling all supply chain activities. The supply chain is the flow of material, information, money, and services from materials, from suppliers through factories and warehousing and finally the customer. The supply chain also involves the organization and the processes in it, including sending product information services to customers.

6.5. Supply Chain Management Performance

To be able to operate the supply chain effectively and efficiently, it is necessary to measure supply chain performance. The supply chain performance measurement allows us to understand supply chain management and can improve its performance. There are several things that must be considered in the performance of supply chain management, including:

1. Supply chain flexibility. The companies must be able to adapt so that they are able to respond to changes that occur.
2. Quality partnerships. The companies must have reliable partners and be able to provide the best.
3. Supply chain integration. All activities of the organization, suppliers, production, and consumers should be well managed.

4. The company's speed in responding to the consumers and market demands.

The method that is widely used to measure the performance of a company's supply chain is SCOR (Supply Chain Operational Reference). SCOR assesses performance from two perspectives, namely: internal business processes and customers. SCOR only provides a generic measurement system for its users. There are many studies regarding supply chain management. SCOR is a process reference model that combines well-known concepts in business process reengineering, benchmarking, and process sizing within a cross-functional framework. There are five main supply chain processes, namely:

1. *Plan*, related to the company's plans to determine what should be done in the future to meet the company's vision, missions, and goals.
2. *Source*, related to the implementation of what will be done within the company so that it creates use value.
3. *Make*, related to the creation of products or goods that can later be profitable for the company.
4. *Deliver*, related to how products or goods originated from the company can reach consumers in a timely manner.
5. *Return*, related to the return of defective products or goods so that consumers do not feel disadvantaged.

CHAPTER VII.
GLOBAL LOGISTICS STRATEGY

7.1. Global Logistics

There is extensive research on logistics and freight transportation. This research is mainly focused on traditional logistics issues, which eventually lead to the development of the solutions only for the implementation in the central location. The Council on Logistics and Management (1993) defines logistics as "the process of planning, executing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to the point of consumption for the purpose of accommodating customer requirements". Components of a logistics system may include some or all of the following: suppliers, production facilities, transshipment points, and demand points. The distribution of goods from their origin to their destination is the essence of logistics (Langevin, 1996). In addition, as a global industry, logistics will involve more material flows through supply chains that go beyond the national boundaries. A global company that seeks to achieve competitive advantage by identifying world markets for the products and developing the manufacturing and logistics strategies to support its marketing strategies. A company that is successful in global markets will expand its production and establish facilities in several areas to meet the needs of foreign markets by using global logistics channels to supply these facilities (Christopher, 1998).

Efficient management of transportation and storage costs is a major issue in planning a logistics strategy. Prior to the mid-1990s, the function of logistics was to minimize the distribution costs and maximize the profits, with the expected level of service delivery (Lambert, 1993; CLM,

1986; Gustin et al., 1995; Langevin, 1995). Currently, the goal is to focus on maximizing the manufacturing flexibility both within and outside the company at the expense of achieving minimum costs (Bowersox and Daugherty, 1995a; Novack et al., 1992).

This means that current logistics is directly proportional to supply chain issues. Besides, the goal of a company's logistics strategy is to exploit the company's unique product manufacturing and delivery, to maximize profits and services leading to competitive performance (Bowersox and Daugherty, 1995b).

In addition to the trend of globalization development in logistics, there are several factors that reshape logistics strategy and operations. These factors are (Cooper, 1993): globalization of markets, cheaper communication, removal of barriers in trading and foreign investment, achieving the economic scale in business, innovation in logistics, and reduction of costs per unit of transportation. These factors tend to increase world trade and specialization of worldwide production. This means that the freight transportation between continents and between countries will not always increase in line with the growth of the world economy, but rather grow and diversify with the specific demands of various regional markets (Lehmusvaara, 1998). Therefore, logistics operations will determine the direction of the flow of freight transportation. This operation not only can be measured by a country's gross national product (GNP), but must also be evaluated by the increasing influences of freight transportation and distribution on the performance of almost all other economic sectors (Croinic et al., 1997).

On the other hand, Qrtuzar (1990), Langevin (1996), Crainicetal. (1997), Fengetal. (2000) and Garridotal. (2000) provide reviews on approach solutions in freight transportation. They point out that the current freight transport research tends to emphasize the important role of freight transportation in the overall manufacturing/distribution process. However, some previous studies on freight transportation have several shortcomings. First, most of these studies assume that product manufacturing is conducted in factories in concentrated areas. Under

the global production trend, companies manufacture their products in several places.

Previous studies on freight transportation have not been able to reflect the reality of today's manufacture and the demands that the company currently places on freight transportation services to meet their needs.

Secondly, previous studies were based on a limited number of data, and may not disclose all the impacts of the international labor division. Finally, some parts of the previous studies did not consider transportation requirements as required by internationalization production activities, because they did not take into account the dynamics of the interaction between the company's request for goods and adjustments in the creation of supply chains. Although some of the previous studies have highlighted the characteristics of logistics strategies and delivery of goods, with the best knowledge, no academic work has previously examined the influence of global logistics on the demand for international transportation.

7.2. Indonesia's Logistics Performance

Indonesia's logistics performance is currently far from ideal because of the high logistics cost and the need for improving the quality of service. Based on the survey by the Logistics Performance Index (LPI) of the World Bank in 2007, Indonesia's logistics sector was ranked 43rd of 150 countries under Singapore (1st place), Malaysia (27th place), and Thailand (31st place). Likewise, when viewed from domestic logistics costs, Indonesia ranks 93 which shows domestic logistics costs in Indonesia are still high. Indonesia's logistics condition until 2009 was still under the performance of several other ASEAN countries even though it rose to rank 75. This unfortunate performance of the logistics sector was caused by various issues related to the supporting element of the transportation sector as described in the Blue Print of the National Logistics System (Sislognas), among others are:

1. Inadequate infrastructure support including the port, road infrastructure, railroad transportation, river lines and crossing, and intermodal and multimodal transportation.
2. The low quality of human resource (HR) competence and logistics educational institutions.
3. The weak provision of logistics services.
4. The uncoordinated regulations related to logistics.

7.3. Logistics Development Strategy in Indonesia

Referring to the issue of Indonesia's logistics sector and in facing global challenges, Indonesia's Logistics Vision in 2025 in the Blueprint of the National Logistics System is "Locally Integrated, Globally Connected for National Competitiveness and social welfare". In 2025, Indonesia's logistics sector, which is domestically integrated between islands and is internationally connected effectively and efficiently to the world's main economic sector so that it will increase national competitiveness to succeed in the competition of world supply chain era.

To achieve the vision, the Indonesia logistics strategy was arranged based on 6 (six) key factors or the main focus, namely:

1. Key commodities.
2. Laws and regulation.
3. Infrastructure.
4. Human resources and management.
5. Information and communication technology.
6. Logistics service provider.

The main focus of the "logistics service provider", in this case, the *Badan Usaha Angkutan Multimoda* (Multi-mode transportation business entity) is directed at:

1. Strengthening the related parties and the provider company of multi-mode transportation services.
2. Creating a good business environment for related parties and service providers of multi-mode transportation.

3. Encouraging private sector participation in the investment of multi-mode transportation infrastructure.

The main focus of infrastructure development is aimed at the availability of adequate and efficient infrastructure and facilities to increase the flow of goods with the following strategies:

1. Water transportation.
    a. Implementing the cabotage principle for domestic water transportation in accordance with the roadmap schedule.
    b. Improving the accessibility of passenger and freight transportation in underdeveloped areas and in crowded/congested areas.
    c. Improving the efficiency and effectiveness of water transportation services that are carried out in an integrated manner and through the arrangement of the route network.
    d. Preparing ports as international hubs in the western and eastern Indonesia region to be more independent without relying on international hubs in other countries.
    e. Increasing operational efficiency, optimizing port capacity, and developing interconnections with hinterlands and international hubs.
2. Land transportation.
    Reducing road loads by developing inter-mode/multi-mode transportation networks and logistics centers as an effort to improve the flow of goods from production centers to outlets-inlets, export-imports, and between islands.
3. Rail transportation.
    Developing a rail network for long-distance freight transportation in Sumatra, Java, and Kalimantan.
4. Air transportation.
    Optimizing the role of the existing airports so that they can function as cargo airports.

7.4. International Logistics Development Strategy

In this section, we will discuss current trends in logistics and supply chain management. As shown in Figure 1, companies are responding to this trend in a number of ways. One of the most important initiative strategies, both today and in the next five years, is talent management, which addresses the need to fill critical gaps that exist in the logistics workforce in the next decade. After that, the organizations are looking to build capabilities in end-to-end supply chain integration, network visibility, integrated planning, technology investment, and cost-to-serve analysis. The last element refers to the ability to accurately describe the true cost of services for different customers or product profiles, which is an important element for logistics decision-making.

The approach taken by the multi-branched leading companies does not consist of a single approach.

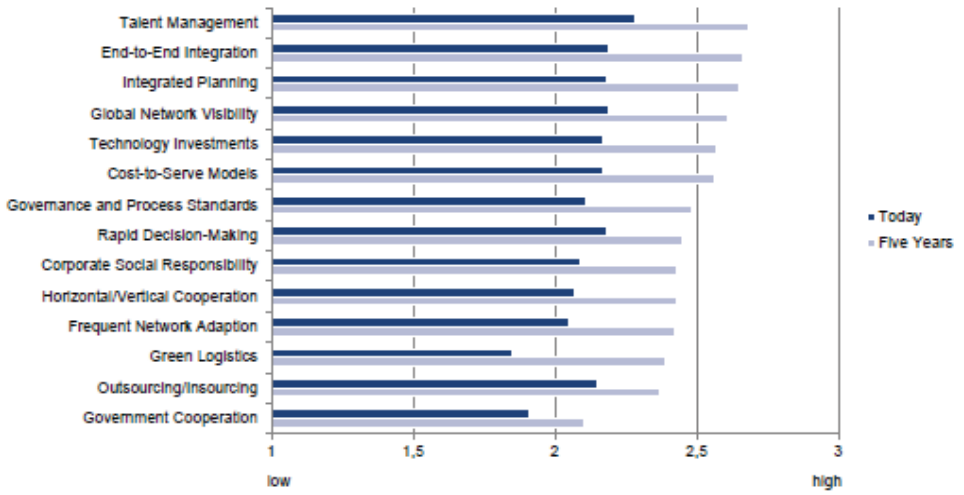

Figure 1. Rating of Logistics Strategy

The graphic representation of strategic organization capabilities is shown in Figure 2. The figure shows a number of capabilities that the best leading companies are looking to develop in the next five years.

The top-performing person in the organization is named the “key actor”. First, organizations can quickly adapt and change direction in response to a complex and shifting environment. A responsive organizational

culture is basically based on a capable and trained workforce (PEOPLE). People are the foundation of every organization. The key actors, who have committed to talent management, must ensure that their people are engaged and empowered to handle difficult and unpredictable situations. Second, the key actors have built a global governance process that organizes people into a standard of attitude and behavior on an integrated plan but with adequate room to maneuver around regional issues encountered by global business units (PROCESS). The standard process ensures that there are a number of global policies and procedures that support appropriate results, and also highlights that plans are strictly aligned across the supply chain.

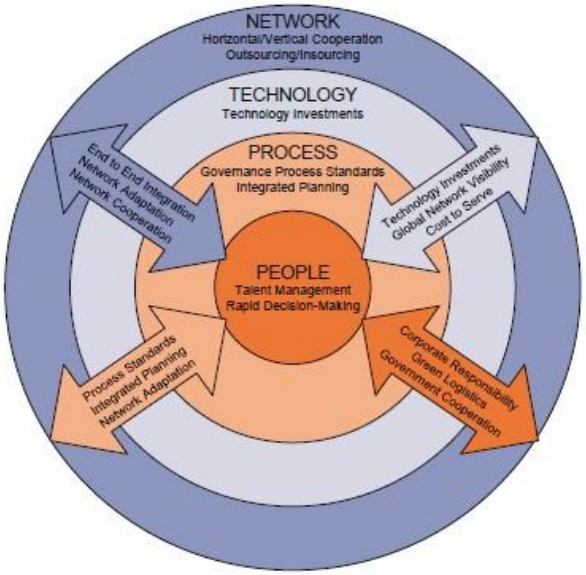

Figure 2. Model of Logistics Strategy

Third, they have developed a roadmap for a long-term technology investment that aligns with its strategic core activities and customer expectations, which drives to a better ability to price products and services effectively and build services that meet or exceed customer expectations (TECHNOLOGY). Investments in technology are made with the intention of enabling people to make better decisions in an integrated way, and always being transparently considered with customer outcomes.

Fourth, the key actors have set an example for creating network partnerships, outsourcing relationships, and products and services provided by main global partners that provide a range of capability enhancements to make it difficult to be replicated (NETWORK). Organizations recognize that they cannot "do that alone". However, with a network of suppliers and logistics partners, they can do it well. This requires a culture of building trust and cooperation in a networked world, which takes time to achieve.

Finally, the main actors have set a commitment to improve the global community with plans to live in better conditions than before, both in terms of footprint and global standards (COMMUNITY). In this case, we can see strategic activities which encourage “green logistics” trends, improve labor conditions and human rights, and promote ethical decisions as an integrated component of the environment in which organizations operate. Implicitly, in this position, the concept involves local communities as an integral component of the logistics network. For that reason, the organization's efforts to improve their COMMUNITY are described in the NETWORKS section. By investing in green logistics and emphasizing labor and human rights, these organizations will achieve the rewards of this investment in the years to come.

CHAPTER VIII. LOGISTICS PERFORMANCE INDEX (LPI)

The Logistics Performance Index is a weighted average number of assessments of the six logistics dimensions of a country. This index is calculated by the World Bank and produces a scale of 1-5 which shows the comparison of performance levels among countries.

According to the World Bank, Indonesia's Logistics Performance Index (LPI) rank has increased, from 75th in 2010 to 53rd. However, this increase is not accompanied by the improvement of the facilities and infrastructure. There are still many shipping routes that are not effective, road conditions are not adequate in terms of quality and quantity. The government needs to improve the development of sustainable transportation infrastructure in order to further increase the LPI. LPI rating upgrade is expected to reduce logistics costs significantly.

8.1. Logistics Performance Index (LPI)

This index is a finding from a study conducted by the World Bank in 2010. This study was first conducted in 2007 by observing approximately 155 countries and nearly 1000 private entities engaged in logistics. The assessment is carried out by taking into account 6 elements, namely:

1. The efficiency of the customs process.
2. The quality of infrastructure related to trade.
3. The level of convenience to set a competitive shipping cost.
4. The level of competence and quality of logistics services.

5. The ability to make forecasts and predictions about the shipping schedule from the companies.
6. The frequency of ship arrivals compared to the existing schedule and estimated time.

The LPI assessment method is to make a rating of 1 to 5. The higher the number, the better the rating. Indonesia which globally has a number of 2.76 is not supported by the infrastructure aspect, because the infrastructure number is lower than Indonesia's LPI rating.

8.2. Aspects of Logistics Performance Index

The LPI measurement according to the World Bank consists of six factors, namely the efficiency of the customs process; infrastructure quality; competitive shipping cost; competence and quality of logistics services; the ability to track and trace goods; and travel time. Table 2 describes the logistics performance index for ASEAN countries.

Table 2. ASEAN's Logistics Performance Index

Country	2010	2012	2014
Singapore	2	2	5
Malaysia	27	29	25
Thailand	35	38	35
Filipina	44	52	57
Vietnam	53	53	48
Indonesia	75	59	53
Myanmar	133	129	145

Source: World Bank

Link: lpi.worldbank.org/international/global/2014

In 2012, Indonesia was ranked 59th in the LPI. Indonesia has increased its ranking compared to 2010 when it was ranked 75th and this year Indonesia is able to reach the 53rd position.

Myanmar experienced an increase in 2012, but its position is still below Indonesia and this country actually experienced a decline in 2014 to the 145th place. Data on the logistics competitiveness ranking of Indonesia and neighboring countries in 2010, 2012, and 2014 can be seen in the LPI Ranking Table of ASEAN.

Table 3. Indonesian Infrastructure Quality Rating

Infrastructure	2010	2011	2012	2014
Quality of Total Infrastructure	96	90	82	92
Road Infrastructure	94	84	83	96
Rail Infrastructure	60	84	52	51
Port Infrastructure	95	96	103	104
Airport Infrastructure	68	69	80	89
Electricity Infrastructure	96	97	98	93

Source: World Economic

Link: http://www3.weforum.org/docs/CSI/2012-3/GCR_Pillar2_2012-13.pdf

In the 2014 World Economic Forum report, Indonesia's infrastructure quality was ranked 92nd out of 134 countries. The type of infrastructure quality that has the lowest rating is the quality of port infrastructure which is ranked 104. The quality of electricity supply has also decreased since 2009-2010. From 2011 to 2012, Indonesia was ranked 96, 97, and 98, and in 2014 it was ranked 93.

The transportation system in Indonesia has a specificity, as a maritime country, transportation uses all existing modes, including land, sea, and water, as well as air. Broadly speaking, the provision of infrastructure involves two basic principles, namely better access to the infrastructure itself and the price of products resulting from the use of infrastructure. Better access will increase productivity and thus, decrease input costs. For the consumers, it means a decrease in the cost of living.

Studies conducted by Ali and Pernia (2003), Rasyid, Ozeki, and Sugiyanto (2003) showed that infrastructure needs between regions should not be generalized. There are areas that need roads as a priority for the distribution of goods, but there are archipelago areas that need more ports and ferries as a priority.

Infrastructure has been defined in terms of the physical facilities (roads, airports, ports, terminals, railroads, and means of transportation), and services (transportation systems) that flow from those facilities. According to the Head of the Toll Road Regulatory Agency (Ketua Badan Pengaturan Jalan Tol or BPJT), Ahmad Ghani Ghazali, the additional length of toll roads in Indonesia has reached 950 kilometers, bringing

the total to 1,710 kilometers. By 2014 there will be 24 toll road projects, trans Java and non-trans Java.

The performance of Indonesia's logistics sector is still low and needs to be improved to increase competitiveness.

The good performance of the logistics sector can result in the low cost of freight transportation, which in turn will increase the competitiveness of an economy. Based on the Logistics Performance Index (LPI, World Bank), in 2010 Indonesia was ranked 75th out of 155 countries (see Table 3.3). This position is still far lower than that of several neighboring countries such as Singapore, Malaysia, Thailand, Vietnam, and the Philippines which have similar geographical conditions to Indonesia (an archipelagic country). Based on the six categories measured in the LPI, Indonesia's performance is worse than the five countries in almost all categories, except for timeliness, where Indonesia is still slightly better than Vietnam. Customs and infrastructure are the two categories with the lowest scores for Indonesia.

Table 4. The Performance of the Logistics sector of ASEAN Countries in 2012

Rank	Country	LPI	Customs	Infrastructure	International Shipping	Logistics Support	Tracing	Timeliness
2	Singapore	4,09	4,02	4,11	3,8	4,12	4,15	4,23
29	Malaysia	3,44	3,11	3,5	3,5	3,34	3,32	3,86
35	Thailand	3,29	3,02	3,16	3,27	3,16	3,41	3,73
44	Philippines	3,14	2,67	2,57	3,4	2,95	3,29	3,83
47	India	3,12	2,70	2,91	3,13	3,16	3,14	3,61
53	Vietnam	2,96	2,68	2,56	3,04	2,89	3,10	3,44
75	Indonesia	2,76	2,43	2,54	2,82	2,47	2,77	3,46
118	Lao PDR	2,46	2,17	1,95	2,70	2,14	2,45	3,23
129	Cambodia	2,37	2,28	2,12	2,19	2,29	2,5	2,84
133	Myanmar	2,33	1,94	1,92	2,37	2,01	2,36	3,29

Source: The Logistics Performance Index and Its Indicator (World Bank, 2010)

CHAPTER IX. INVENTORY

9.1. Things to Consider

1. Types of inventory costs:
    a. Item cost.
    b. Ordering cost.
        1) Purchasing order cost.
        2) Shipping cost.
        3) Transportation cost.
        4) Receiving cost.
        5) If it is self-produced, there will be set up costs: correspondence cost and equipment preparation cost.
    c. Inventory carrying cost.
        1) Costs are stated and calculated at the opportunity lost if the inventory value is used for investment (Cost of capital).
        2) Costs that include warehouse costs, insurance, and taxes (Cost of storage). These costs change according to the value of the inventory.
    d. Cost of obsolescence, deterioration, and loss.
    e. Stock-out costs.
2. Determination of how much and when to order.

9.2. Inventory Management Methods

1. Economic Order Quantity (EOQ) method.
2. Continuous review system.

3. Periodic review system.
4. Hybrid method.
5. Abc method.

9.3. Inventory Functions

In the industrial world, inventory stored in warehouses can have various functions. In this classification, the warehouse will be divided according to what items are stored in the warehouse. In general, based on its physical function, inventory can be divided into 4 (four) main functions.

1. As raw material.
   The raw material is an item that will be processed and given added value so that it can then be sold at a higher value. Raw materials can be different for each company, depending on the type of business and business objectives. Goods that are considered raw materials in one company are not necessarily raw materials in other companies. It is possible for raw materials in one company to become finished goods in another company, for example, in a bakery, the goods that become raw material in that company are flour, but for a flour factory, flour is finished goods produced from complex processes that change wheat seeds into flour.
2. As work-in-process.
   Work-in-process goods in everyday language are known as semi-finished goods. This work-in-process item is a raw material that is subjected to a process to become a product. However, it has not finished yet, and is called "halfway".
3. As finished good.
   Finished goods are goods that are ready to be served or ready to be sold to consumers. Finished goods are goods obtained from basic materials in the form of raw materials that have been processed and given added value.
4. As spare parts or equipment.

Equipment or spare parts are things that do not add value to raw materials to become finished goods, but they will be very useful to support the process of adding value to raw materials to become finished goods.

For example, in a paper company, the equipment used to make an A4-sized paper is a cutting knife, in this case, a cutting knife is an equipment used to provide the added value of logs that are processed into papers. In this case, equipment can also consist of all goods used for machine maintenance or equipment for the finished goods process.

9.4. Inventory Classification

In a warehouse, whether it is a raw material warehouse, WIP warehouse, finished goods warehouse or spare parts warehouse, there will be differences in the flow of goods. In a warehouse, for example, a finished goods warehouse, there are various types of finished goods stored in the warehouse. With these different types, the flow of each item will not be the same.

In this classification, inventory will be viewed based on the flow of the goods, whether the goods are fast-moving, medium-moving, or slow-moving.

1. Fast moving goods.
   Fast-moving goods are goods with a very fast flow. The fast-moving goods will be in the warehouse in a very short time.
2. Medium moving goods.
   Medium moving goods are goods having moderate flow, neither too fast nor too slow. Usually, this item will be in the warehouse for a relatively long time compared to fast-moving goods.
3. Slow moving goods.
   Slow moving goods are goods with a very slow pace of flow. Usually, the slow-moving goods will be available in the warehouse for a long period of time.

This flow of goods must be considered in carrying out for the effective warehousing management. By paying attention to the speed of the flow of goods, it is hoped that the flow of goods in the warehouse will be smooth. The stock of fast-moving goods must always be checked to prevent shortage and to avoid consumers' disappointment. The stock of slow-moving goods must be managed so that there is no accumulation of goods that do not need to be stored. By doing so, the warehouse capacity can be used as effectively as possible.

9.5. Inventory flow process

According to Holy Icun Yunarto and Martinus Gety Santika (1995), inventory flow is the flow of the inventory in the company's business. Thus, the process depends on the form of the company's business. The more complex the business, the longer the flow. The less complex the business, the shorter the flow.

CHAPTER X.
WAREHOUSE MANAGEMENT

10.1. Definition of Warehouse Management

Warehouse management refers to an arrangement to manage a warehouse and the distribution of goods so that the inventory remains in a good condition and can be distributed to the customers at the right time, with the right specifications, and in the right quantities.

10.2. The Scope of Warehouse Management

1. Warehouse management has the function of receiving goods.
2. Warehousing management has the function of storing goods.
3. Warehousing management has the function of releasing goods.

10.3. Types of Warehouse Systems

1. Open-space warehouse.
   The goods stored in this type of warehouse usually have a very fast flow because they don't go through the inspection stage first. Usually, a warehouse manager is not available in this type of warehouse.
2. Closed-space warehouse.
   Goods that enter this warehouse relatively need a long time because the incoming goods are held first by the warehouse manager who will carry out a thorough inspection before allowing goods to enter the area.
3. Semi open-space warehouse.
4. Semi closed-space warehouse/shed.

10.4. Activities in Warehouse

1. Administrative activities.
   The activities of outgoing and incoming cash flow in the company are regulated entirely in administrative activities. All cash flow activities must be fully recorded to facilitate the implementation of the company's product development in relation to warehouse management.
2. Receiving goods.
   The activity of receiving goods is fully organized to be able to map the amount of cash flow and products obtained by the company.
3. Storing goods.
   Goods that enter the warehouse are stored safely to avoid any danger in the building environment.
4. Packing goods.
   Packing is aimed to ensure the condition of the goods sent to the customers. Packing is also managed in the scope of warehouse management.
5. Shipping goods.
   The goods that are dispatched are neatly recorded by the company. This is done to create an orderly and efficient production.

The implementation of the above activities is regulated by warehouse management which is divided into several sub-tasks. The sub-tasks are done by carrying out operational control, cost control, and personnel control.

10.5. Storage Method

The storage of goods in a warehouse is carried out by using the FIFO and LIFO systems.

When storing goods in the warehouse, a certain method is needed in order to avoid any damage to the goods. At least there are two kinds of storage methods in the warehouse, namely LIFO (Last in First Out) and

FIFO (First in First Out). LIFO is a system or method of storing goods in a warehouse, where the goods that come last are used first. This system is usually used for goods that can last for a long time or goods that if stored longer the quality will be better, for example, coffee.

While the FIFO system is a storage system that discharges the goods which arrived first in the warehouse. So, the goods are used sequentially or in chronological order. This system is usually used for goods that are less durable. For example, sugar, rice, and the like.

The choice of the storage system for goods, either FIFO or LIFO, basically depends on the type of goods themselves. If the item is able to last for a long time and will be better if it is stored longer then it would be better if the LIFO method is used. On the other hand, FIFO is used if the goods are less durable or if they tend to be spoiled if stored for a long period of time. If you pay attention, the LIFO system is considered more practical and faster than the FIFO method because goods that have just entered the warehouse can be immediately removed. However, each system has its own strengths and weaknesses.

Here, I will emphasize more the method or system for storing goods in FIFO (First in First Out). As previously explained, this system is a way of storing goods in which the goods that first arrive at the warehouse are also the first to leave the warehouse. This system actually has many advantages, including:

1. To maintain the quality of the goods.
   By using the FIFO system, the goods that arrived first are also the first to leave. Thus, the goods are not stored in the warehouse for too long. The items with the earliest expiration date will also come out the earliest. By doing so, the quality of goods can be maintained, also it is to anticipate the occurrence of mass damage to goods. For example, in a rice storage warehouse, if the rice is stored too long in the warehouse, the rice will be spoiled and contaminated by rice weevils. This will also affect the quality of other rice.

2. To control the price.
   Besides maintaining the quality of goods, another advantage of this system is the stability of the prices of stored goods. The price does not always stay at the same level, there are times when the price goes up but there are times when the price goes down. With this system, it is expected that the goods that are first arrived at a certain price will have the same price when they are dispatched later. In connection with the previous advantage, the risk that the price of the goods will fall can be avoided. In other words, the purchase price will not be higher than the selling price. So, the maximum profit can be obtained. For example, in a rice warehouse, the first item is purchased at a price of IDR 6000/kg then the second item is purchased at a price of IDR 6200/kg. Then, if there is high market demand at that time which causes the rising price, the price of the rice would be stable. In other words, the company is able to control the market price.

3. To have a more systematic record of goods.
   Another advantage of the FIFO system is in terms of recording goods in the warehouse. This will help the personnel of the warehouse in recording the incoming and outgoing goods. The discharge of goods is done sequentially or chronologically so that the warehouse personnel usually do not need to check all the goods. He can just check the number of outgoing goods and compare it with the number of incoming goods at a particular time.

Despite the various advantages of the FIFO system, this system also has several weaknesses. Usually, this system is less effective if the warehousing operators are not able to arrange the layout of the goods sequentially according to the date or time the goods arrived. In addition, the consumer or the user of the goods is not happy with the quality of the goods because the goods received are old stocks that are considered to have poorer quality.

However, these weaknesses can be avoided if the management is able to organize the movement of goods according to this system. The incoming

goods should not be randomly stacked, instead, they should be lined up according to the time the goods are received. Usually, warehouses that employ this system have two doors. The first door is the entrance for goods while the second door is a special door for goods to exit. Incoming goods are usually placed near the exit door. By using this arrangement, the goods that first arrived at the warehouse can be discharged easily because they are close to the exit door. The goods that have just arrived will be easy to store because they are not blocked by goods that have previously been arranged.

10.6. Maintenance and Treatment of Goods Stored at the Warehouse

One of the principles of warehousing is that the goods stored must be ready for use. Therefore, in the function of storing goods, it is necessary to implement proper maintenance and treatment for the goods. Maintenance is an activity of maintaining logistics and equipment so that the conditions are well maintained and ready to use. Thus, they can be used in disaster management effectively, efficiently and accountably, through the principle of:

1. 5S = Sort, Set in order, Shine, Standardize, Sustain.
2. First In First Out (FIFO) is a system that allows the goods which first arrived are the first to be discharged.
3. First Expired Date First Out (FEFO) is a system that allows the goods which are soon to be expired are the first to be discharged and distributed.
   In the arrangement, the goods that have earlier expiration date or which are received earlier must be used earlier because they are usually also produced earlier and are relatively older and their expiration date may be earlier.
4. The goods are arranged on pallets neatly and well organized, in accordance with the requirements.

The goods also need to be treated based on the type of goods. Classification of goods based on the material they are made of and their maintenance is described as follows:

1. Metal goods.
   Items made of metal such as iron tables, safes, metal cupboards and any sort of the kind are usually polished with Vaseline/oil and wrapped in a special paper. By doing so, the items are not rusty.
2. Paper goods.
   Items such as office files, document papers, etc. are usually maintained by being given camphor and anti-moth. This is to prevent termites. In addition, paper goods must also be stored in a dry place.
3. Flammable goods.
   Items that are flammable due to rising temperatures such as perfume, and any sort of the kind, are usually stored with special prevention by regulating ventilation, providing temperature gauges and providing fire extinguishers. If at any time a fire occurs, it can be extinguished quickly.
4. Wooden goods (mebelair).
   Wooden items such as tables, chairs, cupboards, and any sort of the kind are usually maintained with termite spray. In addition, it is also given a pedestal so that when it is moved or shifted it does not damage the warehouse floor.

In addition to taking care of the goods according to the type of material to ensure their quality, there are many things that need to be considered. These include:

1. Checking goods condition and carrying out periodic maintenance. This is conducted to make sure that the goods are not seriously damaged. If minor damage is found during this periodical check, the goods can be repaired immediately. Regular maintenance is very important because basically prevention is better than cure.
2. Protecting the warehouse from any leaks of the roof. This is intended to protect the warehouse from various weather threats, including

the heat of the sun and water from the rain. Usually, there are certain items that are very sensitive to water or solar heat, therefore it is very necessary to keep the roof of the warehouse in proper condition.

3. Avoiding the placement of goods that can affect the quality or can damage the other goods. In this case, there are some goods that can affect the other goods, for example, goods that have strong odors such as durian, alcohol, or other chemicals which must be avoided since they can damage other goods if placed nearby.
4. Checking electrical installations periodically. This is intended to avoid the occurrence of electrical shortage that can occur at any time. A short circuit may be caused by a cable that is gnawed by a mouse which will result in a short circuit which can fatally cause a fire.
5. Using the FIFO method to avoid expiry and damage to goods. The FIFO method has been explained previously that the method of storing goods is discharging the item that first arrived.
6. Provide fire extinguishers. Fire is an unexpected and unpredictable incident. Fire can be caused by an electrical short or by human error. Therefore, it is very important if a fire extinguisher is provided in the warehouse and the location of this fire extinguisher must be easily accessible
7. Regulating the flow of air temperature. This is intended to maintain room temperature because there are some items that are flammable or even explode at a certain temperature.
8. Provide a pad or base when storing each item to avoid moisture damage. Items such as wooden cabinets must be kept dry so they are not damaged by termites. Therefore, it is necessary to keep the goods dry. Every item made of wood or triplex is given a pad or base made of cloth or cardboard.
9. Item arrangement should be made as follows: heavy and bulky 51tem sat the bottom, light and small 51tem sat the top. This is aimed to maintain the quality of goods.

10. Small items that are similar and easy to steal are placed in a special safe or locked place. Items such as important files must be stored in a safe place, and not flammable or can be protected from water.

Another important aspect is to monitor or calculate the goods to make sure that they are ready for use at any time. It is called the stock opname (stock taking). There are several ways to make this process easier.

1. Items of the same type but vary in sizes are grouped by sorting from the smallest to the largest size. In this case, all goods of the same type, for example, based on the material, price, etc., should be grouped. So that later it will be easier to monitor and check at any time. While the way of arrangement is sorted from the smallest to the largest or vice versa. This is done to make the recording of inventory easier.
2. A large warehouse with lots of goods should be equipped with a warehouse map. This is to facilitate the receipt, storage, arrangement, maintenance, search, distribution, and supervision of logistics and equipment. The factors that need to be considered in designing a warehouse layout are as follow:
    a. For easier operation and movement, the warehouse should not be partitioned, unless necessary. Pay attention to the position of walls and doors to facilitate any movements.
    b. Based on the incoming and outgoing flow of goods and equipment, the warehouse needs to have aisles that can be arranged according to the system:
        1) Straight line flow
        2) A U flow
        3) An L flow
    c. Air circulation. One of the important factors in designing a warehouse is the adequate air circulation in the room, including air humidity settings and lighting settings.

d. The use of proper racks and pallets can improve air circulation, protection against floods, pest attacks, moisture, and handling efficiency.

e. Special storage.

   1) Medicines, vaccines, and serums require a special place such as a special refrigerator (cold chain), and must be protected from any possible power outages.

   2) Chemicals must be stored in a special building separate from the main warehouse.

   3) Large/heavy equipment requires a special place that is sufficient for storage and maintenance.

      a) Goods cards and hanging cards/labels are made for each item containing the movement of the goods.

      b) Grouping goods based on a certain amount for each group/stack.

      c) Warehouse staff always tidy up the goods that have been used up.

10.7. Warehouse Operational System

Warehouse operations are the continuation of the physical movement of goods after they are received from the manufacturer or supplier. Goods will be placed in the warehouse in accordance with the available facilities. The facilities can be in the form of racks and pallets or only pallets, even goods can be simply placed on the floor. It depends on the needs and the capital of the company. After the goods are placed in a certain position, there will be times when the goods will be discharged according to the company's needs or based on customers' demands. The process of placing goods from receiving and discharging currently uses computational technology.

There are several scopes of work in warehouse operations, namely:

1. Handling undamaged and damaged goods.
2. Stock calculation (Stock Opname).

3. Packing.
4. Worker operational supervision.
5. Movement of goods from one location to another, etc.

Goods that have been received will be recorded as inventory, and become the responsibility of the warehouse manager. Furthermore, besides ensuring the number of goods (quantity), the way of handling the goods is also important. There are a lot of damages caused by handling errors. The handling of goods is largely determined by the volume, characteristics of the goods, and the equipment used (pallets, hand pallets, forklifts, conveyors, etc.). Damaged or defective products can make the productivity low. Thus, the Lean Manufacturing concept combined with Six Sigma (originally from the lean sigma concept) must be studied by the warehouse manager to find out the system or concept to reduce defective/damaged products. However, a warehouse manager has a limitation in supervising all warehouse workers who have low competence. Thus, it is necessary to have personnel under the warehouse manager to supervise workers and ensure warehouse operations run well.

Deficiencies in the stock calculation might be caused by the carelessness of the warehouse workers. However, it is difficult to eliminate the deficiency in one stage of stock service in large volumes.

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