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# Analyzing the Three Supply Chain Flows in the Maritime Logistics and Distribution Industry

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## Abstract

**Purpose:** Indonesia's maritime logistics and distribution system is currently faced with several challenges, some of which include prolonged export and import time for goods handling as well as the high logistics cost. This study further analyzes the existing business processes in maritime logistics in East Java Province in order to provide solutions to the challenges. **Research design, data and methodology:** This research was carried out in East Java Province, Indonesia, with data collected through field observations, documentation, and in-depth interviews with all the stakeholders involved. **Results:** The study showed that the number of stakeholders and activities involved in the flow of goods movement ultimately impacted the length of time. These factors can be classified into the following five: 1) export and import regulations, 2) third party logistics competencies, 3) transportation infrastructure and facilities, 4) adoption of information systems and technology, and 5) maritime line connectivity. **Conclusion:** Analyzing the three supply chain flows in the maritime logistics and distribution industry called for the need for improvement to increase coordination among related institutions, improve the flexibility of dwelling time to the conditions of each port, enhance service levels, improve transportation infrastructure and facilities, implement information system and technology, and develop shipping routes and networks. Therefore, a collaborative supply chain management system can be realized.

**Keywords :** Supply Chain, Maritime Logistics, Industry, Indonesia, Distribution System.

**JEL Classification Code :** L52, L87, L91, O14, O25

## 1. Introduction

Logistics performance is essential in supporting domestic and international trade (Gani, 2017). According to Rezaei, van Roekel, and Tavasszy (2018), the Logistics Performance Index (LPI) is one of the tools used to measure a country's logistics capability. LPI is a benchmarking tool developed by the World Bank to measure the logistics performance of a country. It consists of six assessment indicators, namely customs, logistics quality & competence, infrastructure, timeliness,

international shipment, and tracking & tracing.

LPI indicators reflect the level of smooth flow of goods, information, and money in trade transactions of a country (Beysenbaev & Dus, 2020). Analysts stated that in 2018, Indonesia's LPI score on several indicators, such as customs, logistics quality & competence, and infrastructure, were low. Therefore, to compete with other countries, Indonesia's logistics stakeholders need to improve the low LPI, including those used by the maritime sector (Rumaji & Adiliya, 2019).

Currently, Indonesia has an average logistics cost of 26.64% of the Gross Domestic Product (GDP). This percentage consists of transportation, administrative and inventory costs of 12.04%, 4.52%, and 9.47% of GDP. The high cost of logistics in Indonesia is not only due to the high cost of transportation, rather it is also due to many factors, one of which is the complexity of the existing system (Sumantri, 2019). This tends to affect the handling time of goods and the swelling of the cost structure. Therefore, to develop an effective and efficient logistics

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system, it is necessary to solve these problems, as well as those associated with the maritime sector (Rumaji & Adiliya, 2019).

Maritime transportation is the backbone of Indonesia's trade sector, with almost 90% of international trade using this logistics route. Furthermore, based on its geographic location, Indonesia is in a strategic position in the world's logistics system because nearly 40% of international trade routes pass through the country. Collaborative efforts between maritime logistics stakeholders are needed to support smooth transportation (Havenga, Simpson, & Goedhals-gerber, 2017). Therefore, due to the high volume of trade and the complexity of the maritime logistics system, Indonesia needs an integrated, effective, efficient maritime logistics system to increase competitiveness at the international level and ensure the existence of strategic commodities for Indonesians.

The increase in maritime logistics flow entering Indonesia's territory has led to the need of numerous activities required to process the distribution and transportation of goods that involve many maritime logistics stakeholders (Rochwulaningsih, Sulistiyono, Masruroh, & Maulany, 2019). According to Amelia & Lathifah (2019), this condition has an impact on dwelling time at the port, which is the time from the arrival of the container in the yard until it leaves the terminal. It has three stages, namely preclearance, customs clearance, and post clearance. Preclearance activities start when the containers are placed in the temporary storage area until the import or export declaration documents is prepared. Customs clearance is a process associated with a document and physical inspections, as well as goods classification by custom officials. Post clearance is a process from receiving customs permits to containers leaving the port. In Indonesia, the average dwelling time needed to export goods to foreign countries is 3 days, while for imports of goods is 5 days.

According to a survey carried out by the World Bank, Indonesia's dwelling time is longer than several ASEAN countries such as Singapore, Thailand, and Vietnam. Therefore, this study is directed to analyze the factors that affect the handling time of goods in international trade through maritime routes. Furthermore, the next section describes the theoretical framework underlying this study and the methods used to achieve its objectives. This is followed by presentation, discussion and conclusion.

## **2. Literature Review**

### **2.1. Benefits Obtained from International Trade**

Economic growth is one of a country's priorities because it represents an increase in its capacity to provide various

goods for the citizens (Gunawan, Permatasari, & Tilt, 2020). It can be achieved through the trade sector, which is an economic activity that connects producers and consumers through the process of buying and selling of goods or services in a market in which sellers and buyers feel mutually beneficial.

The activities carried out in Indonesia's maritime logistics support the continuity of domestic and international trade. Domestic trade is carried out within the territory of a particular country, such as Indonesia. Meanwhile, international trade is carried out by residents of a country with other countries' based on mutual agreement. International trade consists of two activities, namely exports and imports, which are the removal and entry of goods from and into the customs area, respectively.

Some of the benefits obtained from international trade are establishing relationships between countries, obtaining goods that cannot be produced domestically, achieving the benefit from specialization, expanding the market, increasing profits, and transferring technology (Arribas, Perez, & Tortosa-Ausina, 2009; Borchert & Yotov, 2017). Many factors influence different production yields in each country, such as geographical conditions, climate, level of science, and technological mastery. International trade enables countries to meet their various needs that cannot be produced domestically. The main objective of international trade activities is to obtain benefits that are realized through specialization from other countries (Surugiua & Surugiua, 2015). Sometimes producers do not maximize their resource capacity because of concerns on excess production, thereby leading to lower product prices. Therefore, through international trade, producers can maximize resource capacity and sell excess products abroad. International trade also allows a country to learn more efficient production techniques and more modern management processes (Ikumapayi, Oyibo, Akinlabi, & Madushele, 2020). One of the international trade routes that are widely used in business activities in the maritime.

### **2.2. Maritime Logistics**

The maritime sector is the backbone of international trade that encourages and aids in improving a country's economy and welfare because the sea carries out almost 90% of global trade. According to the United Nations Conference on Trade and Development (2018), maritime logistics is the most effective way to distribute raw materials and finished goods throughout the world. This industry grows continuously due to the increase in significant trade routes, such as those between East Asia and Europe, and the expansion of Central Asia driven by positive trends in the Chinese economy (Baniya, Rocha, & Ruta, 2020; Bersenev, Chikilevskaya, & Rusinov, 2020).

This growth needs to be supported by an integrated, effective, and efficient maritime logistics system in each country to increase competitiveness and ensure the existence of strategic commodities of primary community needs are even and affordable (Yang, 2014).

The maritime logistics industry is heavily influenced by the trend of integration, deregulation, and globalization. The removal of trade barriers, market deregulation, and liberalization has further increased the world's containerization, thereby leading to a rise in maritime logistics. All stakeholders involved in the maritime logistics industry strive to create added value and satisfaction for customers to maintain their business's sustainability and growth. However, due to rapid changes in the business environment, the maritime logistics industry is becoming increasingly complex (Notteboom, 2004).

Maritime is the most economical transportation route for shipping in large commodities over long distances (Shinohara, 2009). Urbanyi-Popiołek & Klopott (2016) stated that maritime logistics services are widely available and can accommodate most cargo types. However, it needs a longer delivery time due to the prolonged processing time of at the port, shipping time is long, and handling activities need special facilities (Alrukaibi, Alkheder, & Almashan, 2020). Factors that can cause poor maritime logistics services and slow downtime of transported goods are pre-shipment delays, unprecedented delays at ports, and unexpected delays caused by bad weather or high tide. The need for extra handling makes maritime logistics more vulnerable to product and packaging damage. One of the solutions that can be offered is by analyzing the selection of transportation routes and by increasing the efficiency of the service process (Chung & Choi, 2016).

The maritime logistics industry is one of the rapidly growing value chains. It involves operations that are capital intensive, with risk and high variability. Therefore, when their management processes are not carefully carried out, they tend to significantly stimulate the instability of the industry (Heaver, 2002; Notteboom, 2004; Notteboom & Winkelmanns, 2001; Slack, Comtois, & McCalla, 2002). The increasing demand in the maritime logistics sector means that all stakeholders involved need to increase terminal productivity, determine service priorities, and provide flexible services at reasonable costs. The high cost of handling containers needs the differentiation of the services provided through collaboration between the stakeholders involved.

Another challenge associated with the industry is the low service quality, high logistics cost, congestion at the port area, mistakes and duplications of the document, variability process, and inadequate infrastructure. The low service quality and high cost have a negative impact on the level of customer satisfaction. Therefore, customers'

satisfaction rate can be increased with a rise in the frequency of communication and interaction among stakeholders to create the desired service level. The variability factors that need to be countered by the maritime logistics chain consist of external trucks' arrival time to the port terminal, the service time in each logistics chain, and the variability of ships' arrival time. Furthermore, the variability factors in maritime logistics tend to influence resource utilization. Coordination and integration among stakeholders can be used to minimize the variability process and expedite the process of managing documents, goods, and funds (Ascencio, Gonzalez-Ramirez, Bearzotti, Smith, & Camacho-Vallejo, 2014).

The challenges identified in the maritime logistics sector drive the need for integration of services provided by all actors involved (Notteboom, 2004). With the purpose of integration in the maritime supply chain, its concept and implementation for maritime logistics are needed. Supply chain management (SCM) is "a set of approaches that efficiently integrate suppliers, manufacturers, warehouses and stores for the proper planning, implementing and controlling of the materials and information flows from origin to the point of destination, to enable the production and distribution of right qualities of merchandise to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements" (Simchi-Levy, Kaminsky, & Simchi-Levy, 2003). SCM for maritime logistics chain can be defined as the management of a port logistics chain to promote the efficient integration and coordination of public and private stakeholders. It is also the effective and efficient process of planning, implementing and controlling the flow of maritime, ground transport, cargo and information flow (service orders and documentation of international trade) from origin to the point of destination (hinterland, foreland) to minimize system-wide costs while satisfying service level requirements of importers and exporters (agility and predictability) (Ascencio et al., 2014). From these definitions, it can be concluded that a maritime logistics chain is a series of activities related to shipping services in which there are aspects of planning, coordination, and control of cargo from the point of origin to the destination (Lam, 2011; Talley, 2014).

A maritime logistics chain consists of importers and exporters that act as shipper or consignee, the terminal operators, custom agents, transport companies, and freight forwarders. Ascencio et al. (2014) stated that all processes and stakeholders in the maritime logistics chain need to be integrated to achieve ultimate services. The leading service is expected to increase customer demand. Some of the factors taken into account by customers in choosing a maritime logistics chain are aspects of profit to be obtained, throughput, and cost (Talley, 2014; Tongzon, Chang, & Lee,

2009). Supply chain integration in maritime logistics is dominated by the role of the relationship between stakeholders with each capable of integrating resources in their specific area and act as an integrator according to their goals and needs. A large number of stakeholders and the processes involved make the maritime logistics system complex (Lin, Potter, Pettit, & Nair, 2014).

### **3. Research Methods and Materials**

#### **3.1. The Research Process**

East Java Province is one of the provinces in Indonesia that centers on relatively high business activity with a large and very busy port. This research was conducted to analyze the condition of maritime logistics in East Java Province. The research specifically investigates business processes in maritime logistics, factors that affect the handling time of goods in international trade, and the cost structure caused by the complexity of the region's maritime logistics system.

The study's activities include literature and field studies, problem identification, objectives, data collection, processing, analysis, and conclusion. A literature study was conducted to understand the global problems associated with maritime logistics, with reference to East Java, Indonesia, by exploring related journals. After that, a field study was carried out to determine the complexity of the system in the area.

#### **3.2. The Data Collection Method**

In this research, field studies were conducted by observing and studying documentation of activities carried out in maritime logistics management. They were also carried out by conducting interviews with maritime logistics stakeholders in East Java Province. After the initial study process has been carried out, a problem analysis was conducted, which narrowed the study objectives.

Furthermore, after explicitly identifying the study objectives, data collection was conducted. The data taken in this study consists of information regarding the stakeholders, their individual roles, the trade flows and procedures using maritime routes, documents and service time analysis of each activity, as well as the flow or process for loading and unloading containers at the harbor. After this information was investigated, this study identifies 1) the product, 2) finance, and 3) information flow of maritime supply chain, in addition to the 4) time for export activity, 5) time for import activity, and 6) influential factors to the maritime logistics system. Data were obtained through observation and interviewing of business processes in 50 logistics companies.

During the in-depth interview, an analysis of the process integration level between companies in maritime logistics was conducted. Their practice at the port of East Java compared with other places was based on direct observation and by comparing it with the exposure to research results reported in the literature review. This information is used to identify gaps in maritime logistics management practices at ports in East Java.

Before conducting in-depth interviews related to the level of service integration, this study reviews the literature that explores the various relationships among stakeholders. After determining the conceptual framework, semi-structured interviews with 50 interviewees from 50 different organizations was conducted.

#### **3.3. The Sample**

The observation of the business process is performed in 50 logistics companies in East Java. The data is obtained from the database of the Department of Industry and Trade in East Java. The interview participants include 10 professionals from shipping liner, 10 from freight forwarders, 5 from port operators, and 25 from cargo owners. These participants were selected from the managerial to the operational level to provide an extensive range of perspectives. The participants were mainly based in East Java, and 80% of them have over 15-years of work experience.

### **4. Results and Discussion**

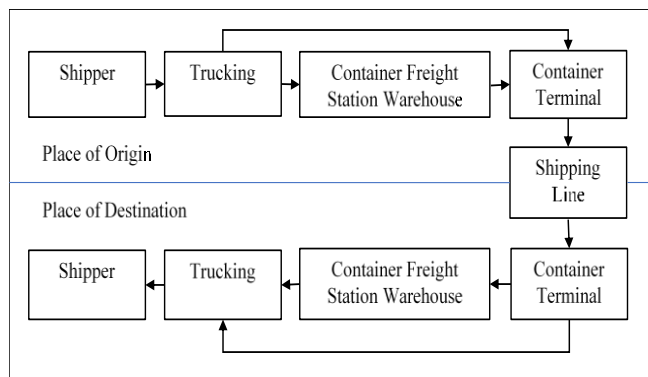
Transport good and transportation infrastructure need to be adequately prepared to support the movement and properly distributed of goods from producers to consumers. Sea transportation is a means of bridging and building connectivity between islands, especially for areas inaccessible by land and air transportation. The vast Indonesian archipelago condition is a big challenge for the logistics sector due to the difficulty in providing logistics services to all areas spread across these islands. Therefore, adequate maritime logistics management is needed to unite the Indonesian archipelago by sea. This tends to provide many benefits, including accelerating growth in various regions in Indonesia, building maritime competitiveness, and increasing national economic resilience and sovereignty. The achievement of these benefits is inseparable from the roles and interactions between stakeholders in maritime logistics. In more detail, this section describes the results of the studies conducted, which include business process analysis in the maritime logistics industry, handling time of goods, cost structures, and potential integrating supply chain activities.

### 4.1. The Analysis of Three Supply Chain Flows

A business process is a series of interrelated activities in a business that includes the initiation of inputs, the transformation of information and the production of output in the form of service. A business process can be broken down into several sub-processes and contribute to achieving the parent process's objectives. Therefore, the scope of business processes consists of goals or objectives, input, resources, and output activities that provide benefits and create values for customers. From the observations of business processes in a system, a model can be developed.

The business process model represents functions related to its activities such as input, control, output, and resources. It also aims to identify activities that still need to be improved from a business process, before carrying out analysis. Business process analysis is a study and evaluation carried out on a series of activities. The stages consist of identifying the value chain, analyzing every activity in a business process, and designing new processes and strategies to improve the old ones.

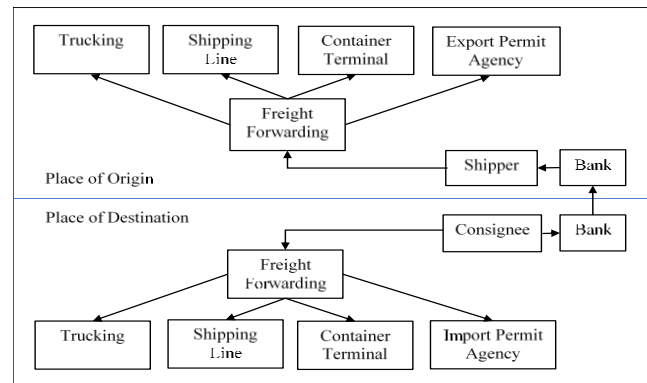
At the value chain identification stage, each stakeholder's activities are identified in carrying out their business processes. These activities form a combination of processes that can provide added value to the company's business processes. At the activity analysis stage, an analysis of each activity in the business process is carried out in terms of time and cost, and in creating or adding to the organization's business value. In the final step, a new business process is designed by improving the old one to create value for all stakeholders. Furthermore, the new business process design results are reviewed and implemented.



**Figure 1:** The Product Flow of Maritime Supply Chain System

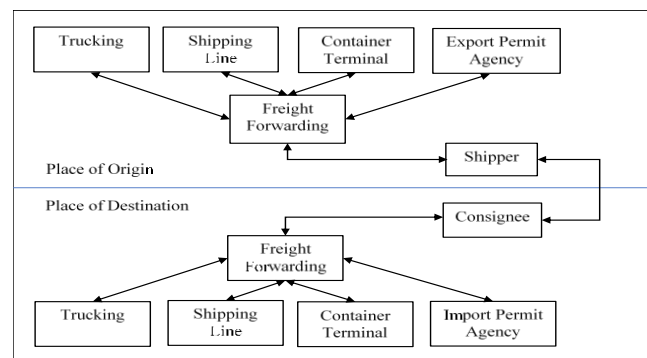
Figures 1, 2, and 3 show the flow of products, finance and information in the maritime logistics system in East Java Province, based on business process analysis through observation and in-depth interviews. A simple description of

the process that occurs is as follows. A shipper is a person or company that supplies or owns the commodities to be shipped. Shipper gives orders for the delivery of goods. Consignee is the recipient of the goods or the party-appointed in the Bill of Lading (B/L). Freight forwarding is a company that represents the shipper or consignee in handling the delivery and receipt of goods and provides logistics services, such as optimizing logistics solutions, finding the best alternative delivery, managing customs procedures, and preparing the administrative documents needed.



**Figure 2:** The Finance Flow of Maritime Supply Chain System

The shipping line is a company that operates ships and networks, for the provision of container to ensure customer needs can be met, and controls the containers' movement to optimize their use. A port terminal provides port facilities consisting of location for ships to dock or moor, storing goods, and for the loading and unloading of container equipment. Container terminals or ports carry out the transfer of containers from land to sea transportation and vice versa. The relationship between stakeholders in East Java's maritime logistics is similar to Lin's study (Lin et al., 2014).



**Figure 3:** The Information Flow of Maritime Supply Chain System



From the results of in-depth interviews with stakeholders involved in handling goods in maritime logistics and based on observations of the flow of goods, finance, and information, several problems that arise in the maritime logistics system in East Java Province can be identified. The goods flow diagram shows that the number of activities and stakeholders involved in the flow of goods movement have an impact on the length of time. Based on financial flows, the maritime logistics system’s complexity causes many cost components to be incurred from when the goods are shipped till they arrive at their destination. Meanwhile, when it is viewed from the flow of information, the complexity of the maritime logistics system causes difficulties in tracking the status of the existence of goods and invoices because there is no integrated information system among all stakeholders.

**4.2. The Analysis of Goods Handling Time in Maritime Logistics System**

The goods handling time by maritime logistics in Indonesia is still relatively high. Tables 1 and 2 show the export and import handling activities in East Java, with the highest time component obtained from stacking of containers for import or export, while the long buildup is due to the unresolved custom clearance process. From this description, an analysis is carried out to identify the factors that influence the handling time. Table 3 shows the influential factors in the maritime logistics system, with their individual explanation.

**Table 1:** Time for Export Activity

Activity	Hours	PIC
Preparation of trade documents	24	Shipper, Freight Forwarding, & Export Permit Agency
Permit & Administration	48	
Empty container collection	5	Shipper, Freight Forwarding, & Truck Company
Stuffing	3	
Trucking to the container terminal	4	
Stacking of export containers & customs clearance for export	75	Shipper, Freight Forwarding, Terminal operator & Customs
Loading containers into the ship	7	Terminal operator, Shipping Line

From the several causes of delay, the following are recommendations for improvements.

1. Coordination between ministries and licensing issuing institutions is necessary to prevent valid licenses from overlapping.
2. It is essential to evaluate and simplify the processing of export and import documents without reducing the quality associated with the supervision process of the entry and exit of goods at the port.
3. The socialization of export and import policies with other related parties is required before entering the implementation stage.
4. The dwelling time restriction policy needs to be adjusted to the conditions of each port/terminal.
5. There is need for an evaluation process and improvement of the service level of all actors involved in the maritime logistics sector.
6. The private sector’s involvement and funding are needed through a cooperation scheme for the development of a container terminal.
7. Government needs to support the development of land transportation that connects ports with industrial areas.
8. It is necessary to use information systems and technology in issuing licenses without reducing their control functions.
9. It is essential to develop an information system and technology that integrates all stakeholders in the maritime logistics sector, especially between shippers, consignees, service providers, transport carriers, port operators, and related government agencies.
10. Shipping using adequate fleets and supporting infrastructure is required
11. It is necessary to develop shipping routes and networks through equal industrial development distribution in the certain areas.

**Table 2:** Time for Import Activity

Activity	Hours	PIC
Permit & Administration	48	Consignee, Freight Forwarding & Export Permit Agency
Unloading of containers from ships	7	Terminal Operator, Shipping Line
Customs arrangements for import & stacking of containers for import	130	Consignee, Freight Forwarding, Terminal Operator & Customs
Trucking to the destination	4	Consignee, Freight Forwarding, Truck Company

Of all the recommendations given, it is hoped that all relevant stakeholders can implement them. Implementation of these recommendations can achieve the expected results.

**Table 3:** The Classification of Influential Factors to Maritime Logistics System

No.	Classification of Factors	Explanation
1	Export and Import Regulations	Lack of coordination between ministries and related institutions in drafting export and import policies leads to overlapping licenses, which increases the number of permits that need to be completed.
		A large number of export and import requirements have to be resolved. This condition leads to a prolonged document completion time.
		The minister's policy regarding terminal operations has not been fully supported by all related parties, therefore, it needs to be implemented for 24 hours nonstop. The customs have not supported this policy in handling the process because they only operate Monday through Friday.
		For several ports that do not experience congestion, the dwelling time restriction policy that needs the removal of containers from the stockpile field after a certain time limit is deemed ineffective. The transfer process tends to increase the handling of goods, thereby leading to an increase in non-value-added activity for ports that do not experience congestion.
2	Third Party Logistics Competence	Freight forwarding competence related to administrative and licensing management is still not optimal. The situation has led to the accumulation of goods at the container terminal due to unfinished customs processes.
		The shipping line's competence related to the timeliness of the delivery of goods is still not optimal. The condition tends to impact on ship queues at the container terminal dock.
3	Transportation Infrastructure & Facilities	The limited capacity of container terminals in terms of infrastructure and facilities include: 1. Limited wharf capacity and depth of the pier 2. Limited the number of loading and unloading equipment 3. Limited piling yard capacity 4. Limited warehousing capacity All of them hit the queue at the container terminal.
		Inadequate conditions and the roads' width connecting the port with industrial areas cause congestion at certain points.
		There is a limited number of sea transportation facilities in serving the delivery of goods, therefore there is a considerable time difference between the process of ordering the ship space until the goods are loaded.
4	Information Systems	The lack of use of the information system in issuing export and import documents, therefore some documents need to be processed manually and take a longer time.
		The information system has not been integrated into all aspects, therefore it requires more time to track and trace the status of goods.
5	Maritime Connectivity	Shipping routes and networks have not covered all areas, therefore certain regions sometimes need longer shipping times irrespective of the close shipping distances.

### 4.3. The Analysis of Cost Structure

The activity of moving goods in maritime logistics incurs other costs before they are sent to their respective destinations. The financing stages that business actors need to consider are divided into three stages, namely a) access costs to ports, b) costs at the container terminal, and c) cost of access to the destination location.

The access cost to port consists of a) the cost of preparing the documents required for the administrative process, b) ship fare fees for delivering goods from the port of origin to destination, c) shipping costs by the land route which consists of taking empty containers up to the delivery

of goods to the container terminal, d) rental fee for empty containers to be used to transport the delivered goods, e) costs for packing, labeling and arranging goods into containers.

The cost at the container terminal consists of a) the cost of the container truck entering the terminal, b) administrative costs for processing permit documents for delivery or receipt of goods, c) parking fees for container trucks in the terminal area, d) taxes related to certain export and import commodities, e) loading and unloading process costs for container handling, f) the cost of stacking containers in the yard, g) the cost of using a Container Freight Station (CFS) warehouse to consolidate Less

Container Load (LCL) loads into Full Container Load (FCL) and vice versa, h) fees for the use of additional facilities such as quarantine or physical inspection of certain commodities for export and import, i) costs for container trucks exiting the terminal area. Meanwhile, the cost associated with access to the destination consists of shipping costs by land, starting from collecting containers at the terminal to returning those that are empty.

By analyzing the problems that occur, an in-depth interview is then carried out regarding the main expectations of stakeholders that work in maritime logistics in East Java. These expectations include: 1) improving port infrastructure facilities to support ship mooring as well as the process of loading and unloading containers, 2) the existence of traffic control or pilot services at each port for proper coordination, 3) there is a balance between the number of containers transported and the ship's operation, thereby making the process more efficient without tariff adjustment for the shipper or consignee, 4) ease of regulation or customs licensing, 5) improvement of land route infrastructure, sea lane infrastructure, port infrastructure, specific equipment, and warehousing, 6) affordable service fees for land and sea transportation, 7) more intensity of ship arrivals and departures and 8) extended shipping routes.

The solution that can be offered to solve problems in the maritime logistics industry in order to meet all stakeholders' expectations is by creating a collaborative supply chain management system. This suggestion is in line with the previous research carried out in other areas (Ascencio et al., 2014; Lin et al., 2014; Notteboom, 2004; Talley, 2014; Yuen & Thai, 2017). Therefore, the maritime logistics industry can create a competitive advantage throughout the supply chain by developing close collaboration among stakeholders, creating a competitive advantage, and increasing operational efficiency. A collaborative supply chain management system is a condition that all stakeholders merge to manage the intra- and inter-organizational processes to achieve efficient and effective product and service flow in addition to the provision of maximum value to customers. Organizational support and policies impacts on the performance of collaboration (Hoa, Ngan, Quang, Thanh, & Quyen, 2020; Kim & Song, 2019). A collaborative supply chain management system contributes to the total supply chain value (Carbone & Martino, 2003; Lam, 2013; Lin et al., 2014).

The collaborative supply chain management system that is needed in the maritime logistics chain consists of port logistics governance, logistics management platform system, and port logistics operation model. Port logistics governance manages the continuous improvement of infrastructure, logistics processes, connectivity between ports and cities, and minimizes the environmental impact of

logistics activities. It supports collaborative schemes between stakeholders, minimizes costs, enhances service quality and safety of cargo, and continuously improves innovation (Ascencio et al., 2014).

A logistics management platform system is needed to manage physical and document flow more efficiently and effectively through the implementation of processes and technology (Sumantri, 2020). Aziz, Memon, and Ali (2020) stated that the focus of logistics management platform is currently on the coordination of a collaborative approach to achieve good performance throughout the chain. The logistics management platform system regulates planning, scheduling, and control of the flow of goods, information, and technology that supports the entire supply chain. Meanwhile, the port logistics operations model regulates the relationship between infrastructure and related logistics processes (Ascencio et al., 2014; Lin et al., 2014).

## 5. Conclusion

The number of stakeholders and activities involved in the maritime logistics industry impacts on the length of time in handling goods. In general, these causative factors can be classified into complex export and import regulations, TPL competencies that are not maximal, inadequate infrastructure, transportation facilities, use of technology and information systems, and insufficient maritime connectivity. These factors causes' difficulties in the integration process of activities and information systems of the maritime logistics industry, such the several cost components from before the goods are shipped until when they arrive at the destination location.

The most significant time component in handling goods is while stacking the containers for import or export. The long buildup is due to the unresolved custom clearance process. Some activities used to improve coordination between related institutions regarding the process of issuing permits are managing documents, customs operations, improved service levels, development of supporting infrastructure and facilities, and shipping route development. Furthermore, collaborative supply chain management system in the maritime logistics industry can be used as an alternative solution to solve existing problems.

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