

## OPTIMIZATION ACTIVITIES IN A CONTAINER TERMINAL TO REDUCE IDLE TIME IN LOADING-UNLOADING OPERATION

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### ABSTRACT

*In line with the implementation of development in Indonesia, whose main target is in the field of economic development, trade activities are one of the sectors of economic development, constantly developing their role. Therefore, it is necessary to have adequate transportation facilities, both by land, sea, and air. The dynamics of the construction can be seen clearly both in terms of the number of high-rise buildings, vehicles, activity facilities, residential areas, and other infrastructure. This condition requires careful, fast, and precise anticipation from the Regional Goverment and various policies in a spatial structure feasibility plan that considers the ability of transportation support as one of the main supports. This study seeks to study and analyze the related handling of idle time at PT Samudera Indonesia Jakarta by optimizing loading and unloading activities on container ships. By using descriptive qualitative methods and samples taken from PT Samudera Indonesia Jakarta, the following results are obtained: Problems in the system The cargodoring are: Difficult to direct the location of container dropping from the ship, The slow process of container dropping from the ship, Limited number of cranes, The occurrence of transportation queues, Limited ability to carry containers for each transport, Required trucks in large quantities, There was a clash between trucks that carry out the process of loading and unloading containers, the difficulty of directing the location of containers if it must be stacked with other containers, the development idea is to make a cargodoring handling system using a headless semi-automatic train, which utilizes seawater power and the conveyor system.*

**Keywords :** Idle time, Optimization, Loading, Container, Samudra Indonesia

### ABSTRAK

*Sejalan dengan pelaksanaan pembangunan di Indonesia yang sasaran utamanya adalah di bidang pembangunan ekonomi, kegiatan perdagangan merupakan salah satu sektor pembangunan ekonomi yang senantiasa mengembangkan perannya. Oleh karena itu, diperlukan sarana transportasi yang memadai, baik darat, laut, maupun udara. Dinamika pembangunan terlihat jelas baik dari segi jumlah gedung bertingkat, kendaraan, sarana kegiatan, kawasan pemukiman, dan infrastruktur lainnya. Kondisi ini memerlukan antisipasi yang cermat, cepat, dan tepat dari Pemerintah Daerah serta berbagai kebijakan dalam rencana kelayakan tata ruang yang memandang kemampuan penurunan transportasi sebagai salah satu penurunjang utama. Penelitian ini bertujuan untuk mengkaji dan menganalisis terkait penanganan idle time di PT Samudera Indonesia Jakarta dengan mengoptimalkan kegiatan bongkar muat di kapal peti kemas. Dengan menggunakan metode deskriptif kualitatif dan sampel yang diambil dari PT Samudera Indonesia Jakarta diperoleh hasil sebagai berikut: Permasalahan pada sistem Penumpukan muatan adalah: Sulitnya mengarahkan lokasi penurunan peti kemas dari kapal, Lambatnya proses penjatuhan peti kemas dari kapal, Terbatasnya jumlah crane, Terjadinya antrian pengangkutan, Keterbatasan kemampuan mengangkut peti kemas untuk setiap pengangkutan, Wajib truk dalam jumlah banyak, Terjadi bentrok antar truk yang melakukan proses bongkar muat peti kemas, sulitnya mengarahkan lokasi kontainer jika harus ditumpuk dengan kontainer lain maka ide pengembangannya adalah membuat sistem penanganan kargo dengan menggunakan kereta api semi otomatis tanpa kepala, yang memanfaatkan tenaga air laut dan sistem konveyor.*

**Kata kunci :** Idle time, Optimalisasi, Pemuatan, container, Samudra Indonesia

## 1. Introduction

In the world of sailing, Indonesia made progress, ships from both domestic and abroad and out of Indonesia, a lot. Moreover, here the ship services are needed, especially naval services for transporting raw goods, raw materials, goods as finished as possible to be consumed properly. In the current era of globalization, ports as an element of sea transportation play an essential role in the distribution of goods, passengers, and services for the smooth distribution of goods highly dependent on port performance and facilities, which are divided into public ports and special ports. A new market research report on maritime containerization states that Asia-Pacific is the largest market in the world, this region is also expected to have the highest growth of over 7% during the analysis period from 2009 through 2017 (Global Industry Analyst Inc. 2013).

The existence of transportation of goods, then the management of loading and unloading activities, is one factor in handling the loading and unloading of goods. In these activities, there are often found delays in completing documents, damage, and shortages of goods, then limited equipment and lack of expertise in operating loading and unloading equipment. As a result, ships will take longer at the port, and this will result in costs incurred by shipping companies. This delay issue shows the importance of a strategy to measure and improve port performance to achieve high levels of success in domestic and international supply chains (Madeira et al., 2012). In line with (Christiansen et al., 2013), the maritime inventory routing problem the vendor needs to manage the inventories in one or both ends (in this case, end storage depots), while optimally routing and scheduling the ship movements minimizing the overall transportation cost.

While loading and unloading activities for each ship have different times, depending on the size of the ship and the capacity of the ship. Time fluctuations and different problems in each loading and unloading activity for each different ship also require the classification of factors affecting the loading and unloading activities. This is useful to know the factors that often arise and influence in Idle time (IT) to make effective time increase, and it is necessary to know more in detail the influence of IT.

Maximizing the control or controlling function is also very important at PT. Samudera Indonesia Jakarta, because it greatly influences many aspects of the success of company performance, specifically to improve the quality and quantity of the company. The oversight function is now increasingly contributing to the success of an organization. Many companies realize that the element of control (supervision) in an organization can provide an overall advantage. Likewise, in loading and unloading activities, companies need reliable labor so that loading and unloading activities can run smoothly so that the delivery and receipt of goods becomes smooth. Unloading activities carried out are activities to reduce loads from inside the hold to the dock or directly to the conveyance or the barge. In contrast, the opposite load is the activity of raising the load from the dock or the conveyance or the barge to the hold with a crane so that these activities require good performance from the employees of the supervision department so that the quantity and condition of the cargo following the official report in the receipt or delivery of goods.

In loading and unloading containers, problems often arise when the process of loading and unloading containers is idle time. Container loading and unloading at related companies have categories of types of goods according to what will be unloaded, including general cargo, unitize cargo, and dry bulk cargo. Some of the obstacles that often occur in the implementation of loading and unloading are like waiting for trucks, revamping or repairing equipment, and others that hinder for time efficiency. With some of these phenomena, it can be taken essential points regarding the need for monitoring functions during the loading and unloading. Supervision carried out can reduce when there is Idle Time, such as a delay of the loading and

unloading schedule above. So it does not harm the company and maximize services regarding container loading and unloading with proper handling. (Setiawan Feri, 2016).

In its operational activities, the container system, if seen, is straightforward to implement to obtain maximum benefits, including not consuming much time. However, in practice that is carrying out the activity of unloading and loading goods using the containerization system has not been carried out efficiently so that the results are not optimal at PT Samudera Indonesia. This is proven by the fact that every container terminal carrying out loading and unloading activities of imported or export containers still wastes much time or what is known as idle time (unused time during loading and unloading activities), such for example in container terminals which discard each semester much time (idle time) at the time of loading and unloading activities from 500 hours to 700 hours. This is very beneficial for the container terminal because the longer the docked ship is docked to carry out loading and unloading activities, the greater the benefits gained. However, this is very detrimental to the customer. From the results of the research that has been carried out it can be seen that the average loading and unloading productivity is good, while ET & BT (Effective Time and Berth Time) are still not good, besides that it still needs improvement to reduce Idle Time (M. Rum Rachkan, 2017). So the research needs to be done to Optimize Container Load and Unloading Handling as an Effort to Reduce Idle Time at PT Samudera Indonesia Jakarta.

Scope of this research is the Port and Its Facilities. It is because port is equipped with buildings for cargo and passenger services such as docks, moorings, and all equipment (Bambang Triadmodjo, 2008). To speed up and tether a ship that will load and unload goods in a container, it needs a dock. The dimensions of the pier are based on the type and size of the ship that is docked and moored at the pier. The pier can be divided into two types, namely wharf or quay and jetty or pier or bridge. Wharf is a pier parallel to the beach and usually coincides with the coastline. Jetty is a jetty that juts into the sea. Based on the pier, there is also a good service within the scope of the pier and the harbour itself.

The container terminal at the port is where container ships are anchored, unload inbound containers (including those that are empty or filled with cargo), and loading outbound containers. Inbound and outbound container operations are very different: inbound and outbound containers are estimated in large numbers in the yard, whereas in and out containers are predicted but arrive in random order (Facchini et al., 2020).

Port performance can be used to determine the level of port services to port users, which depends on the service time of the ship while in the port. High port performance shows that the port can provide good services. (Triadmojo, 2010). As is the case in container service (container), which is the core of the shipping service.

The focus of this research is the Use and Functions of the Supervision Loading Process which based on the type of container handling operation, the container terminal can be divided into two main areas, the dock, and the storage area. The dock is where the ship is anchored. Quay cranes (QCs) release inbound (I/B) and transit containers from and load outbound (O/B) and transit containers to ships (Chuqiang Zhang et al. 2003). In the implementation of container loading and unloading, a shipping company must have a structured and good system. So that in the course of the loading and unloading process can later be programmed smoothly and adequately. Starting from the act of supervision or controlling when the initial implementation of the loading and unloading process which includes matters relating to the supervisory function, for example, supervision when the loading and unloading process takes place. This step is the main thing that is necessary because, during loading and unloading, anything can happen, and when something unexpected happens or in planning, the officer can be swift to handle it. In addition, the process of loading and unloading containers on the vessel is dependent on the type of vehicle

used for horizontal transport (Debjit Roy et al., 2020). The standard deviations that occur when the loading and unloading process are idle time symptoms such as equipment damage, waiting for workers or operators, waiting for trucks, or technical obstacles such as time to wait because the warehouse is empty. These things come from humans themselves, not because of natural factors. Even though natural factors can still be understood, the discussion of the researchers here refers to the human resources themselves. So by paying more attention to this form of deviation, one can know more or less about the forms of discrepancies that need to be corrected. Within limits specified, the supervisory or controlling function must conclude immediately. On the other hand (Chuqiang Zhang et al. 2003), to reduce idle time, the solution that must be implemented is: first, determine the container in each storage block in each period. Second, determine the containers associated with the total vessels allocated to each block in each period.

The loading and unloading carried out by related companies require a process or a good and correct flow, because the results of their performance are sometimes still hampered by factors that are caused by errors from the human resources (HR) itself (Arizki Andrianto, 2013). Operation in the field or known as yard operation, becomes the main thing in the implementation of loading and unloading activities. The field also functions as a container stacking to be carried out by the process of Lift on / raise and Liftoff / lower. Including all these activities, the system is well controlled so that that container handling can be maximized (Moh. Khairul Hamzah, 2016). By making the right design, configuring a container terminal for high performance is challenging because of the very large design search space and the complexity of the interactions between the quayside, stack side, and vehicle transport processes

Problems often arise in the process of loading and unloading. One of the steps taken regarding loading and unloading is by paying attention to handling procedures. The loading and unloading activities carried out following procedures or steps by their portions, can achieve the efficiency/effectiveness of time and cost in loading and unloading activities in the container (Darmagi Ebit, 2013).

## 2. Research Method

The method used in this study is a type of qualitative research that describes the management of supervision or control concerning reducing the idle time of the container loading and unloading process to meet the effective time at PT Samudera Indonesia Jakarta.

In the research to be conducted, the subjects and informants have a vital and strategic role because the research subjects are the data about the research variables to be observed. In qualitative research, the term respondent or research subject is called an informant, a person who provides information about the data the researcher wants, relating to the research being carried out that is the subject and information in this case, among others, supervisors, heads division, employee of PT Samudera Indonesia.

### 2.1 Data Collection Technique

The method used for data collection in this study is through in-depth interviews, observation, and documentation studies.

### 2.2 Test Data Validity

A validity test is needed in qualitative research for the sake of authenticity and reliability as well as the level of confidence of data that has been collected. The data validity technique is to use triangulation techniques, and this is one of the validity checks of data that uses something else outside the data for checking purposes or as a

comparison of that data. (Moleong, 2006). Test the validity or validity, and the researcher uses the technique of source triangulation and theory triangulation.

### 2.3 Data Analysis Technique

In the analysis process, three main components must be understood by every qualitative researcher. The three main components are data reduction, data presentation, and drawing conclusions and verification. (H.B Sutopo, 2002). These three components are involved in the analysis and are interrelated and determine the final results of the analysis.

The analysis process is not done once, but interactive, back and forth between the activities of the reduction, presentation, and drawing conclusions or verification during the research time. After verifying, it can be concluded. In this study, the researchers focused the research on the case of the supervisory function when the loading and unloading process activities were carried out as an effort to reduce idle time at PT Samudera Indonesia.

## 3. Result and Discussion

### 3.1 Fact of Research Findings

The interview was conducted by three informants who were considered to be representative of the problem objects in the study. The selection of research samples is based on ownership of information about the organizational management process in terms of controlling or control measures. In contrast, the number of research samples is adjusted to the needs of information data and the objectives of the study. The results of the interview explained various informants' answers about the process of cargodoring so that they could answer the problem statement whether or not it was proven. The answers to the research results are described in more detail and explained in the following research results.

#### 3.1.1. Fact-finding that often occurs when loading and unloading containers

In any job, of course, it is expected that all parties to their work or the company are a success and work effectiveness. Apart from that, there must be obstacles and obstacles that occur during the implementation so that it will cause delays in the completion of the work. The cargodoring handling process often experiences a time lag, resulting in the cost of logistics that swells when the distribution of logistics. The arrival of trucks is the main factor when receiving and delivery because trucks are the primary mode of transportation in moving goods by containers. In addressing these matters, the researcher conducted interviews, conducted observations, and documentation with the research informant, namely Prabowo Budhyu Santoso as director. The informant said:

*"This truck is indeed a significant factor in the cargodoring process, and there are many problems encountered in using the truck, one of which is the delay in arrival, the difficulty of placing containers on the truck, truck traffic that needs to be regulated so it is not jammed and so on. That is an example of the problem faced, and solutions need to be found so that in the future, the container cargodoring process can run effectively and efficiently."*

Based on the results of interviews with the controller staff, Mrs. Mayangsari Dian Irwantari, Informant said that:

*"It needs many trucks to transport containers from the pier to the warehouse and vice versa, and also the ability of trucks to carry containers which I think is less compared to the ability of trains, if I use trains I think it is quite efficient because the trains can carry containers with a number of a lot so that the cargodoring process becomes efficient and fast, right!"*

Based on the informants' answers, the researchers dug more in-depth information on one of the most common obstacles that occurred was the use of trucks in container transportation.

### 3.1.2. Fact-finding of other obstacles that occur

Other obstacles that occur in the cargodoring process are the placement of containers on trucks and also rubber-tired gantry (RTG) as a means of transporting and arranging containers in warehouses. In this case, the researcher immediately asked the source or informant related to these obstacles.

The informant said that:

*"Concerning the placement of containers on trucks, the problem faced is the difficulty of directing the location of containers right above the trucks and the rather slow process of decreasing containers from ships and also the limited number of cranes. For the use of rubber-tired gantry (RTG) as a container transporter, the root of the problem is the congestion from the dock to the stacking yard, and vice versa and also I think the tools we have are still limited, so I think the tools we have are still limited, so I think going forward we need to find a new strategy to optimize this process."*

Based on answers from all the research informants above shows that the use of trucks as a means of transport in the cargodoring process causes many problems that cause delays in the distribution of goods, so the cost of logistics distribution becomes expensive.

From this informant obtained relevant results with previous research as conducted by (Wahyudi, 2011) which the condition of irregular container haulage because truck operators do not know the hours of departure from the depot which can later be at the dock at the specified hour. The length of the truck's journey from the depot to the dock at the hour is affected by the level of road density.

The results of the study refer to the haulage condition caused by the delay of the truck because the truck does not know the departure time from the depot. The broad outline is based on the answers of all the research informants above based on the concept of the port terminal operation regarding the procedures for handling cargodoring, wherein the process of handling cargodoring the right strategy must be applied with the right tools and equipment to accelerate the distribution of goods so that distribution costs must be issued minimized bias.

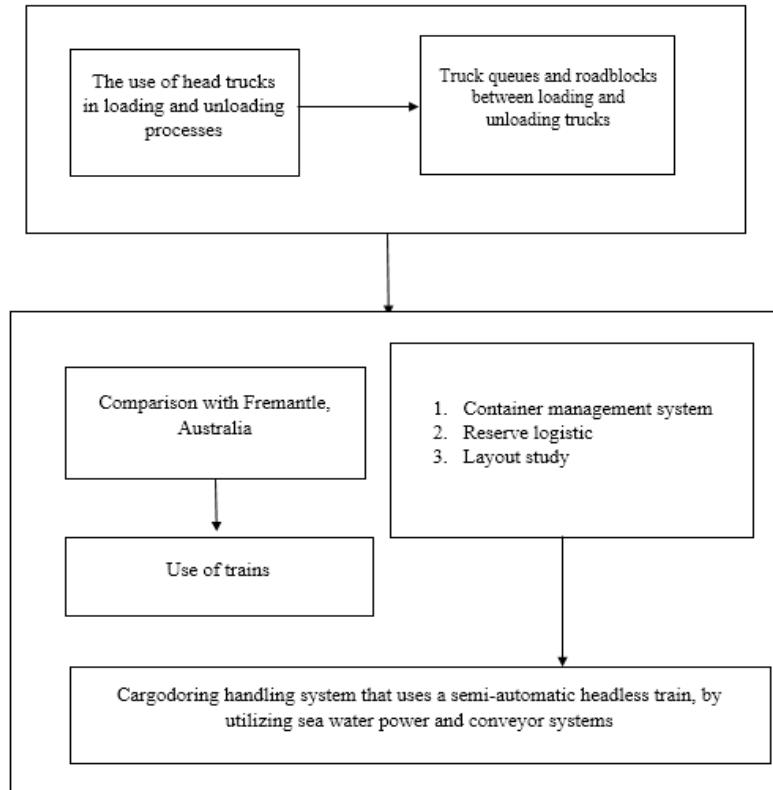
An effective and efficient cargodoring system at a port can be seen from how the system can serve the loading and unloading process smoothly, and precisely so that the time spent on the loading and unloading process can sprint due to the proper and fast loading and unloading process, and the logistics costs will also be lower. The Fremantle container port in Australia is a port that includes an excellent cargodoring system. Cargodoring system there has been well structured so that the percentage of container ships leaning on the dock to wait for the loading and unloading process has decreased, from 2005/2006 to 2009/2010. Based on this information, the Fremantle port in Australia is the right container port to be used so that the learning material is to have an excellent cargodoring handling system.

### 3.2. Interpretation of research results

Cargodoring system in the process of loading and unloading is the system that takes the longest time among the others. Based on the description of the

implementation above, it can be seen that cargodoring activities in Indonesia will be vulnerable to causing waiting times for ships because they use head trucks.

The use of head trucks only transports 1 to 2 standard size containers. While the



**Fig. 1** The proposed framework of improvement

handling system using the train represents about 45,000 movements behind the head truck per year. Also, it was noted by using the train that more than 1 million containers could be distributed, which is equal to more than a quarter-million head truck movements per year (Fremantle Annual Report, 2010). This also contributes to reducing congestion at the dock.

#### 4. Conclusion

The cargodoring process is the most time-consuming process of loading and unloading, thus causing high logistics prices in Indonesia. Problems in the cargodoring system are (1) Difficulty in locating the drop in containers from ships, (2) The slowing down of containers from ships (3) a Limited number of cranes, (4) The occurrence of transportation queues, (5) Limited ability to carry containers for each transport, (6) Many trucks are needed, (7) Clashes occur between trucks that carry out the process of loading and unloading containers, (8) Difficult to direct the location of containers if they must be stacked with containers Others.

Indicators of success to build an effective and efficient cargodoring system are (1) Container management system, (2) Reserve Logistics, (3) Facility lay out.

Proposals that can be recommended by PT Samudera Indonesia Terminal in order to improve the cargodoring system is doing something similar to what is done by the port of Fremantle by using the train, however, as the development idea is to

make a cargodoring handling system using a headless semi-automatic train, which utilizes seawater power and configuration system.

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