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Analysis of Container Crane on Stevedoring at Nilam Multipurpose Terminal

Mudayat, Soedarmanto*, Meyti Hanna Ester Kalangi, Fina Idatul Umah
STIA and Management Kepelabuhan Barunawati Surabaya
Corresponding Author*: Soedarmanto@stiamak.ac.id*, mudayat@stiamak.ac.id, meytihanna@gmail.com

ABSTRACT

Purpose: This study is titled "Analysis of Container Cranes on Stevedoring in Nilam Multipurpose Terminals the Use of Container Crane Against Container Stevedoring in Nilam Multipurpose Terminals". This study aims to determine the effect of using a Container Crane on the productivity of container stevedoring activities at Nilam multipurpose terminals.

Design/methodology/approach: This study uses a descriptive method with a qualitative approach accompanied by other instruments such as secondary data, interviews and documentation which aims to determine the influence of container crane loading and unloading productivity and also supporting factors that can maximize the performance of the container crane at the Nilam Multipurpose Terminal. The data used as analytical material to support the research is performance data from loading and unloading activities at the Nunukan Island KM in 2016 to 2017 in the first semester

Findings: The results showed that the role of container cranes is the most important factor in the implementation of container loading and unloading activities at Nilam multiplepurpose terminals.

Paper type: Research Paper.

Keyword: *Container Crane, Stevedoring, Container*
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I. INTRODUCTION

PT Pelabuhan Indonesia I (Persero), PT Pelabuhan Indonesia II (Persero), PT Pelabuhan Indonesia III (Persero), and PT Pelabuhan Indonesia IV (Persero) are Non-Listed STATE-OWNED companies whose shares are 100% owned by the Ministry of SOEs as Shareholders representing the Republic of Indonesia. On October 1, 2021, legally PT Pelabuhan Indonesia I (Persero), PT Pelabuhan Indonesia III (Persero) and PT Pelabuhan Indonesia IV (Persero) were merged into PT Pelabuhan Indonesia II (Persero) based on Government Regulation No. 101 of 2021. PT Pelabuhan Indonesia II (Persero) acts as a surviving entity. Then based on the Letter of the Minister of State-Owned Enterprises of the Republic of Indonesia No. S-756 / MBU / 10/2021 dated October 1, 2021 regarding Approval of Name Changes, Changes in Articles of Association and Company Logo, PT Pelabuhan Indonesia II (Persero) changed its name to "PT Pelabuhan Indonesia (Persero) or abbreviated as Pelindo".

The journey of the Pelindo Merger has long been planned. Starting in 2009, the preparation of the Port Holding and Dredging Study was carried out. Then followed in 2012 the Pelindo I, II, III, and IV Integration Study has been compiled. Furthermore, in 2013, a study of the Indonesian Port Holding and the establishment of PT Terminal Container Indonesia has also been compiled. In 2016, a National PMO was formed and continued with the preparation of the Pelindo Incorporated study, which at that time intended to unite subsidiaries of PT Pelabuhan Indonesia I, II, III and IV (Persero) which had similar business fields. Furthermore, in 2017 the initiation of the Establishment of Maritime Holding was carried out and in 2018 an Integrated Port Network study was carried out which identified 7 (seven) RJPMN Port Hubs, until in 2019 the initiation of the Formation of Container Sub-holdings was carried out.

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The next development is the formation of a Team for the Acceleration of Increasing Synergy and Integration of State-Owned Enterprises in Port Services by the Ministry of SOEs in December 2019 as stated in the Decree of the Minister of State-Owned Enterprises No. SK-311 / MBU / 12/2019, as part of the government's strategic program to improve trade connectivity that can contribute to lowering national logistics costs. This decision is then continuously updated in the Decree of the Minister of SOEs No. SK-83 / MBU / Wk2 / 11/2020 dated November 13, 2020 and the Decree of the Minister of SOEs No. SK-33 / MBU / Wk2 / 03/2021 dated March 29, 2021. The Ministry of SOEs took the initiative to carry out the process of consolidating SOEs in Port Services so that the arrangement is not based on regions and provides maximum capacity in maritime connectivity and connectivity with related strategic areas throughout Indonesia. Thus, SOEs in port services can become more efficient in operations and investment, create an optimal sea transportation network, and can provide excellent service supported by standard and adequate port infrastructure. This is realized through the preparation of a Study on Synergy and Integration of Port SOEs which produces output in the form of a merger design for the four Pelindo in 2020.

There are four main Pelindo business clusters, namely:

1. Container clusters
2. Non-container clusters
3. Logistics cluster & hinterland development
4. Marine cluster, equipment and port services

This business cluster grouping is carried out in order to make business development in Pelindo more focused, improve the ability and expertise of human resources working in each cluster, so as to be able to work more efficiently and make customer satisfaction increase. If this happens, it will open up a wider market share and increase the company's profits.

Globalization and modernization of various fields make the growth rate of transportation very rapid development which is directly proportional to technological development. In international trade, transportation has a key role as a mode of transportation and can also be the stability of the country. Transportation itself has several modes including, namely land, sea and air. Indonesia, which is an archipelagic country, relies heavily on transportation tools to keep the logistics chain running smoothly (supply chain logistics).

For island countries, sea transportation has more value than other means of transportation because it can transport goods in large quantities and in large quantities as well. The progress and development of an negara can be seen from the activities or activities within the port. The transformation also occurs from general cargo to specially designed containers with a certain size that is weather resistant, can be used repeatedly, can store goods and avoid damage or theft and so on.

By using containers, the distribution of goods is easier and more efficient. In addition, loading and unloading goods with containers is faster because the arrangement on board is easier than general cargo ships, thereby reducing the ship's berthing time at the port (turnround time). However, despite everything many factors affect the productivity of container loading and unloading. In the implementation of container loading and unloading activities, it is realized that the number of tool alleys is very influential in accelerating activities, if you use only one tool alley, the speed will be slower than using two aisles tool. In relation to the tool aisles, it will adjust to the amount of cargo large or small in container loading and unloading activities, but can also be used two tool aisles at a small amount of cargo to increase the speed of loading and unloading containers. Continuing on the role of the land fleet (trailer) in supporting the transportation of containers from the dock to the stacking field or from the stacking field to the pier, the main point is the availability of an adequate number of land fleets (trailers).

PT. Pelindo container terminal headquartered in Surabaya is a State-Owned Enterprise (BUMN) that has the task and responsibility to manage public ports in seven Indonesian provinces, namely East Java, Central Java, Bali, West Nusa Tenggara, East Nusa Tenggara, South Kalimantan and Central Kalimantan. Tanjung Perak Surabaya Branch which has several terminals including Jamrud Terminal, Nilam and Mirah Terminal, and Kalimas Terminal.

Tanjung Perak Surabaya branch port has two Terminal Divisions that carry out complete loading and unloading activities for a variety of commodities such as liquid bulk, dry bulk, general cargo (GC) and containers. As for the Nilam Terminal and Mirah Terminal which have now changed their names to Nilam and Mirah Terminals, these terminals handle a variety of loading and unloading activities, both operated by the Pelindo Loading and Unloading Company (PBM) and also carried out by Non Pelindo Loading and Unloading Company (PBM) with types of liquid bulk commodities, dry bulk, general cargo and containers. However, for the handling of container activities, it has been focused on being carried out by the Pelindo Loading and Unloading Company (PBM), at the Multipurpose Nilam Terminal which carries out Loading and Unloading activities focusing on containers and with Container Crane tools. Therefore, the author is very interested in raising the title "Analysis of Container Cranes on Stevedoring at Nilam Multipurpose Terminals"

ISSN : 2597-4785 (ONLINE)
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The rapid growth or development of ports, especially container ports built by PT Pelabuhan Indonesia (Persero) in Tanjung Perak Branch, namely the Nilam Multipurpose Terminal where this port is loading and unloading activities using container cranes, then with regard to that, the formulation of the problem taken by researchers is as follows: How to analyze the effect of using Container C rane Loading and Unloading Containers at Nilam Multipurpose Terminal.

II. METHODS

The type of research that the author uses is qualitative research. Qualitative research is a type of research that produces discoveries that cannot be achieved using statistical procedures or by other means of quantification. Straus and Corbin (2008) detail that qualitative research can be used to examine people's lives, history, behavior, organizational functionalization, social movements, or kinship relationships Murdiyanto, E. (2020). Qualitative Research (Theory and Application accompanied by sample proposals).

"Research Object is a generalization area consisting of objects/subjects that have certain qualities and characteristics that are determined by the researcher to be studied and then drawn conclusions" (Sugiyono, 2011: 90). In this study, the population was the entire loading and unloading activities of containers at PT. Nilam Multipurpose Terminal.

To obtain the necessary data in this study, the techniques that the researcher will use are as follows:
1. Indepth Interview
2. Observation

The data analysis technique used in this study refers to the concept of Milles & Huberman (1992: 20), which is an *Interactive model* that classifies data analysis in three steps, namely: Siswandi, E., Sujadi, I., & Riyadi, R. (2016). *Journal of Mathematics Learning*, *4*(7).
1. Data Reduction
2. Presentation of data (Display Data)
3. Conclusion drawing (Verification)

A. Literature Review

According to the Regulation of the Minister of Transportation of the Republic of Indonesia Number Pm 57 of 2020 concerning the Second Amendment to the Regulation of the Minister of Transportation Number Pm 51 of 2015 concerning the Implementation of Sea Ports. Port are places consisting of land and / or waters with certain boundaries as places of government activities and business activities that are used as a place for ships to lean, up and down passengers, and/or loading and unloading of goods, in the form of terminals and ship berths equipped with shipping safety and security facilities and port supporting activities as well as a place for intra- and intermodal transportation movement.

1. Loading and Unloading Company (PBM)

In line with the increasing economic development today in Indonesia, especially regarding international trade activities, resulting in an increasing frequency of flow of goods and services through ports in Indonesia. For this reason, the development of transportation service companies, such as EMKL and loading and unloading companies (PBM) is also increasingly emerging.

According to the Regulation of the Minister of Transportation of the Republic of Indonesia Number Pm 59 of 2021 concerning the Implementation of Service Business Related to Transportation in the Waters of the Goods Loading and Unloading Business is a business activity engaged in loading and unloading goods from and to ships at ports which includes stevedoring, cargodoring, and receiving / delivery activities. Stevedoring is the work of unloading goods from the Ship to the dock / barge / truck into the Ship until it is arranged in the hatch using the Ship's crane, land crane, or ship's ramp door.

2. Performance of Goods Service

An illustration of the ability and speed of implementation of goods handling that can be achieved for unloading activities from the ship to the warehouse or stacking field or vice versa for loading activities from the warehouse / stacking field to the ship.

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

3. Definition of Loading and Unloading

a. According to the Port Reference series 06 edition II.

In Indonesia, the work of loading and unloading from and to the ship is carried out by an Indonesian legal entity loading and unloading company that is specifically established to organize and strive for loading and unloading activities of goods from and to the ship.

4. Definition of Loading and Unloading Performance of Goods

The performance of loading and unloading goods is the result of port operational services, which in this case is the loading and unloading of goods. Achievement of operational performance of each indicator based on Article 5 paragraph (2) of the Decree of the Director General of Sea Transportation Number: UM.002/ 38/ 18/ DJPL-II concerning Port Operational Service Performance Standards.

5. Loading and Unloading Activities

Stevedoring is the work of unloading goods from the ship to the dock / barge / truck or loading goods from the dock / barge / truck into the ship until it is arranged in the ship's hatch using a ship crane other crane. Khaldun, A. I., Suryailahi, V. I., & Muajir, M. (2018). According to B.S. Herman in the book Port Management & Export & Import Realization, loading and unloading activities are activities to unload goods from the ship using cranes and ship slings to the nearest land on the edge of the ship, which is commonly called a pier, then from the pier using a lorry, forklift, or stroller, inserted and arranged into the nearest warehouse designated by the port Harbormaster. While the load activity is the opposite activity. There are 4 kinds of loading and unloading operations from / to the ship, namely: 1. Stevedoring activities The process of unloading cargo from the ship's deck to the edge of the port using heavy loading and unloading equipment. 2. Cargodoring Activities The process under which the goods are shiploads that are on the edge of the port (cade) to the port storage warehouse to be stored/stockpiled 3. Deliverydoring Activities The process of sending goods - shiploads that suda are in the port storage warehouse to exit the port environment for storage. 4. Receivedoring activities the process of re-transporting goods in the factory or company or industry to be sent back to the port storage warehouse. Basuki, M., Susanto, R. B., & Herianto, H. P. (2015, August).

6. Definition of Golden Crate

A container is a specially designed package with a certain size, can be used repeatedly, used to store and at the same time transport the cargo inside.

7. Container Ships

A container ship (English: containership or *celullarship*) is a ship specifically used to transport standard containers. It has cavities (*cells*) for storing standard size containers. Containers are lifted onto the ship at the container terminal using special faucets / cranes that can be done quickly, both cranes on the dock, and cranes on the ship itself.

8. Container Terminal

Temporary stockpiling of *export* and *import* containers, equipped with container handling equipment according to international services, there is an adequate stacking field and supported by reliable human resources and equipped with information technology in the management of container services.

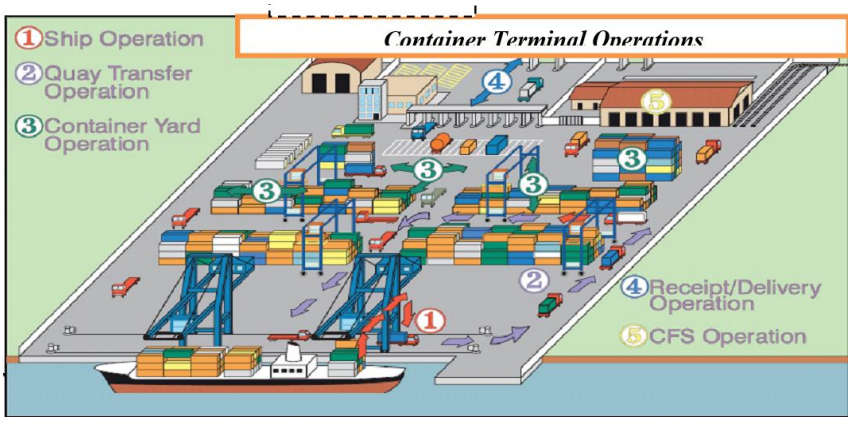

Figure 1. Container Terminal Operations

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

Source: Nilam Multipurpose Terminal Division Tanjung Perak Surabaya Branch

9. Container Terminal Equipment

For the smooth operation of container services, it must be equipped with handling equipment that is of international standard, including:

c. Container Crane
d. Harbor Mobile Crane
e. Rubber Tyred Gantry
f. Top Loader
g. Reach Stacker
h. Side Loader
i. Head truck
j. Chassis
k. Forklift

10. Understanding Container Crane

Container Crane, often also called *Quayside* Crane or *Gantry Crane* is a loading and unloading equipment that serves to unload or load containers from ship to dock / mainland.

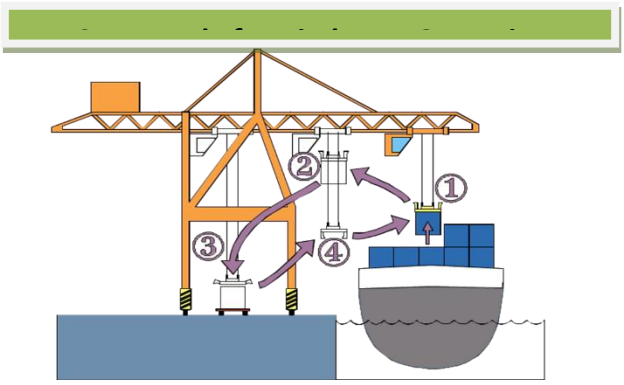

Figure 2.

Source: Nilam Multipurpose Terminal Division Tanjung Perak Surabaya Branch

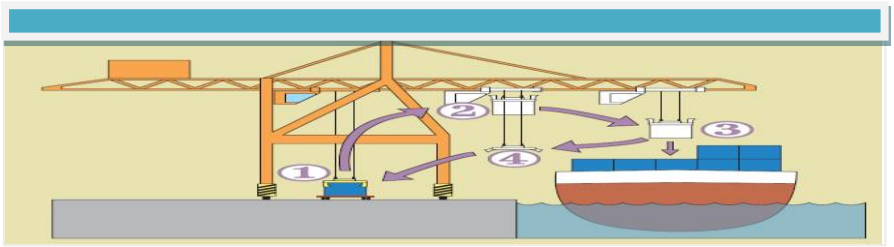

Figure 3.

Source: Nilam Multipurpose Terminal Division Tanjung Perak Surabaya Branch

Frame of Mind

Nilam Multipurpose Terminal is a terminal built by PT Pelabuhan Indonesia (Persero) where loading and unloading activities are specialized in handling container handling activities. At the Nilam Multipurpose Terminal itself, facilities for loading and unloading activities use *Container Cranes*. The performance of the tool is only able to bongkat or load containers parallel or straight with the tool. The one who operates the *container crane* is an operator from PT Pelabuhan Indonesia (Persero) which is assigned to the Terminal Multipurpose Nilam division. The author will try to decipher and analyze the productivity of the two tools. The framework that the author uses here is the Graphic Model, namely:

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

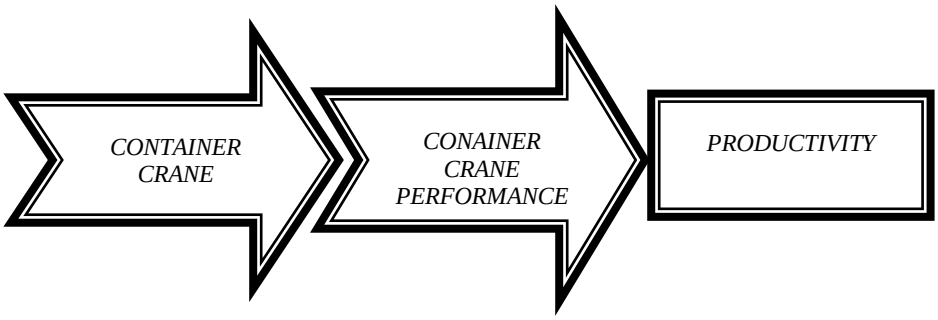

Figure 4. Framework

III. RESULTS AND DISCUSSION

A. Data Analysis

Container loading and unloading activities using more than one number of tools greatly affect the productivity of the container B / M which is often carried out at the Nilam Multipurpose Terminal itself container activities have used container cranes more than one unit, namely two units of *Container Crane* can also be called two tool alleys. Continuing on the supporting factor that operates during container loading and unloading activities is the readiness of the land fleet as a mode of land transportation to carry out transfer movements from the ship to the CY (*Container Yard*) stacking area or vice versa.

This research in principle wants to know the synergy between the factors of the number of *container cranes* that work and also the number of land fleets operating at the Nilam Terminal. The terminal has a productivity target to be achieved, the Nilam Multipurpose Terminal has a minimum target of 23,964 boxes per month in January 2017 to 29,714 boxes per month in December 2017. One of the factors that determine the achievement of productivity to be achieved is the flow of ship visits. The following is an analysis of the flow of ship visits at the Nilam Multipurpose Terminal.

1. Analysis of Ship Visits at Nilam Multipurpose Terminals in 2016

From the data, it can be concluded that the flow of ship visits at the terminal in the same year, namely 2016. Data on the flow of visits at the Nilam Multipurpose Terminal during 2016 was 641 ships and the highest monthly flow of ship visits was in August recorded at 57 ships and the lowest was that in July there were 37 ships docked at the Nilam multipurpose terminal for container loading and unloading activities experienced an increase and decrease.

2. Analysis of Ship Visits at Nilam Multipurpose Terminals in 2017

In 2017 there was a list of minimum standards for achieving productivity from the Nilam Multipurpose Terminal which became the basis for the reference performance that must be achieved, continuing the analysis of the flow of ship visits at the Nilam Multipurpose Terminal undergoing changes. The table above describes the data on the flow of ship visits in 2017, previously in table 2 it was explained that the flow of ship visits in 2016 Nilam Multipurpose Terminal the highest flow of ship visits was in August as many as **641** ships in a matter of one year and **312** in the first half count. In 2017 within a period of one semester, from January to June, the highest flow of ship visits at the Nilam Multipurpose Terminal for container B/M activities was in March, the highest flow of ships was recorded at **53** ships while the lowest was in June recorded at only **39** berthing ships. However, to calculate the data on the difference in ship visits, we can calculate from 2016 in the first semester and in 2017 in the first semester, namely with a total of **312** ships in 2016 and **288** ships in 2017. The comparison of ship visits flows in 2016 and 2017 in the first half of the Nilam Multipurpose Terminal decreased from 312 down to **288**, thus there is a decrease of as much **24** ships or in a percent count of ***(7.69%)***

3. Analysis of the Effect of Container Crane Use on Loading and Unloading Containers on similar ships owned by PT Salam Pacific Indonesia Lines

In this analysis, the researcher will examine one of the ships owned by the shipping company PT Salam Pacific Indonesia Lines. At the Nilam Multipurpose Terminal, B / M activities will certainly use *a Container Crane*. Therefore, researchers will analyze the **Nunukan Island KM** Ship in one B / M activity using a different number of tool aisles, namely, the influence of container *crane* and land fleet tool gangs to find out which variable is more dominant which affects productivity.

ISSN : 2597-4785 (ONLINE)
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B. Results of Interviews with Interviewees

In 2016 Nilam Terminal had a total of 3 units of Container Cranes, namely (CC01, CC02 and CC03), again added at the end of 2016 to be precise in September with 2 units of Container *Cranes* with electric power, namely CC04 and CC05, but again experienced a reduction with the allocation of *Container Crane* equipment to the Kupang branch port, namely CC02.

In handling **KM Nunukan Island**, it is normal as usual, namely with the construction of ships that have pontoons / hatch lids which will always take time in handling in addition to opening the pontoon lid / hatch lid must use a tool, namely *a sling.* The handling of ships with a length of 112 m is often carried out using 2 aisles of the Container Crane tool considering the large number of cargoes and also the criteria of the length of the ship that meets the requirements to be carried out using 2 aisles of the *Container Crane* tool. Continuing on the role of the *Container Crane* Operator skill which must always understand from all ship construction that will be carried out loading or unloading activities.

It is very necessary to play the role of the land fleet (trailer / trucking) as a means of moving *container cranes* from the stacking area (*Container Yard*) to the dock area or vice versa.

The toughest obstacle is when during the activity there is damage to the tool so that it will take time for repairs to be able to operate the *Container Crane* tool again for the loading process by referring to the appropriate work procedures.

The data explained the performance for the KM Pulau Nunukan ship in the first half of 2017 at the Nilam Multipurpose Terminal, the condition of the ship is the main determinant of the high B / C / H in the loading and unloading activities of this ship. This ship has a length of 112 meters, this type of ship is a towed ship so that the unloading and loading process must adjust the position of the container to be loaded or loaded, there are not too many significant obstacles related to the way the unloading and loading process, spreaders on the container *crane* can also directly take *the container* which has been arranged on the ship easily but must pay attention to the position of the ship crane installed on the ship, as for another obstacle that is often experienced by *container crane* operators is because the ship has a pontoon / hatch lid that needs time to open / close so that there is a planned non-working time but will still take time and reduce the effectiveness of working time, Unlike the case with ships with a semi-barge type that does not have a pontoon / hatch cap on the ship. For example, in January, the ship docked on January 29 at 9:27 a.m., then started work at 12:30 p.m. One hour earlier was used for unloading preparations for example loose *lashing* and waiting for *CC down bombs* to be continued with rest hours for loading and unloading labor workers (TKBM). Furthermore, the activity started on the 29th at 12:30 until it ended on the 30th at 01:15 with a total unloading of 330 boxes, hourly production or B / C / H obtained was 18.00 *boxes*. Thus, if the ship with a total unloading of 330 *boxes* with B / C / H 18.00 will be completed in approximately 6 hours and 45 minutes.

IV. CONCLUSION

A. Conclusion

Based on the results of observations and discussions carried out at PT Pelabuhan Indonesia (Persero) Terminal Multipurpose Nilam Tanjung Perak Branch Surabaya, conclusions can be drawn about the role of using Container Cranes on the productivity of container loading and unloading at PT Pelabuhan Indonesia (Persero) Terminal Multipurpose Nilam Tanjung Perak Branch Surabaya, namely:

1. The use of Container Crane is the main advantage of the Nilam Multipurpose Terminal to carry out container loading and unloading activities, with good performance on the tool as seen in the existing activities so far.
2. The role of the use of the Container Crane tool is indeed the main aspect in loading and unloading processes at the Nilam Multipurpose Terminal, but of course there is always a supporting factor that becomes a driver in the process of these activities, namely the land fleet (trailer / trucking) which carries out transfer activities either from the outside into the terminal area called Delivery or from the inside out called Receiving, if specifically can be called cargo dooring / haulage, namely the movement from the container unloading area to the stacking field or called the Container Yard or vice versa from the Container Yard to the container loading area.
3. Next is also the role of the operator of the Container Crane who acts as a controller, of course, balanced and high skills are needed to carry out their duties as an operator to pursue the production targets to be achieved by the Nilam Multipurpose Terminal every month.
4. In handling loading and unloading activities at KM Nunukan on (29/01/12:30 to 30/01/01:15) has reached the target, 22.88 boxes with a minimum standard achievement of 18.00 boxes per shift.
5. Loading and unloading activities will be faster if done using 2 tools at the same time or 2 tool aisles.

ISSN : 2597-4785 (ONLINE)
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B. Suggestion

Based on the conclusion n, the results of secondary data and the results of interviews that have been conducted by the author, the suggestions given by the author are as follows:

1. The need for periodic maintenance of container crane loading and unloading equipment so that it is able to maintain the productivity that has been achieved by the Nilam Multipurpose Terminal, as well as handlers actively and quickly in making repairs in the event of damage.
2. Carry out careful planning when going to carry out the process of loading and unloading activities according to the results of the determination and during the ship meeting process at the Nilam Multipurpose Terminal. This is related to the readiness (trailer/trucking) to support the activities of the Container Crane
3. Maintain and improve the skills of the Container Crane operator because the main role to operate affects the speed or not of loading and unloading activities takes place. As well as all Container Crane operators must be able to understand from the loyal criteria of ship construction which is a technical reference in the implementation of container loading and unloading at the Nilam Multipurpose Terminal.

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