The Influence of Crane Productivity and Pilotage Service toward vessel waiting time at Terminal Petikemas Semarang Branch Pelabuhan Indonesia III

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ABSTRACT
The study examined the influence of crane productivity and pilotage service toward vessel waiting time. Multiple Linear Regression Analysis method was used to observe the influence. Secondary data were collected from Semarang Container Terminal and PT. Pelabuhan Indonesia III. The result of F-test showed that simultaneously independent variables influenced dependent variable. Meanwhile, T-test result showed only one independent variable influenced dependent variable; it was pilotage service with t count 2.859 with the significant value 0.008. Based on coefficient of determination test, the variables of crane productivity and pilotage service influence vessel waiting time by 27.6% and the other 72.4% influenced by the other variables. Regression model showed positive equation of pilotage service, it means if there is an increase in pilotage service, vessel waiting time will also increase. Suggestions that can be taken are to increase the number of pilot boats, upgrade port facilities, upgrade vasa and inaportnet application periodically. Further study is needed to investigate the other factors that influence vessel waiting time.

Keyword: Crane Productivity, Pilotage Service, Vessel Waiting Time

Pengaruh produktivitas crane dan pelayanan pemandu terhadap waktu tunggu kapal di Terminal Petikemas Pelabuhan Indonesia III Cabang Semarang

Abstrak
Penelitian ini mengkaji pengaruh produktivitas crane dan pelayanan pemanduan terhadap waktu tunggu kapal. Metode Analisis Regresi Linier Berganda digunakan untuk mengamati pengaruhnya. Data sekunder dikumpulkan dari Terminal Peti Kemas Semarang dan PT. Pelabuhan Indonesia III. Hasil uji F menunjukkan bahwa secara simultan variabel independen mempengaruhi variabel dependen. Sedangkan hasil uji-t menunjukkan hanya satu variabel bebas yang mempengaruhi variabel terikat; yaitu jasa pemanduan dengan t hitung 2,859 dengan nilai signifikansi 0,008. Berdasarkan uji koefisien determinasi, variabel produktivitas crane dan pelayanan pandu mempengaruhi waktu tunggu kapal sebesar 27,6% dan sisanya 72,4% dipengaruhi oleh variabel lain. Model regresi menunjukkan persamaan positif pelayanan pandu, artinya jika terjadi peningkatan pelayanan pandu maka waktu tunggu kapal juga akan meningkat. Saran yang dapat diambil adalah memperbanyak jumlah kapal perintis, mengupgrade fasilitas pelabuhan, mengupgrade aplikasi vasa dan inaportnet secara berkala. Studi lebih lanjut diperlukan untuk menyelidiki faktor-faktor lain yang mempengaruhi waktu tunggu kapal.

***Kata Kunci** : Produktivitas Crane, Pelayanan Pemandu, Waktu Tunggu Kapal*

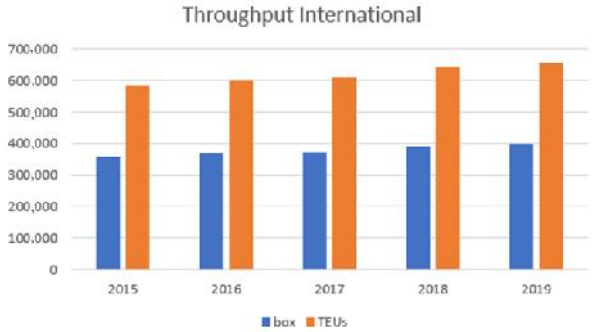
INTRODUCTION

Globalization in economy is developing very rapidly, according to the United Nations (2000), this is caused by the rapid pace of science and technology, with this capability of communication and transportation becoming affordable. Economic globalization is more centred on the globalization of production, which refers to the process of receiving goods or services from different locations around the world. With the rapid advancement of the field of transportation, the export and import of goods have become more accessible.

One of the essential factors in export and import activities is the port. According to Lasse, D. A. (2012) port is a gateway to enter a specific area and as a means of connecting infrastructure between regions, between islands, and even between countries.

PT Pelabuhan Indonesia (PELINDO), the company that provides container loading and unloading services, strives to continue improving quality at each port in the area of 3. Container Terminal Semarang is a separate branch from the Port of Tanjung Emas. Semarang Container Terminal focuses on providing loading and unloading services. With the growth of the global economy, each year the demands of exports and imports goods through Semarang Container Terminal increase.

Figure 1. Throughput International



Source: Terminal Petikemas Semarang

To anticipate the surge in demand for shipping goods through the Port of Tanjung Emas in Semarang, the facilities and infrastructure at the Port have to be observed because this will directly affect the performance of the Port. If the condition of facilities and infrastructure is persistent and not accompanied by optimization of port performance, it will cause a long ship-queue to dock at the Port of Tanjung Emas. If a port performance is less than optimal it causes longer vessel waiting times, if there is a decline in port performance, it will have a negative impact to other aspects, such as the increase in costs incurred in a series of loading and unloading processes.

Table 1. Semarang Container Terminal Performance (2019)

Description	Unit	RKAP 2019	Realization	
			2019	2018
Waiting Time	Hours	0.52	0.26	0.22

Source: Terminal Petikemas Semarang Annual Report (2019)

The table shows that the Realization of Waiting Time (WT) in 2019 was 0.26 hours compared to the budget of 0.52 hours or realized 49% faster than the budget, this was caused by the readiness of TPKS mooring, scout officers and scouting and delaying facilities (SBPP) when compared with the realization of 2018 of 0.22 Hours or realized 21% longer.

Although waiting time in 2019 has met the budget target, its value is still volatile compared to previous years', other than that based on the key performance indicator (KPI) determined by PT Pelabuhan Indonesia III. The targeted waiting time is 0.22 hours. Then it can be said that the waiting time of the container terminal in Semarang still has not met the target set by PT Pelabuhan Indonesia III. Factors that may affect the ship's waiting time are pilotage services and crane productivity

Pilotage service affects the waiting time of the ship because it is one of the port services that first enters the port area is scouting. If scouting/guide services run smoothly and quickly, it can reduce the waiting time of the ship at the port.

Unloading productivity is very influential in the ship's waiting time. If the loading and unloading productivity is fast, then the ship's waiting time will be reduced because the ship that is docked can be immediately replaced by the next ship.

This research is aimed to observe the influence of crane productivity and pilotage service toward vessel waiting time at Terminal Petikemas Semarang branch Pelabuhan Indonesia III.

Literature Review

Loading or Unloading is the activity of unloading or loading goods from the dock to the ship or vice versa. In port activities, this loading and unloading activity is also known as a stevedoring activity.

The container loading and unloading processes have an indicator that functions to measure productivity and be an indicator of container service quality. In general, the quality of container service is measured by the length of time of the loading and unloading process carried out; the faster process, the shipping party will be more satisfied.

According to Supriyono (2013) the indicators used in measuring terminal productivity in the process of loading and unloading are:

a. Crane productivity, crane productivity is commonly called Box Crane per Hour (B/C/H). For the understanding of crane productivity itself is the number of container boxes that can be carried out by one crane within one hour, the use of this indicator usually addresses more the internal use of the container terminal.
b. Box/Ship/Hours (BSH) is the number of container boxes that can be unloaded or loaded by the terminal against a ship within one hour. This indicator is more aimed at the interests of the shipping party, because the higher the BSH, is the shorter service time and will affect the cost of ship berth reduced.

Each indicator of loading and unloading performance is calculated using the formula that has been set by the Directorate General of Sea Transportation with regulation number: HK.103/2/2/DJPL-17, it is a guideline for calculating the performance of port operational services.

Box/Crane/Hour (B/C/H) is the number of containers unloaded/loaded in 1 working hour per crane (Container Crane, Ship Crane, Shore Crane)

$$BCH = \frac{Total\ Container}{Total\ Evective\ Time\ x\ Total\ Crane}$$

Pilotage Services according to Minister of Transportation on PM 57 of 2015 are scouting activities in assisting, providing advice and information to the captain about the state of local waters so that navigation can be carried out safely and orderly and

smoothly for the safety of the ship and the port environment.

According to Perdana (2017) the number of Pilotage ships and Tugboats, the number of workers, and the distance between the lego anchor to the pier are the several factors that influence the Pilotage Service.

Waiting Time (WT) is a waiting time incurred by the vessel to undergo a process of activities in the Port water area, intending to get service in the port dock or pier, to be able to perform the loading and unloading of goods in a harbor.

Based on the sea transportation general regulation number: HK.103 / 2/2 / DJPL-17 in article 2 it was decided that the guidelines for calculating the performance of port operational services apply as an evaluation material to monitor the effectiveness of port services. The following is formula to measure the waiting time

Waiting Time (WT) = Service Time *(Pilot on Board/POB)* – Determination Time of Entry Service

Theoretical Framework and Hypothesis

The Theoretical Framework of this study is as follow:

Figure 2. Theoretical framework

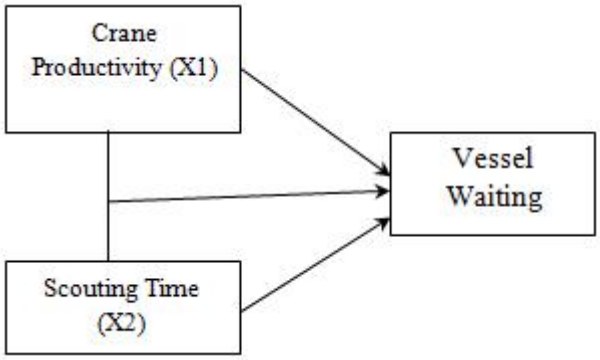


Figure 2. outlines the research framework in which there are series of hypothesis suggested as follows:

Ha1 : There is significant influence between Crane Productivity with Vessel waiting time

Ha2 : There is significant influence between Pilotage Service with Vessel Waiting Time

Ha3 : There is significant influence between Crane Productivity and Pilotage Service with Vessel Waiting Time

METHOD

This study is an explanatory research which aims to explain the position of the variables studied and the effect of one variable with another variable. This research is also associative research because it aims to determine the relationship of two or more variables.

This study is trying to explain the effects Container crane productivity and Pilotage Service toward vessel waiting time in Semarang Container Terminal.

Population and Sample

Population in this research is the data of container crane productivity, Pilotage Service, and vessel waiting time produced by PT. Pelabuhan Indonesia III (Persero) Semarang Container Terminal (Terminal Petikemas Semarang).

The samples in this research are container crane productivity data, service scouting, and vessel waiting time produced by

PT. Pelabuhan Indonesia III (Persero) Semarang Container Terminal from January 2018 - June 2020, in the period of 30 months (data).

Data Collecting Method

This research used secondary data obtained from studying document taken from The Operational Division of PT Pelabuhan Indonesia III.

Data Analysis Technique

This research is using descriptive analysis and regression analysis which consist of classical assumption test and multiple linier regression test. The tests were carried out using SPSS 25.0.

a. Descriptive Statistics
   Descriptive statistics function provides a description of the data seen from the mean, standard deviation, variance, minimum, sum, range of each variable. (Ghozali, 2018)
b. Multiple Linear Regression
   Multiple linear regression is used to determine the functional relation or causal relation between two or more variables to an independent variable.
c. Goodness of Fit Model
   It is to find out how well the model fits the observations made. The goodness of fit can be used in determining the validity of the statistical hypothesis testing results.

Coefficient determination (Adjusted R^2)

This test aims to determine the proportion or percentage of the total variation in the dependent variable explained by the independent variable.

a. Simultaneous test (F-test)
   The F test is used to determine the effect of the independent variables together on the dependent variable
b. Partial test (T-test)
   T-test will show how much partial influence of Container crane productivity and service Pilotage Service vessel waiting time.

Classic Assumptions test

a. Normality Test
   This test aims to test whether, in a regression model, an independent variable and a dependent variable or both have normal or abnormal distribution.
b. Heteroscedasticity Test
   This test finds whether this research has the same residual variance from one observation to another.
c. Multicollinearity Test
   The multicollinearity test shows whether there is a high correlation between independent variables in a multiple linear regression model.
d. Autocorrelation Test
   To test whether this research residual relate to previous observation, A right regression equation does not have an autocorrelation problem
e. Linearity Test
   Linearity tests are used to determine whether two or more variables have a significant linear relationship or not. (Ghozali, 2016)

FINDINGS AND DISCUSSION

Descriptive Statistics

Table 2. Descriptive Statistics Output

	N	Min.	Max	Mean
Crane Productivity	30	22	30	26,30
Pilotage Service	30	,77	1,94	1,2580
Waiting Time	30	,14	,86	,3733
Valid N (listwise)	30			

Source: Processed primary data, 2020

Table 2 shows that the number of data used in this study (N) is 30 (thirty). The numbers of data are collected from January 2018 to June 2020. The minimum data value in Crane Productivity is 22, the maximum is 30, the means is 26.30. In Pilotage Service, the minimum is 0.77, the maximum is 1.94, the means is 0.86. In Waiting Time, the minimum is 0.14, the maximum is 0.86, the means is 0.3733.

Classic Assumptions Test

Table 3. Classic Assumptions Output

Classic Assumptions	Output	Decision
Multicollinearity	VIF>10	No Multicollinearity
Autocorrelation	dU<1.753>4-dU	No Autocorrelation
Heteroscedasticity	Data spread around at scatterplot graphic	No Heteroscedasticity
Normality	P-Plot data spread close to diagonal line	Data have Normal distribution
Linearity	Deviation from linearity (0.506)> 0.05	Data have linear correlation

Source: Processed primary data, 2020

Based on Table 3 it is found that all variables qualify the requirement of the classic assumption test, namely the normality test, the multicollinearity test, autocorrelation test, heteroscedasticity test, and linearity test.

Goodness of Fit Model
F-Test

Table 4. Simulant Significant Test

Model	F	Sig.
Regression	6.152	0.007

Source: Processed primary data, 2020

Based on Table 4, the F count value is 6.157 greater than F table value 4.2909 and the Significance is 0.007 less than 0.025. Thus, H03 is rejected and Ha3 is accepted. This means that Crane Productivity (X1) and Pilotage Service (X2) simultaneously have a significant effect on Vessel Waiting Time (Y).

T-Test

Table 5. Partial Significant Test

Model	t	Sig.
Crane Productivity	-0.454	0.654
Pilotage Service	2.859	0.008

Source: Processed primary data, 2020

The hypotheses tested are as follows:

1. The significant value of crane productivity was 0,654, which is higher than 0.025 and the t count is -0.454 less than 2.05954. As a result, H01 is accepted, and Ha1 is rejected. It means that partially there is no significant influence between Crane Productivity (X1) and Waiting Time (Y).
2. The significant value of Pilotage Service is 0,008, which is less than 0.025 and the t count is 2.859 higher than 2.05954. As the result, H02 is rejected and Ha2 is accepted. it means that partially there is significant influence of Pilotage Service (X2) on Waiting Time (Y).

Coefficient of Determination

Table 5. Coefficient of Determination Output

Model	Adjusted R Square
1.	0.276

Source: Processed primary data, 2020

Based on Table 5 the value of Adjusted R Square is 0.276, which means that the independent variables (crane productivity, Pilotage Service) contribute 27.6% to the dependent variable (vessel waiting time). Furthermore, the other 72.4% is influenced by the other variables not included in this regression model.

Multiple Linear Regression

Table 6. Multiple Linear Regression Output

Model	Standardized Coefficients
Crane Productivity	-0.101
Pilotage Service	0.638

Source: Processed primary data, 2020

Based on table 6, the regression model of this research is:

$$Y = -0.101\ X1 + 0.638\ X2$$

Where:
Y = Waiting Time (Hours)
X1 = Crane Productivity (Box)
X2 = Scouting Time (Hours)

This study found there is only one independent variable affects the dependent variable, so that only Pilotage Service (X2) is explained from the regression model above. Table 6 shows that if there is an increase in Pilotage Service time by 1 (one) hours, it will add a Vessel Waiting Time for 0.638 hours with significant value 0.008 which is less than 0.025. It can be concluded that the Scouting Time variable has a significant influence on Vessel Waiting Time.

Discussion

a. F-test result shows that the significance value is 0.007 lower than 0.025 and the F-count is 6.152 greater than F-table 4.2909, so it can be concluded that the independent variables (Crane Productivity and Pilotage Service) simultaneously influenced the dependent variable (Vessel Waiting Time). In other words, the better crane

productivity and pilotage service, the vessel waiting time will also be faster.

b. The t-test result shows that not all independent variables partially affect the dependent variable. The independent variable that has a partial effect is Scouting Time. In contrast, the Crane Productivity does not partially affect vessel waiting time. In other words, if the pilotage service is getting faster, the vessel waiting time will also be faster, and vice versa. Meanwhile, crane productivity partially did not affect vessel waiting time so that the presence or absence of an increase in crane productivity did not affect vessel waiting time.
c. The standardized coefficients result showed that the variable Pilotage Service has a regression coefficient value of 0.638 so that if there is an increase in the Pilotage Service time for 1 hour, the vessel waiting time will increase by 0.638 hours.
d. Adjust R Square is 0.276, so the ability of the independent variables to explain the dependent variable, namely Vessel Waiting Time of 27.6%, so there are still 72.4% explained by other variables.

Research Implication

The research results show that partially only variable scouting time affects vessel waiting time. This result is related to previous research results where in Perdana (2017), Pilotage Service has a positive effect on vessel waiting time at Tanjung Perak port, and Basuki Soleh (2004) stated that Pilotage Service has a significant effect on waiting time at Belawan port. So that if the Pilotage Service time gets faster and the vessel waiting time will also decrease and vice versa.

To shorten vessel waiting time, company and related institutions can periodically evaluate the Pilotage Service and also factors that influence Pilotage Service which is the workers, number of guide ship and tug boats, and the distance between lego anchor to pier so that it can be monitored for any problems that can hinder service scouting and what things can improve the performance of the Pilotage Service.

On the Crane Productivity variable, there is no significant effect on vessel waiting time. Even so, the company still has to increase crane productivity and loading-unloading productivity because it has an essential effect on port performance. There are differences in this study's variables from previous studies variables, which can lead to different results. Therefore, it is necessary to conduct further research so that the company can continue to obtain relevant information to improve company performance.

CONCLUSION AND RECCOM-ENDATION

Conclusion

a. All classical assumption tests have fulfilled; it can be concluded that the regression model used can explain precisely the effect of the independent variable on the dependent variable.
b. Variable Pilotage Service has a significant and positive effect toward Vessel Waiting Time in Semarang Container Terminal branch PT. Pelabuhan Indonesia III (Persero).
c. Variable Crane Productivity has no significant effect toward Vessel Waiting Time in Semarang Container Terminal branch PT. Pelabuhan Indonesia III (Persero).
d. Simultaneously variable Crane Productivity and Pilotage Service influence Vessel Waiting Time in Semarang Container Terminal branch PT. Pelabuhan Indonesia III (Persero).
e. The result of Adjust R Square shows that Crane Productivity and Pilotage Service has a contribution of 27,6 % on explaining Vessel Waiting Time. And around 72,4 % explain by the other variables.
f. The standardized coefficients result showed that the variable Pilotage Service has a regression coefficient value of 0.638 so that if there is an increase in the

Pilotage Service time for 1 hour, the vessel waiting time will increase by 0.638 hours.

Recommendation

Based on the result of this study, the suggestion that could be given to the company are:

a. To reduce vessel waiting time, the company might increase the efficiency of pilot boats operating at the Semarang Container Terminal. With the increase efficiency in pilot boats, it will reduce the Pilotage Service time because the queue of ships to get service will decrease and speed up the service process so that the waiting time for the next ship to get service will also be reduced.
b. the availability of scouting personnel is also crucial for the scout service's smooth running. Hence, the company also needs to improve a pilotage personnel skill so that the Pilotage Service can run smoothly. Besides that, the scout condition is also important both physically and psychologically so that it can be minimized the occurrence of human error during scout service.
c. The process of pilotage document service can affect vessel waiting time, therefore if the service time for scouting documents can be shortened, the Pilotage Service can be done more quickly, and there is no time wasted waiting. Online document service has been implemented using the Vasa and Ina Portnet applications. So, in order to reduce the time for processing company documents, the company can update the application periodically so that they can keep up with technological developments.
d. Conduct research in the future. With the various limitations that are still present in this study, the company can conduct further research on other variables that affect vessel waiting time. Conducting future research can give company information that can help the company to operate or in decision making.

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