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EFFECT OF IDLE TIME AND BERTHING TIME ON LOADING PRODUCTIVITY IN SURABAYA CONTAINER TERMINAL

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Abstract:

Improving loading and unloading efficiency at container terminals is a significant challenge in the maritime industry, with idle time and berthing time at the Container Terminal being key factors influencing loading productivity and potentially causing disruptions in the supply chain and reducing customer service quality. This study aims to determine the effect of idle time and Berthing time on loading and unloading productivity at the pier of the ocean-going container terminal Surabaya (TPS) Pelindo III." The strategy in research uses associative with a quantitative approach. The target population in this study were all employees and workers at the Surabaya container terminal, with a sample of 38 respondents. The sampling technique in this study used the Slovin technique. Sampling with the Accidental Sampling approach, the researcher takes a sample of the sampling technique based on coincidence. The type of data used is quantitative. Quantitative data in this study is data sourced directly from respondents presented in the form of a Likert scale. Data collection techniques are used by distributing questionnaires or questionnaires. The data statistical method used is descriptive statistics and Partial Least Square (PLS) with the SmartPLS version 4.0 program. The results of this study are that there is a positive and significant effect of idle time on loading and unloading productivity, and there is a positive and significant effect of berthing time on loading and unloading productivity; there is a positive and significant effect simultaneously of idle time and berthing time on purchasing decisions, idle time and Berthing time significantly affects the productivity of loading and unloading.

Keywords: *Idle Time; Berthing Time; Loading and Unloading Productivity*

INTRODUCTION

Container terminals are critical links in the maritime transportation system. As the number of commodities traded has increased over the past year, the role of container terminals with better performance needs to be strengthened to ensure the smooth movement of commodities. Analysis of container terminal loading and unloading performance influences efforts to improve current and future services.

Surabaya Container Terminal is one of the technology implementation divisions of PT (Persero) Pelabhan Indonesia III, responsible for container loading and unloading operations and services. All container service activities, both ship operations and terminal operations, are performed by Surabaya Container Terminal for maritime container services and inter-island container services.

Ideally, load and unload productivity in TPS can be measured based on service speed and low idle time, so load and unload performance is performed optimally. According to the author's observation, TPS (Surabaya Container Terminal) has good prospects, especially in loading and unloading. However, despite the growing business potential in Surabaya Port, it is clear that service management at Surabaya Port is still

sub-optimal. This is evidenced by the long idle times at the container quay while loading and unloading goods to and from the TPS quay. So that ships can stay in port longer. This is observed at deepwater container quays, leading to above-average vessel idle times.

Only time is spent efficiently, unproductively or wasted while a vessel is at berth due to weather conditions or damage to loading and unloading equipment. Cargo-handling hours and hours included in cargo-handling hours (rain out, etc.) are hours during which no cargo-handling or cargo-handling operations were performed while the ship was docked at the pier. Berth loading and unloading operations during unloading hours (e.g. B. Interruption of activity due to weather. King Orian and Eko Hariyadi (2007:165). The idle time effect refers to a ship's time in its container terminal in Surabaya before loading and unloading goods begins. This time includes the time the ship is in port for various reasons, including B. Late arrivals, limited queues and limited options at the terminal make it impossible to carry out loading and unloading operations.

Idle time is when equipment or machines, such as computers, are available but not used. The reason could be damaged, machine malfunction, material shortage, power failure, untidy production schedule, etc. According to PT. Pelabuhan Indonesia (2000): "Idle time is the number of working hours that are not used or wasted during loading and unloading work time at the moorings excluding rest hours expressed in units of hours".

According to Larsen Barasa (2019: 7), berthing time is required while mooring at the pier to carry out loading and unloading activities calculated from the first rope tied to the pier until the release of the last mooring rope from the pier. Expedite loading and unloading activities. Speeding up loading and unloading activities refers to efforts to increase efficiency and reduce the time needed to load and unload containers at ports or container terminals. The aim is to speed up the flow of goods and increase operational Productivity. Victor, f. WP (2019)

Raja Oloan Saut Gurning and Drs.Eko Hariyadi Budiyono (2007: 174) explained that. The level of ship service capability or overall operational performance is strongly influenced by the speed of loading and unloading or referred to as loading and unloading Productivity. The Productivity of loading and unloading at container terminal ports can be measured through several dimensions that reflect operational efficiency and effectiveness.

Equipment readiness at the port refers to the readiness and availability of the equipment needed to carry out port operations efficiently and smoothly. The equipment in question may include cranes, container moving equipment, transport trucks, heavy equipment, supporting equipment such as stacking equipment, and other supporting systems. This dimension relates to the physical size or the number of containers successfully loaded or loaded in a certain period. Physical Productivity can be measured by counting the number of containers or TEUs (Twenty-foot Equivalent Units) handled by a container terminal in one hour, day, or other time.

Physical Productivity can be measured by counting the number of containers or TEUs (Twenty-foot Equivalent Units) handled by a container terminal in a specific period, such as per hour, per day, per week, or other periods. This figure reflects the level of production or output obtained from the loading and unloading process. Suryantoro, B., Punama, DW, & Haqi, M. (2020).

RESEARCH METHODS

In this technique, the author uses research with the five senses themselves as a medium for making observations. In the observation section, the author observes the results of unloading and loading activities at conventional wharves to obtain factual information and events from the field regarding Idle Time and its effect on Berthing Time.

3.1 Population and Sample

3.1.1 Population

The Population consists of objects that are the centre of attention, from which the information you want to know is contained (Gulo, 2002, p. 76). The Population taken by

the author in the preparation of this thesis is data on all activities of unloading and loading of goods during the last five months at the container wharf and calculated within a period of months in the period December 2020 to April 2021 at the Surabaya Container Terminal Pier (TPS).

Table 3.1 Operational Performance for the period December 2021 to April 2022

DESCRIPTION	SAT	REALIZATION				
		December	January	February	March	April
Service Time						
Ship Visit	CALL	**23**	**9**	**10**	**19**	**19**
Transported Average	BOX	**120,000**	**45,000**	**50,000**	**95,000**	**95,000**
Effective Time	JAM/KPL	**511**	**139**	**206**	**265**	**285**
Idle Time	JAM/KPL	**110**	**14**	**29**	**62**	**57**
Not Operation Time	JAM/KPL	**165**	**7**	**48**	**103**	**90**
Berthing Time	JAM/KPL	**788**	**18**	**284**	**431**	**433**

3.1.2 Sample

According to Sugiyono (2014: 149), the sample is part of the number and characteristics possessed by the population. If the population is large and it is not possible for the researcher to study everything in the population, a sample population is taken from that population. The size of the sample in the study is determined using the slovin formula as follows:

$$n = \frac{N}{1+N(e)2}$$

n = Number of samples
e = error rate
N = Number of population
(note: generally used 1% or 0.01, 5% or 0.05 and 10% or 0.1)

So for this study, the number of samples is based on calculations using the Slovin formula, namely:

$$n = \frac{N}{1+N(e)2}$$

$$n = \frac{33}{1 +33(0.05)2}$$

$$n = \frac{33}{1+(33 \times 0.0025)}$$

$$n = \frac{33}{1+0.0825}$$

$$n = \frac{33}{1.0825}$$

n = 30

Based on calculations using this formula, the sample obtained is 30 respondents. The researcher used 5% (0.05) of the error rate due to the large population and the timing which was not possible

3.1.3 Measurement Scale

According to Sugiyono (2011) a questionnaire or questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer.

According to Sugiyono (2010) the Likert scale is used to measure attitudes, opinions, and perceptions of a person or group of people about social phenomena. With a Likert scale, the variables to be measured are translated into variable indicators. Then the variable indicator is used as a benchmark for compiling instrument items in the form of questions. The rating scale for the statement is as follows:

Table 3.2 Assessment scores based on the Likert scale.

NO	KETERANGAN	SKOR
1	Sangat Setuju (SS)	5
2	Setuju (S)	4
3	Netral (N)	3
4	Tidak Setuju (TS)	2
5	Sangat Tidak Setuju (STS)	1

3.1.4 Statistical Analysis of Data

Partial Least Square (PLS) analysis aims to help researchers to obtain latent variables for prediction purposes (Ghozali 2014: 31.) In this study three stages were carried out, namely:

1. Outer Model Analysis.
2. Inner Model Analysis.
3. Hypothesis Testing.

RESULTS AND DISCUSSION

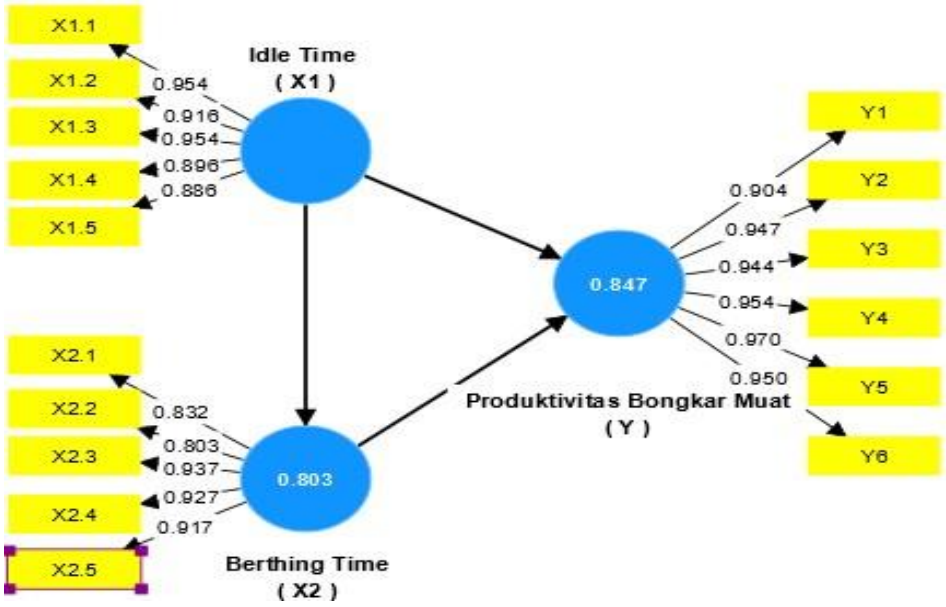
This study uses three variables, namely Variable X1 (Idle Time), X2 (Berthing Time) and Variable Y (unloading productivity). The authors used data collection methods to analyse the research data through questionnaires (questionnaires) given to respondents. This study took a respondent population of 33 employees or workers at the Surabaya Container Terminal (TPS) Pelindo III.

4.1. Outer Model Analysis

Testing the measurement model (outer model) is used to determine the specification of the relationship between latent variables and their manifest variables. This test includes convergent validity, discriminant validity and reliability.

Convergent Validity

Convergent validity of the measurement model with reflexive indicators can be seen from the correlation between the item/indicator scores and the construct scores. Individual indicators are considered reliable if they have a correlation value above 0.70. However, loading of 0.50 to 0.60 is still acceptable at the scale development stage. The results for outer loading show that there is an indicator that has a loading below 0.60 and is not significant. The structural model in this study is shown in the following figure.



Source: Smart PLS Program Output, 2020 Outer Model - Step 1

Discriminate Validity

In this section, the results of the discriminant validity test will be described. The discriminant validity test uses the cross-loading value. An indicator is declared to meet discriminant validity if the cross-loading value of the indicator on the variable is most significant compared to other variables. The following is the cross-loading value for each indicator

Table 4.1 Discriminant Validity

	Berthing Time_(X2)	Idle Time _(X1)	Produktivitas Bongkar Muat_(Y)
X1.2	0.794	0.916	0.802
X1.3	0.828	0.954	0.784
X1.4	0.899	0.896	0.875
X1.5	0.789	0.886	0.776
X2.1	0.832	0.709	0.573
X2.2	0.803	0.663	0.728
X2.3	0.937	0.808	0.754
X2.4	0.927	0.870	0.912
X2.5	0.917	0.881	0.950
Y1	0.840	0.814	0.904
Y2	0.874	0.789	0.947
Y3	0.781	0.748	0.944
Y4	0.879	0.919	0.954
Y5	0.807	0.880	0.970
Y6	0.917	0.881	0.950
X1.1	0.810	0.954	0.856

Based on Table 4.3. above states that several indicators on the research variables have a smaller cross-loading value compared to the cross-loading values on other variables, so they must be known and observed further. Another way to measure

discriminant validity is to look at the square root value of the average variance extracted (AVE). The recommended value is above 0.5 for a good model. The next test is the composite reliability of the indicator blocks that measure constructs. A construct is reliable if the composite reliability value is above 0.60. Then it can also be seen by looking at construct reliability or latent variables, which are measured by looking at the Cronbach alpha value of the indicator block that measures the construct. A construct is declared reliable if the Cronbach alpha value is above 0.7. The following describes the construct results for each variable: product quality and brand image, word of mouth and purchasing decisions with each variable and indicator. The following is a table of loading values for the research variable construct resulting from running the Smart PLS program in the following table:

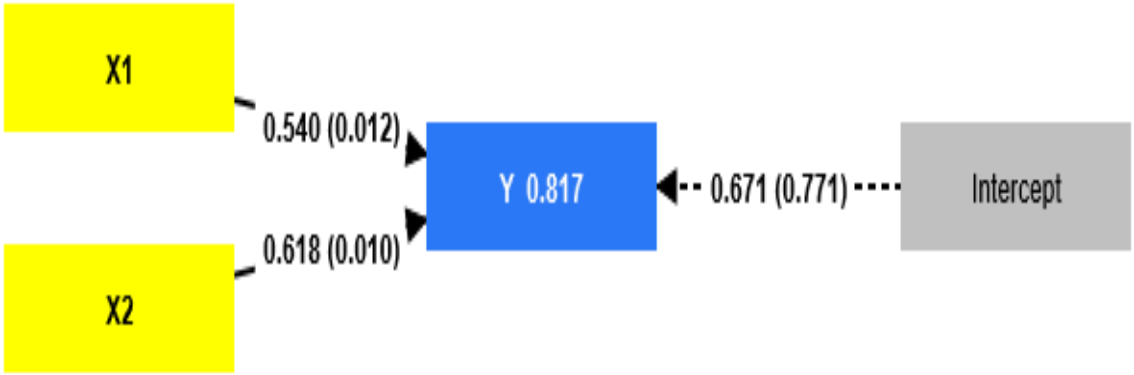
	Cronbach's alpha	Keandalan komposit (rho_a)	Keandalan komposit (rho_c)	Rata-rata varians diekstraksi (AVE)
Berthing Time_(X2)	0.930	0.945	0.947	0.783
Idle Time_(X1)	0.955	0.957	0.966	0.849
Produktivitas Bongkar Muat_(Y)	0.976	0.978	0.980	0.893

The model shows that the value of composite reliability for all constructs is above the value of 0.70. Thus, all constructs are reliable according to the required minimum value limit.

Multiple Linear Regression Results

In PLS, testing to find out the relationship between variables X1 and X2 jointly affect variable Y is carried out using a simulation with the regression method of the sample. This test aims to determine the direction and how much influence the independent variables have on the dependent variable (Ghozali, 2018).

Chart of Multiple linear Regression output results



Hypothesis test

Hypothesis testing is done by bootstrapping and regression techniques. The data used for bootstrapping and regression is data that the Measurement stage has carried out. The hypothesis testing is included in the Structural Model and shows the hypothesized relationship with the simulation practice. This bootstrapping test also aims to determine the direction of the relationship and the significance of the relationship for each latent variable. Hypothesis testing is done by comparing t-statistics or t-counts that have been determined. The t-count produced in the bootstrapping test must be greater than the one-tail t-table, which is 1.65 for a standard error of 5% or a p-value below 0.05 (Hair et al. 2017).

Table 4.2. Value of Path Coefficients Hypothesis(X1) > Y

	Sampel asli (O)	Rata-rata sampel (M)	Standar deviasi (STDEV)	T statistik (|O/STDEV|)	Nilai P (P values)
Idle Time _(X1) -> Produktivitas Bongkar Muat_(Y)	0.892	0.897	0.052	17.038	0.000

Table 4.3. Value of Path Coefficients Hypothesis (X2) > Y

	Sampel asli (O)	Rata-rata sampel (M)	Standar deviasi (STDEV)	T statistik (|O/STDEV|)	Nilai P (P values)
Idle Time _(X1) -> Produktivitas Bongkar Muat_(Y)	0.892	0.897	0.052	17.038	0.000

Table 4.4 Hypothesis Path Coefficients (X1&X2) > Y

	Koefisien yang tidak distandardisasi	Koefisien standardisasi	SE	Nilai T (T value)	Nilai P (P value)	2.5 %	97.5 %
X1	0.540	0.461	0.201	2.686	0.012	0.128	0.952
X2	0.618	0.476	0.223	2.773	0.010	0.162	1.074
Intercept	0.671	0.000	2.280	0.294	0.771	-3.999	5.342

This study seeks to obtain an overview of the influence of Idle Time and Berthing Time on Loading and Unloading Productivity at the Surabaya Container Terminal. From the test results obtained by discussion. Based on the hypothesis test, it is concluded that:

Hypotheses (H1) and (H2) are rejected. This means that the hypothesis (H3) is accepted because there is a relationship, namely the influence of Idle Time and Berthing Time on Loading and Unloading Productivity at the Surabaya Container Terminal. which has been proven from the test results of several data processing tests using innovative pls, such as from the results of the r square test it was found that the values X1 and X2 for Y were 0.803. including high. So it can be concluded that the magnitude of the influence between Idle Time and Berthing Time on Loading and Unloading Productivity at Surabaya Container Terminal. Around (80%), then we also know, after carrying out the results of the bootstrapping and regression testing of the Path Coefficients, outer loading and outer weight values, it is known that all indicators have a significant p-value of 0.000 <0,

CONCLUSION

From the results of the research conducted, it is proven that the Idle Time variable (X1) and the Berthing Time variable (X2) have a relationship to loading and unloading Productivity (Y). The total calculation of idle time (X1) results are 656, with the highest questions being 134 and the lowest being 124. Moreover, the total variable Berthing Time (X2) is 661, with the highest number of questions, 144 and the lowest 130. Moreover, the loading and unloading productivity variable (Y) consists of the questions, and there were respondents totalling 30 people. The overall results for the questions were 783. The highest questions were 134, and the lowest was 129. So when all the data was analyzed using the innovative pls application, the results were:

Outer Model Analysis

The convergent validity test on the indicator variable X1 with the highest value is from the Idle time indicator at the port, which can hamper the smooth flow and operational efficiency. (0.954) Moreover, the lowest value is an indicator of high idle time at the port which can affect service time and reliability of ship schedules (0.886) for the variable indicator X2, the highest value is the long berthing time indicator which can affect operational efficiency and Productivity at the port (0.937) and the lowest value Delays in the ship berthing process can disrupt delivery schedules and service reliability (0.803). In contrast, the highest value Y variable indicates poor loading and unloading Productivity which can affect the schedule and reliability of goods delivery. (0.970),

Moreover, the lowest indicator of high loading and unloading Productivity at the

port can improve overall operational efficiency. (0.904), it is known that all indicators of the variables X1, X2 and Y have values above 0.70 so that they have a high level of validity and fulfil convergent validity.

The discriminant validity test shows that the loading value of each indicator on the construct (X1) and (X2) is greater than the cross value loading Y, and vice versa; the indicator item to the construct (Y) is greater than the cross loading value of X1. Thus it can be concluded that all constructs or latent variables already have good discriminant validity.

The composite reliability test has two measurements: the Cronbach alpha value, the X1 is 0.955, X2 is 0.930, and the Y variable is 0.976. At the same time the second is the composite reliability measurement. The X1 variable is 0.957, the X2 is 0.945, and the Y variable is 0.978. the data all constructs are above the value of 0.70. Thus, all constructs have good reliability.

In the average variance extracted (AVE) test, the AVE value of variable X1 is 0.849, X2 is 0.783 and variable Y is 0.893; it is known that each construct is above 0.5. Therefore there are no convergent validity problems in the tested model, so the constructs in this research model have good discriminant validity.

The Cronbach alpha test results in the variable X1 having a value of 0.955 and X2 having a value of 0.930, and the variable Y is 0.976, so all constructs are above the value of 0.60. Thus, all constructs have good reliability.

Inner Model Analysis

R Square Analysis (R2)

R2 indicates that the value of R2 is at a value of 0.803. Based on this, the results of calculating R2 show that R2 is high (0.803). So the conclusion is the magnitude of the influence between berthing time and idle time on the Productivity of loading and unloading containers at the Surabaya ocean-going pier. (80%), and other variables around (20%).

F Square Analysis (F2)

The Effect of Idle Time and Berthing Time on the Loading and Unloading of Containers at the Ocean Going Pier Surabaya Container Terminal (TPS) Pelindo III F2 (355) is included in the small group.

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