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## Factor Influence of Container Loading and Unloading As Productivity Support on Mirah Terminal

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### ABSTRACT

**Purpose:** This study aims to obtain a quantitative model that can be used to determine the factors that have a significant impact on loading and unloading productivity.

**Design/methodology/approach:** The method used to solve the problem is multiple linear regression method and dummy variable.

**Findings:** The number of samples for this analysis were all ships that belong to PT Meratus Line which docked at the Mirah Terminal in Surabaya for 12 months, starting from January 2019 to December 2019. The response used is realization data in the number of containers per hour. The initial predictors that are thought to have an impact on productivity are operational personnel and loading and unloading workers, loading and unloading equipment readiness, work system, full empty ratio and total container weight. There are 4 steps to analyze the regression model that has been obtained. Simultaneous test (using P-value), individual test (t test), F test (simultaneous test), Glejser heteroscedasticity and heterocedasticity test, multicoreleation test, reliability test and validity test and residual test and the best final model obtained.

**Practical implications:** The conclusion is that the weight and the order of the containers are the factors that most take influence the productivity of both the CY (Container Yard) and the ship. The value of the influence of the significance of determination is 957 or equal to 95.7%, so that means that one independent variable has a significant influence of 19% on the existing dependent variable.

**Originality/value:** This paper is original.

**Paper type:** Research paper.

**Keyword:** Dummy Variable, Multiple Linear Regression, Productivity

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### I. INTRODUCTION

Based on preliminary observations, loading and unloading productivity at Mirah Terminal affects several aspects of work that can make cases (problems) that can be researched in order to provide solutions and new systems to run, so as to get new performance / work systems as acceleration and the achievement of productivity itself is in accordance with what has been applied. The cases / problems in Mirah Terminal itself are quite numerous and complex to research such as the limited container yard loading and unloading equipment , ship cranes used for the loading and unloading tools at the dock, the existing work system is still influenced by loading and unloading workers and so on.

As for all matters related to the productivity of loading and unloading containers at Mirah Terminal, including the presence of both operational and loading and unloading workers who carry out their duties and responsibilities for a good job, the readiness of existing supporting tools and use for smooth movement of containers both from CY (container yard), truck chassis, docks to the top of the ship for loading, work systems in place to carry out work planning in order to get maximum results and get the maximum possible results, the ratio of fully empty containers which can determine activities related to the work system to be used to carry out existing work activities and also the weight of the container which is one of the main reasons for carrying out lifting or related unloading activities so that activities can run faster by carrying out ship unloading activities quickly and maximally with one force unloading two containers live. All related matters in the aspects that are capable of supporting productivity itself can fulfill the maximum possible results. The productivity obtained has a very significant effect in gaining company profits.

In the previous research on "loading and unloading productivity" which was carried out by Gunawan, (2008), 5 factors were thought to be influential, namely gank / labor group, loading and unloading equipment, full empty ratio, container weight, and loading and unloading process time. The results obtained by carrying gank, full empty ratio and loading and unloading tools have the greatest influence, while container weight and loading and unloading time do not have a significant number or results by showing negative results on the existing loading and unloading productivity. In this research, which was carried out at Berlian Surabaya Terminal with case studies obtained based on ships belonging to the shipping company PT Meratus Line which docked and carried out loading and unloading work in the work environment of the Berlian Surabaya Terminal area which was managed by PT Berlian Jasa Terminal Indonesia found that they did not have a work system and equipment readiness that is being discussed, it does not experience a significant effect, it does not experience significant obstacles and all related matters already have work standardized.

To get the best results is by looking at the results of the test data made by looking at the reference to the existing hypothesis in the subject of the problem to be investigated and it can be concluded that the truth of the existing work process, while this study uses multiple linear regression as a tool that is often used to conduct research. on the loading and unloading productivity itself to see the results that are already significant. Linear regression method is one method that is often used to analyze and the related relationships of several factors. In addition, this linear regression method can provide a description and the extent of the influence of uncontrolled factors, provide prediction and build models.

## **II. METHODOLOGY**

### **A. Operational Personnel**

According to Widjono, (2007) operational is a definition of what is used as a new definition for doing any activity.

Operational personnel are all people who are given the job and authority to carry out their duties or jobdesk as appropriate and precisely based on the predetermined SOP (Standard Operating Procedure). This operational personnel has an important meaning in every operational activity related to everything that has been determined by the company, as a support for the success, speed and smoothness of all work that has been determined by the company, in the implementation of existing work existing operational personnel must have work ethic, honesty, cooperation, decision making and so on in order to complete predetermined work quickly, safely and precisely.

### **B. TKBM (Loading and Unloading Workers)**

According to Suyono, (2007) TKBM (Loading and Unloading Workers) are workers who carry out loading and unloading activities at the port, as executors of the smooth operation of existing operations and are related to work on warehouses and docks both on ships and at dock kades.

In determining the productivity that is in accordance with the application of the work system to made the results of the application of the work system can be maximally achieved, needs analysis that related to the importance of productivity itself for the company and all involved workers and capable to realize the achievement of productivity itself. The goals and benefits that can be obtained from measuring productivity so that everything that is going to be done and done has a fairly good and detailed orientation and focus with respect to the results to be obtained in running a work system that can spur productivity of loading and unloading in the Mirah Terminal work environment, so that it can make corporate profits for the company itself.

### **C. Loading and Unloading**

Loading and unloading is the activity of moving goods from land transportation, and to carry out the activity of moving the cargo, it is necessary to provide adequate facilities or equipment in a service method or procedure. What is meant by loading activity is the process of moving goods from the warehouse, loading and then stacking them on board while the unloading activity is the process of unloading goods from the ship and then arranging them in a warehouse at the port or stock pile or container yard.

### **D. Container**

According to Suyono, (2007) regarding containers, are a package that is specially designed with a certain size, can be used repeatedly, is used to store and simultaneously transport cargo.

Containers are crates or boxes that meet technical requirements in accordance with the Organization for Standardization (ISO) as a means or equipment for transporting goods that can be used in various modes, starting from road mode with container trucks, trains and container ships.

## **III. RESEARCH METHOD**

Data used in this study is secondary data that have been taken directly from PT Pelabuhan Indonesia III (Persero) Mirah Terminal Division related to loading and unloading data directly by conducting data observations, interviews with experts or workers in the Mirah Terminal Environment, and the data that is supported describes all the results of productivity in order to increase the increase in work and related productivity, so that existing data and all managed variables experience perfect data validity. The secondary data used is a reference for loading and unloading data in the Mirah Terminal environment from January 2019 to December 2019.

For the input variable (independent variable) that is used, includes five independent variables that are available and ready to be managed, the results include:

1. Operational Personnel and TKBM Variables (X1);

The variable of loading and unloading equipment (X2);

Work system variable (X3);

Variable Ratio Full empty (X4);

Variable Container Weight (X5);

## **IV. RESEARCH RESULTS AND DISCUSSION**

Data processing is carried out in order to find the best results that have a positive effect and get a value that has a significant effect on existing results, so that the managed data can be accepted and the research carried out can also be considered correct, because getting results that have a positive effect on productivity itself.

### **A. Validity Test**

The test is used to show the extent of the measuring instrument used in a study is proven valid or valid for a questionnaire. According to Ghozali, (2006) states that the validity test is used to measure whether a questionnaire is valid or not. In the validity test, the test results can be declared valid if the Pearson correlation or R-count table is more than the R-table value of 0.3610 or 0.4 which is obtained by means of  $df = (N-2)$  with a significance value of 0.05 or has a star 2 (two).

### **B. Reliability Test**

Reliability test is to measure a questionnaire which is an indicator of a variable or construct. A statement can be said to be reliable if a person's answer to the statement is consistently stable over time. The data processing test research can be said to be reliable if the existing data has an alpha result of more than 0.6 or Cronbach's reliability  $> 0.60$ .

### **C. Classic Assumption Test**

This test is done to see whether the data used has deviated from classic assumptions or not. In the assumption test carried out, there are 3 tests that are used in the classical assumption test, namely the normality test, multicollinearity test and heteroscedasticity test. The results of the 3 tests are generated and processed properly using SPSS 16 to obtain a data processing that has data significance related to the subject matter, so that it can be a development of work productivity, among others, as follows.

**D. Normality test**

Is a test carried out with the aim of assessing the distribution of data on a group of data or variables, whether the distribution of the data is normally distributed or not.

**E. Histogram**

One of data reading tools is to find out that the processed data or variables are proven to be normal. The histogram image can be seen in the image below to ensure that the explanation is in accordance with the existing data results based on processed variable data that has been processed using SPSS version 16, so that the data used is completely normal and can be used as a new benchmark for the development of a new work system in the Mirah Terminal work environment in order to achieve appropriate productivity gains.

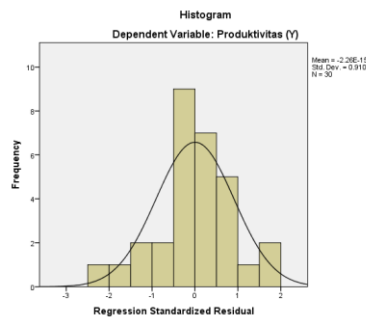


Figure 1 Histogram

**F. P-Plot or Probability Plot**

Is an image that shows the results of the data processing test data on existing variables with the conclusion that the results of reading the processed data always follow the diagonal line, so that the existing data is proven to be normal and acceptable.

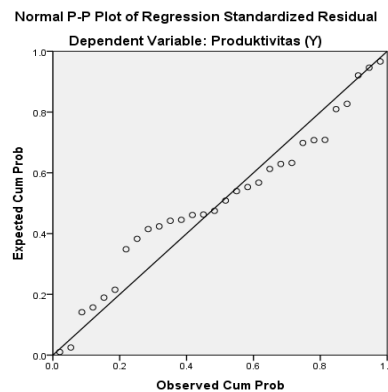


Figure 1 P-Plot or Probability Plot

**G. Kolmogorov-Sminor test data sample**

Kolmogorov-Smirnov sample can be stated and proven to be normal by looking at the results of the processed data test in the Unstandardized Residual table which must have a result greater than 0.05, so that the existing data processing can be ascertained normal and the value obtained must be positive, so that existing data will be valid. The Kolmogorov-Smirnov table can be stated in the table below.

*Table 1 Kolmogrov-Smirnov*

One-Sample Kolmogrov-Smirnov Test		
		Unstandardized Residual
N		30
Normal Parameters a,b	Mean	,0000000
	Std. Deviation	,99007642
	Absolute	,140
Most Extreme Differences	Positive	,106
	Negative	-,140
Test Statistic		,140
Asymp Sig (2-tailed)		,139°

**H. Multicollinearity Test**

Tests are carried out to ascertain whether in a regression model there is intercorrelation or collinearity between independent variables. The cause of multicollinearity is a strong correlation or relationship between two or more independent variables. In the multicollinearity test, the tolerant level cannot be below 0.1 and the VIF value in the table cannot be above the value or number 10, so the data can be ascertained that there will be no multicollinearity or the existing independent variable test results equation. The processed data can be presented in the table below by looking at the table of processed data in the colinearity statistical table.

*Table 2 Cefecient*

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,523	2,483		1,822	,081		
Operational personnel	,149	,067	,246	2,212	,037	,121	8,290
Readiness of loading and unloading equipment	,179	,068	,209	2,648	,014	,239	4,177
Work system	,140	,061	,170	2,293	,031	,271	3,690
Ratio full empty	,229	,088	,261	2,591	,016	,147	6,816
Container weight	,212	,100	,175	2,130	,044	,221	4,533

**I. Heteroscedasticity Test**

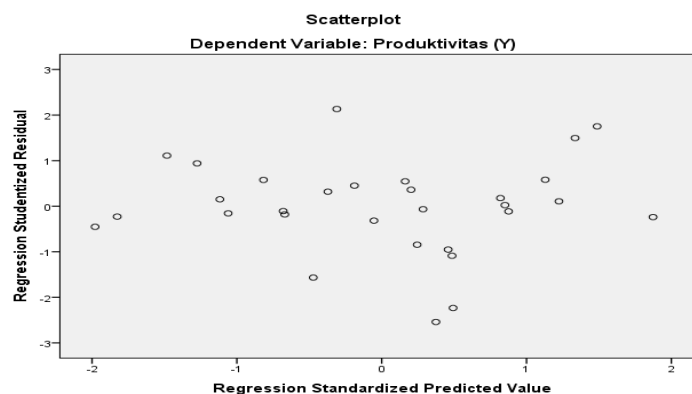
Testing of variable data that has a significance level with the conclusion that it should not be below 0.05 or the independent variable cannot affect the Y variable or this data processing is assumed to be the name abs\_res data test. The heteroscedasticity test data can be presented using two modes of data test results, with the ordinary image results or using the heteroscedasticity test using the Glejsier test to further ensure that the data to be processed does not experience symptoms of heterocedasticity. And the two processed data results can be presented in the following figures and tables.

*Table 3 Glejser Heterokedastasis Test Results*

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	,153	1,585		,096	,924
Operational personnel	-,004	,043	-,054	-,099	,922
Readiness of loading and unloading equipment	-,052	,043	-,462	-,1204	,240
Work system	,072	,039	,666	1,846	,077
Ratio full empty	,012	,056	,107	,218	,829
Container weight	-,011	,064	-,069	-,173	,864

a. Dependent Variable: Abs\_res

In the Glejser Heteroscedasticity test, explained that heteroscedasticity did not occur according to the explanation above.



*Figure 2 Scatterplot*

In the Heteroscedasticity test using a scatterplot, you can process the data using Zpred and Spresit, review the results of the processed data are scattered randomly or randomly and the points are above and below the number 0.

**J. Multiple Linear Regression**

The tools used in testing is the hypothesis. Multiple linear regression analysis is used to measure the strength of the relationship between the independent variables and the dependent variable and to show the direction of the relationship between these variables. This analysis will form an equation that can be explained the results as shown in the section below:

Table 4 Results of Multiple Linear Regression Analysis

Variabel	Unstandardized Coefficients	
	B	Std. Error
1 (Constant)	4,523	2,483
Tenaga operasional dan TKBM (X1)	,149	,067
Kesiapan alat bongkar muat (X2)	,179	,068
Sistem Kerja (X3)	,140	,061
Ratio full empty (X4)	,229	,088
Berat Container (X5)	,212	,100

**K. Hypothesis Testing**

F test or Simultaneous test

Test data processing with the condition that the level of significance must be below 0.05 or 5% and F count must be greater than F table. With the value of the resulting data processing of F table 2.53 <129.471, which means that the conclusions obtained from the 5 independent variables are X1 (operational personnel and loading unloading personnel / TKBM), X2 (tool readiness), X3 (work system), X4 ( Ratio Full Empty) and X5 (Container Weight) together have a significant effect on variable Y (Productivity).

Table 4 ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	766,733	5	153,355	129,471	.000b
Residual	28,427	24	1,184		
Total	795,2	29			

a. Dependent Variable: Produktivitas

b. Predictors: (Constant), Berat Container (X5), Kesiapan alat bongkar muat (X2), Sistem Kerja

**L. T test or Partial test**

The formula for calculate this t or partial test is n-k-1, with the following formula translation:

n: Sample of respondents

k: The constant or number of independent variables

To determine the significance of the data in the t test or partial test, it must be below 0.05 or 5%. The resulting data processed in the t test in the analysis of the existing titles, all the independent variables consisting of 5 variables, including X1 (Operational Personnel and loading unloading personnel / TKBM), X2 (Tool readiness, X3 (work system), X4 (Ratio full empty) , X5 (Container Weight) has significance to the value of Y (Productivity) partially or individually.

Table 5 T Results Test and Partial Test

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	4,523	2,483		1,822	,081
Operational personnel (X1)	,149	,067	,246	2,212	,037
Readiness of loading and unloading equipment (X2)	,179	,068	,209	2,648	,014
Work system	,140	,061	,170	2,293	,031
Ratio full empty (X4)	,229	,088	,261	2,591	,061
Container weight (X5)	,212	,100	,175	2,13	,044

a. Dependent Variabel: Produktivitas (Y)

**M. Determination coefficient test (Adjustable R square)**

The data test obtained was .957 or 95.7%, which means that the 5 independent variables were X1 (operational personnel and loading unloading personnel / TKBM), X2 (tool readiness), X3 (Work system), X4 (Full Empty Ratio), and X5 (Container weight) have each influence of 19% which is obtained from 95.7% divided by the 5 existing independent variables. The value can be seen in the table below to provide a significant explanation.

*Table 6 Adjustable R square*

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.9822	.964	.957		108.833

a. Predictors: ( Constant), Berat Container (X5), Kesiapan alat bongkar muat (X2), Sistem Kerja (X3), Ratio full empty (X4), Tenaga operasional dan TKBM (X1)

**V. CONCLUSION**

**A. Conclusion**

Existing independent variables such as operational personnel and loading unloading personnel / TKBM (X1), loading and unloading equipment readiness (X2), work system (X3), full empty Rato (X4), and container weight each have a partial effect on the dependent variable. productivity (Y) with a significance number of 0.05, the df value obtained is 25 and all partial tests can be stated in detail and correctly so that the results of the tests carried out affect positively and get valid values.

Existing independent variables such as operational personnel and loading unloading personnel / TKBM (X1), loading and unloading equipment readiness (X2), work system (X3), full empty Rato (X4), and container weight each have an effect simultaneously or jointly. the same as the dependent variable productivity (Y) with a significance number of 0.05.

Independent variables, Operational Personnel and loading unloading personnel / TKBM (X1), loading and unloading equipment readiness (X2), work system (X3), full empty ratio (X4) and container weight (X5) which are used as basic materials for testing related data processing with the hypothesis that is made and processed using multiple linear regression and the existing classical assumption test resulting that have a positive effect on the dependent variable Productivity (Y), while the 5 variables have a determination value of 95.7% or 19% per independent variable there is a significant effect on the productivity variable (Y), so that based on the existing point of view, the five independent variables are felt to have the most significant effect on the results than the other variables and have a positive effect.

**B. Suggestion**

For Operational personnel and loading unloading personnel/TKBM

Must have self-motivation so that capable doing the job that must be his responsibility. Fostering a more sense of responsibility for a job that has been given can bring a bad habit changement to be better one without having to look at various aspects when doing a job that has become a responsibility and asking for it to be completed immediately as the key to successful service related to speed, successful loading and unloading of containers;

The readiness of the loading and unloading equipment must be very adequate if you want the loading and unloading productivity to get better results, by providing the equation of the loading and unloading aid tool itself, such as the RTG block must be backed up with RTG or an arrangement that adapts to the RS tool as back up RTG. Apart from that, they carry out golden times to control or maintain equipment in good condition;

The existing work system should gradually change its work pattern, so that the existing work can run more smoothly as it should be, for example there is a standard value given to the ship's capacity to perform loading and unloading process without having to do a negotiation process before working;

Likewise with the ratio of full empty and the weight of the container, although as a key determinant of work activities with the work system in Mirah Terminal, it is better if the work system pattern must have a special standard with existing ships of the same type, so that work treatment can have a definite work standard for doing the activities and get maximum results.

Suggestions that can be conveyed for further research are to be able to analyze similar or the same research by collecting data that takes into account other factors so that it can be processed by obtaining data processing



that is much more complex and has significant results. Other factors that are thought to have an effect on the length of time, success and constraints that can hinder loading and unloading productivity, such as emphasis on idle time and NOT in order to obtain much more effective time calculations and BCH (Box Crane Hours) is much more maximal and lots.

## REFERENCES

- Ghozali, I. (2006). Aplikasi analisis multivariate dengan program SPSS. Badan Penerbit Universitas Diponegoro.
- Gunawan, M. E. S. H. (2008). Suhartono, "Analisis Faktor-Faktor Yang Berpengaruh Terhadap Produktivitas Bongkar Muat Kontainer Di Dermaga Berlian Surabaya (Studi Kasus Pt. Pelayaran Meratus)," *J. Widya Tek*, 7(1), 79–89.
- Suyono, R. P. (2007). Shipping: pengangkutan intermodal ekspor impor melalui laut. Penerbit PPM.
- Widjono, H. S. (2007). Bahasa Indonesia: Mata Kuliah Pengembangan Kepribadian di Perguruan Tinggi. Jakarta: Grasindo.