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THE INFLUENCE OF CONTAINER WEIGHT AND NUMBER OF GANG ON STEVEDORING PRODUCTIVITY

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Abstract

The aim of this study is to analyze the influence of container weight and number of gang on stevedoring productivity in Tanjung Emas Semarang Port case at PT Samudera Indonesia Tbk., Semarang Branch. This research used a multiple linear regression carried out by SPSS 22.0 with time series data for 2013-2017 and secondary data from PT. Samudera Indonesia Tbk., Semarang Branch. The result showed that partially, container weight has significant negative influence on stevedoring productivity, and number of gang has significant positive influence on stevedoring productivity. Simultaneously, container weight and number of gang significantly influence stevedoring productivity by 37.7% while 62.3% are influenced by other variables that were not described in this research.

***Keywords**: container weight, number of gang, stevedoring productivity.*

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Introduction

The earth with hundreds of countries lie on seven different continents inevitable to have different geographical condition which leads to the capability of producing products. Therefore, each country has its own specialization in producing certain products and services. Thus it leads to exchanging commodities among those countries.

A lot of modes of transportation are used in export and import such as truck, train cargo, airplane, and vessels. However, maritime transportation continues playing an important role in the movement of certain commodities and is still the favorite way of transportation in export and import with over 80% of global trade by volume and more than 70% of its value being carried on board ships and handled by seaports worldwide (UNCTAD, 2017).

In the transportation of goods with container which is loaded on a container vessel, there is a special terminal called a container terminal. This terminal demands at least to provide dock in form of wharf, container yard, along with loading and unloading equipment in order to run the loading and unloading process well. There are three activities in cargo handling at port operation: stevedoring, cargodoring, and receive/delivery.

PT Samudera Indonesia Tbk Semarang Branch is a shipping line company which provides international container shipping service. In order to compete with other shipping companies PT Samudera Indonesia Tbk Semarang Branch needs to be competitive by minimalizing the service cost. In shipping activities there are some bills to pay and the value of wharfage is fluctuating; it can be change due to the duration that is needed by the vessel to load and unloading containers. The longer vessels stay at berth, the higher is the cost that the vessels will have to pay. The thing to note is the stevedoring productivity.

INSA has targeted the stevedoring productivity of 22 containers per hour, TPKS has targeted the stevedoring productivity by 25 containers per hour. Meanwhile the stevedoring productivity of PT. Samudera Indonesia Tbk Semarang Branch's vessels is less than what INSA and TPKS have targeted. From the problem above, it is needed to know the influence of container weight and number of gang on stevedoring productivity. The research can be an evaluation and reference for the company to recognize what factors influence the stevedoring productivity and can do something to help TPKS in improving the stevedoring productivity.

In "*Analisis faktor-faktor yang berpengaruh terhadap produktivitas bongkar muat container di dermaga Berlian Surabaya (studi kasus PT. Pelayaran Meratus)*" (Gunawan, 2008) container weight influences the stevedoring productivity of Caraka Jaya vessel, Mahakam River vessel, Musi River vessel and Meulaboh vessel. The number of gang influences the stevedoring productivity of Caraka Jaya vessel and Mentaya River vessel. "*Analisis pelayanan bongkar muat petikemas yang optimal pada terminal petikemas*" (Supriyono, 2009) finds that the container crane operator with experiences and high skill can shorten the time needed to load and unload and increase the stevedoring productivity, the stevedoring service can be optimal with three container cranes, 21 head truck, and four RTGs being used in stevedoring productivity for each vessel. Study by Nyema (2014) Factors influencing container terminal's efficiency: a case study of Mombasa entry port finds that quay crane, infrastructure, and the delays in clearance procedure, the lack of integrated IT system effect container terminal efficiency. In Analysis of stevedoring productivity in Australia's five major container ports (Lubulwa and friends, 2010) stated that key drivers of stevedoring productivity are crane intensity, trade mix, and average TEUs exchanged per vessel visit. Container terminal productivity : experiences at the ports of LA and Long Beach (Le-Griffin and Murphy, 2006) reveals that the capacities and performance of marshalling yards and transfer

to landside transportation systems are particularly important factors of terminal productivity. Thus leads to the container weight and number of gang as the independent variables and stevedoring productivity as the dependent variable of this study.

Research Method

Data in this research are collected form documentary study. The documents which are studied for the research are yearly report of vessel productivity of PT. Samudera Indonesia Tbk, Semarang Branch 2013-2017.
The steps below are taken in conducting the research:

a. Study the business process.
b. Determine the research variables after conducting review on secondary data and previous researches.
c. Collecting the data.
d. Conducting test with five classic assumption tests.
e. Processing the data with multiple linear regression to get the formula.
f. Knowing what factors influencing stevedoring productivity.
g. Conclusion and recommendation

Result and Discussion

Test of Normality

Based on the SPSS output on test of normality, the significance is 0.200 which is higher than 0.05. Thus, from the output above it can be concluded that the data distribution in this research is normal.

Multicollinearity Test

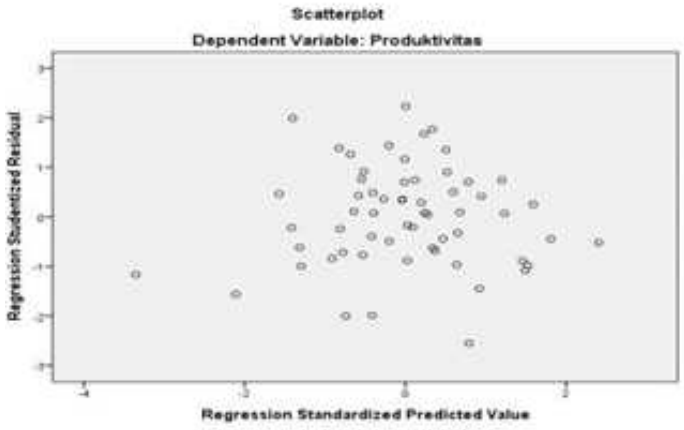
From the multicollinearity test output the VIF value of container weight and number of gang is 1.003. All the VIF value of the independent variables above is less than 10; it means there is no multicollinearity of each independent variable in the regression model.

Autocorrelation Test

The Durbin – Watson value in the output is 1.967. The DL and DU is known from the Durbin - Watson Table. With $\alpha = 0.05$, $k = 2$, and $n = 60$ the DL is 1.5144, the DU is 1.6518, and 4 – DU is 2.3482. Based on the Durbin – Watson decision making when the Durbin – Watson value is higher than the DU but less than 4 – DU means there is no autocorrelation.

Heteroscedasticity Test

Figure 1 Scatterplot Graph



From the graph of Figure 1 there is no certain pattern formed, and the dots spread above and below 0 in its ordinate, therefore there is no heteroscedasticity in the regression model.

Linearity Test

The R^2 is 0.398, with n is 60 then the c^2 is 23.88. The c^2 with df = 59 and = 0.05 is

77,93. Thus, the counted c^2 is lower than the c^2, means the model regression is linear.

Coefficient Correlation

It can be seen from the R value which is the correlation of container weight and number of gang together has a relationship to the stevedoring productivity by 0.631. The interpretation of the relationship between container weight and number of gang variables together with the stevedoring productivity is classified as strong based on the Table 1.

Table 1 Interpretation Of Coefficients Correlation

Coefficient Interval	Relationship Level
0,00 – 0,199	Very Low
0,20 0,399	Low
0,40 – 0,599	Moderate
0,60 – 0,799	Strong
0,80 – 1,000	Very Strong

Source: Sugiyono (2014: 192)

Coefficient Determination

The Adjusted R Square is 0.377 which means 37.7% of the dependent variable (stevedoring productivity) can be explained by the independent variables (container weight, and number of gang). Meanwhile the rest 62.3% of dependent variable can be explained by another independent variable which is not in this research.

F - Test

F value is 18.872. With = 0.05, two independent variables means DF1 = 2 and DF2 = 60 – 3 = 57 the table shows 3.16 as the value of F table. Seeing the F table is lower than the F regression means the H0 which states that container weight and number of gang do not influence the stevedoring productivity is rejected.

T – Test

The hypotheses are as follows:

H_{01} : Container weight does not influence the stevedoring productivity.

H_{a1} : Container weight influences the stevedoring productivity.

H_{02} : Number of gang does not influence the stevedoring productivity.

H_{a2} : Number of gang influences the stevedoring productivity.

The significance of container weight is 0.000, and number of gang is 0.000. Both significance values are lower than 0.05. Therefore, $H_{01,}$ and H_{02} are rejected. It implies that container weight and number of gang influence the stevedoring productivity partially.

Multiple Linear Regression

The independent variables are container weight (X1), and number of gang (X2). The

dependent variable is stevedoring productivity (Y). From the output can be obtained multiple linear regression formula with standardized coefficients as the units between the variables are different as follow:

Stevedoring Productivity = - 0.452 Container Weight + 0.417 Gang

Conclusion

Based on the multiple linear regression container weight and number of gang have influence on stevedoring productivity. The conclusion can be obtained from the research is there are factors influencing the stevedoring productivity of PT. Samudera Indonesia Tbk., Semarang Branch's vessels:

a. Container weight has negative significant influence on stevedoring productivity. The result revealed that each increase of container weight will decrease the stevedoring productivity by 0.452 with assumption the rest variables are cateris paribus.
b. Number of gang has positive significant influence on stevedoring productivity. The result revealed that each increase of number of gang will increase the stevedoring productivity by 0.417 with assumption the rest variables are cateris paribus.
c. Simultaneously, container weight and number of gang have significant influence on stevedoring productivity.
d. Changes in stevedoring productivity can be explained by container weight, and number of gang by 37.7%. The rest 62.3% of dependent variable can be explained by another independent variable which is not in this research.

Recommendation

In increasing the stevedoring productivity, thing that should be considered is the number of gang being used in every stevedoring activity, because the stevedoring productivity needs gang to help speed up the process. In stevedoring productivity while unloading the containers, separating one container from other, sometimes the twist lock between containers cannot be fully off the container. Therefore, needs gang to help remove the twist lock, because the container cannot be placed on the truck if the twits lock is still on the container. In the meeting between the port authorities and the shipping line before every vessel arrival, PT. Samudera Indonesia Tbk. can pay more attention on the number of gang that can be used optimally loading and unloading process

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