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Analysis of the Effect of Head Truck Performance on the Cargodooring Process at the New Makassar Container Terminal 1

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ABSTRACT

Makassar Port is currently the choice of many people in using transportation services, because in addition to transporting in large quantities also travel long distances. Therefore it is necessary to have an analysis of the container loading and unloading service system at the Soekarno-Hatta Makassar Container Terminal, so that the port can optimize its operational management, especially in supporting facilities for loading and unloading activities such as Head Trucks. The purpose of this study was to determine the effect of the number of loading and unloading, container cranes, and RTG on the truck head and effective time and truck head modeling. In this study, a quantitative research method was used with a descriptive approach by collecting data and then analyzing and testing the established hypothesis with the results of the head truck performance analysis on loading and unloading equipment at the New Makassar Container Terminal (TPKNM) at Makassar ports. The direct effect of loading and unloading on the head truck and CC on the head truck has a positive effect but is not significant at AP value of 0.001, while the direct effect of RTG has a positive effect on the head truck but is significant at AP value of 0.637. The direct effect of loading and unloading has a positive effect on effective time but not significant at AP value of 0.001, while the direct effect of RTG on effective time has a positive and significant effect at AP value of 0.438. Likewise, CC positively and significantly affects effective time at AP value of 0.563.

1. Introduction.

Provide as the gateway to the Eastern Indonesia Region (KTI), the existence of the Soekarno-Hatta Makassar port, especially the container port, is very important for the growth and development of South Sulawesi. The Soekarno-Hatta Makassar container port has become a support for the growth of inter-island and even inter-country trade flows, which are growing day by day. This is due to the port's strategic position in the sea transportation network system both locally, regionally, and even internationally. Indonesia is an archipelagic country, so reliable transportation is needed to connect these islands. Access and distribution channels to regions in Indonesia are very important to support the development and progress of a region. Indonesia's vast territory makes regional development in parts of Indonesia less evenly distributed, especially in eastern Indonesia. As an entry point for trade and other industrial goods routes to an area, it is necessary to have an adequate port and container terminal that is useful to accommodate the distribution process. To realize this, Indonesia needs a good and efficiently managed port sector. The definition of a port is a ship mooring service consisting of port services such as ship services, goods services, container terminal services, and various business services. Effective and efficient service to port users (ships, goods, and passengers) is a major capital for the development of a port (Triatmodjo., 2010).

The New Makassar Container Terminal is one of the core business segments of PT Pelabuhan Indonesia IV (Persero). The services of the New Makassar Container Terminal are oriented towards several basic policies, namely: cost efficiency, time ef-

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fectiveness, and customer satisfaction. The development of the quality of container terminal services is also supported by the availability of modern facilities and equipment, as well as high-quality human resources capable of providing fast, precise, and safe services. The magnitude of the potential for transshipment of goods that occurs in the field requires an increase in the service side, both the operational side and the facilities side.

The port is a place where ships dock, it is hoped that it is a place that is protected from sea disturbances, so that loading and unloading can guarantee the safety of goods. Sometimes a coastal location can fulfill this condition and the water depth/size of the port pool meets the requirements for a certain ship size, so it only needs to build a mooring (wharf) to dock the ship so that loading and unloading can be carried out. Sea transportation aims to bridge the gap between regions and promote the distribution of development results. Sea transportation has an important role in the smooth running of a business because it has economic value, including large transport capacity and relatively low costs. Port transportation is made as a center for trade and traffic of goods cargo handling where ships can dock, dock or export, load and unload goods, and forward to other areas (Kramadibrata., 2002).

For port managers, ports are a business that can be used if managed properly to generate profits. Poor management can lead to financial losses. Within the national framework, the non-financial objectives of a port may have other interests such as from a strategic perspective. Despite the change from labor-intensive and technical industries, ports are becoming a source of direct and indirect employment for several companies associated with their activities. The port consists of several functions that can meet the needs of stakeholders in different ways (Ashury., 2022).

Containers can be interpreted according to the words crate and pack. A crate is a geometric-shaped box made of natural materials (wood, iron, steel, etc.). The pack is matters relating to packing or packaging. So a container is a large box in the shape of four rectangles, made of a mixture of steel and copper or other materials (aluminum, wood/fiberglass) that are weather resistant, used as a place to transport and store a number of goods that can protect and reduce the occurrence of loss and damage to goods and can be separated from the means of transportation easily without having to remove the contents (Amir., 2004)

2. Review of Related Literature.

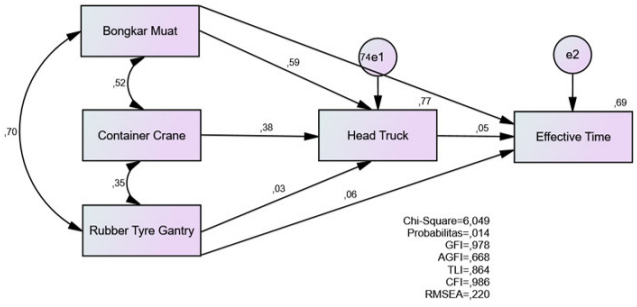
In Normayunengsi's (2019) research, the research results show the average time that a head truck can travel from the stacking yard to the pier. The most influential variables are head truck speed as the independent variable and head truck as the dependent variable. In this research, the research variables are the same, namely the number of loading and unloading, the number of containers, the number of head trucks, only in this study there is no number of head trucks as an independent variable and Budiansyah (2019) said that the waiting time for head trucks has a positive and significant effect on lost productivity. Furthermore, research by Deni Saputra (2018), in that study, all variables have a significant effect on loading and unloading speed and the most dominant container crane and Azza Aunillah (2016) the results of the equation show that if the productivity of container cranes and the frequency of ship calls are increased then the number of containers handled will also increase. V.F Andromeda (2021) idle time and container cranes have a significant effect on the cargodoring process where the loading and unloading process is the most time consuming, thus causing high logistics prices.

3. Methodology.

Data collection is the main thing in completing research. This is done as the main information and the first step in analyzing the operational performance of the loading and unloading equipment at the New Makassar Container Terminal, especially the head truck equipment. The descriptive method or data and information collection is carried out by directly observing the loading and unloading activities with the head truck and quoting from documents/archives from an agency, and individual dialogue related to the required data needs. he approach to assessing the measurement model is carried out to measure the variance extrad for each construct. Another measure of reliability is the variance extrad as a complement to the measure of construct reliability. The recommended figure for the variance extrad value is > 0,50. After testing the previous measurement model has passed the test, because it has passed the testing process, the process of testing the structural model comes from the measurement model, so making a structural model is only changing the 'arrangement' of the measurement model components. The structural model is the relationship between constructs that have a causal relationship (Ghozali., 2014)

The SEM model can be seen in figure Analysis of the structural model testing below.

Figure 1: SEM model.



Source: Authors.

Structural model testing will look for the Hypothesis value
H1: Loading and unloading against the Head Truck.
H2: RTG to Head Truck.
H3: Container Crane to Head Truck.
H4: Unloading against Effective Time.
H5: RTG to Effective Time.
H6: Container Crane to Effective Time.

4. Sources of Data.

Collecting data in the field for this study which was carried out at the New Makassar Container Terminal, for about 2 (two) months. This survey was carried out by examining using a head truck sample on each ship. There are 28 units of head trucks at the New Makassar Container Terminal with an average hauling capacity of 40 tons in good condition. The data needed for the analysis is the head truck data for each ship with a sample size of 105 ships.

5. Empirical Results.

The results of the measurement analysis produce measurements of the goodness-of-fit-model of the measurement model. It can be concluded that the model made can be identified, almost all of the data with variable indicators, both latent and manifest variables, are said to be appropriate. In the measurement model test, the chi-square result is 6.049, the probability is 0.014. Testing the model hypothesis shows that this model is in accordance with the data or fit to the data used in this study. The chi-square value is affected by the DF value, if the DF value is smaller, the chi-square value will decrease. Then the GFI result is 0.978 with conditions > 0.90, the AGFI value is 0.668 with conditions > 0.90, the TLI value is 0.864 with conditions > 0.9, the CFI value is 0.986 with conditions > 0.90, and an RMSEA value of 0.220 with conditions < 0. 8.

High GFI and CFI values indicate better fit and there is no standard for how much GFI and CFI values can be accepted as proper values, but many studies recommend values above 90% as a measure of goodness-of-fit (Ghozali., 2014).

Hypothesis calculations on the measurement model can be seen in table 1 below.

Table 1: Testing the CMIN Measurement Models.

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	14	6,049	1	0,014	6,049
Saturated model	15	0,000	0		
Independence model	5	381,124	10	0,000	38,112

Source: Authors.

The probability number p in the CMIN Default Measurement Model is the value of p (probability level) where the number is worth 0.014 because the number p0.014 <0.05 which should be P> 0.05 then (H0) is rejected, meaning that there is no significant effect between one independent variable to the dependent variable. The results of the DF calculation produce a value of 0 on the saturated model or identified model, then the model is included as just identified, which is a model that has been identified so that an estimation of the model assessment is not needed.

After the model is tested, it can be tested on the hypothesis. The basis for making a decision to test the hypothesis is done by looking at the p value with a significant level of. The results of the hypothesis can be seen in Table 2 Summary of the results of the analysis of the structural model hypothesis test below.

Table 2: The output results of the structural model hypothesis test.

Hypothesis	Jalur	Estimate
H1	BM→HT	0,592
H2	RTG→HT	0,031
H3	CC→HT	0,381
E4	BM→ET	0,740
E5	RTG→ET	0,060
E6	CC→ET	0,055

Source: Authors.

The output results show that there is a direct relationship between the number of loading and unloading trucks with the number of truck heads and an indirect relationship between the number of loading and unloading trucks and the number of truck heads, then to the effective time. The number of loading and unloading has a positive effect on the number of truck heads with a standardized coefficient of 0.592 and is significant at a p value of 0.001. RTG also has a positive effect on the number of truck heads with a standardized coefficient of 0.031 and a significant p value of 0.637. The number of CCs has a positive effect on the number of truck heads with a standardized coefficient of 0.381 and is significant at a p value of 0.001, likewise the number of loading and unloading has a positive effect on Effective Time with a standardized coefficient of 0.740 and is significant at a p value of 0.001. The number of RTGs also has a positive effect on Effective Time with a standardized coefficient of 0.060 and is significant at a p value of 0.438. CC has a positive effect on Effective Time with a standardized coefficient of 0.055 and a significant p value of 0.563.

Table 3: Table R Square.

	Estimate
HT	0,766
ET	0,685

Source: Authors.

The R-Square of the number of truck heads is 0.766 which means that the variability of the number of truck heads which can be explained by the variable variability of the number of loading and unloading, the number of CC and the number of RTG is 76.6%. While the R-Square Effective Time is 0.685, which means the Variability of Effective Time which can be explained by the variable number of loading and unloading, the number of CCs and the number of RTGs is 68.5%.

After carrying out the SEM test at AMOS, the next step is to carry out an Effective Time model analysis with the variables to be included in the number of loading and unloading (X1), the number of container cranes (X2), the number of RTG (X3), the

number of head trucks (X4) as independent variables or independent variable, then effective time as the dependent variable or dependent variable. After testing the Multiple Linear Regression analysis on these variables, the following results were obtained:

1. The value of the constant a has a value of 270.722 indicating that the consistent value of the ET variable is 270.722.
2. The value of the coefficient X1 (total loading and unloading) is 1.62 indicating that for every 1% addition of loading and unloading, the ET value increases by 1.62. The regression coefficient is positive, so it can be said that the direction of the influence of variable X1 on Y is positive.
3. The value of the coefficient X2 (total CC) is -108.89 indicating that for every 1% addition of the number of CC, the ET value increases by -108.89. The regression coefficient is negative, so it can be said that the direction of the influence of variable X2 on Y is negative.
4. The value of the coefficient X3 (Total RTG) is 12.33 indicating that for every 1% addition to the number of RTGs, the ET value increases by 12.33. The regression coefficient is positive, so it can be said that the direction of the influence of variable X3 on Y is positive.
5. The coefficient value of X4 (Number of Head Trucks) is 9.1 indicating that for every 1% addition of the number of head trucks, the ET value increases by 9.1. The regression coefficient is positive, so it can be said that the direction of the influence of variable X4 on Y is positive.

Effective Time hypothesis testing test:

1. Hypothesis Testing 1: It is known that the sig value for the effect of the amount of loading and unloading on the effective time (ET) is t count 6.4 > 1.98. So it can be concluded that there is an influence of the variable number of loading and unloading on the effective time variable.
2. Hypothesis Testing 2: It is known that the sig value for the influence of the number of CC on the effective time (ET) is t count -2.34 <1.98. So, it can be concluded that there is no effect of the variable number of loading and unloading on the effective time variable.
3. Hypothesis Testing 3: It is known that the sig value for the influence of the number of RTGs on the effective time (ET) is t count 0.98 <1.98. So, it can be concluded that there is no effect of the variable number of loading and unloading on the effective time variable.
4. Hypothesis Testing 3: It is known that the sig value for the influence of the number of head trucks on the effective time (ET) is t count 1.01 <1.98. So, it can be concluded that there is no effect of the variable number of loading and unloading on the effective time variable.

F-test was carried out at the level of $\alpha = 5\%$. If F count > F table 5%, then the regression line equation model is accepted or variable X can predict Y together.

$$F \text{ table} = F(k;n-k)$$

$$F = (4;101)$$

$$F = 2.46$$

It is known that the calculated F value is 47.69 > F table 2.46. So, it can be concluded that there is a simultaneous influence of the independent variable (X) on the dependent variable (Y).

The results of the regression analysis as a whole show the value of R Square Effective time (0.65 indicating that the correlation value or the relationship between the number of loading and unloading variables, the number of CCs, the number of RTGs, and the number of head trucks has a strong relationship level of:

$$D = R \times 100\%$$

$$D = 65.6\ \%$$

Conclusions.

Based on the research that has been conducted at the New Makassar Container Terminal to obtain the results of the head truck performance model in the cargodoring process at the Makassar Container Terminal with a sample of 105 ships using the variable number of loading and unloading, number of container cranes, and number of RTG, the final results of this study, show that each hypothesis that has been tested is positive / negative and significant / insignificant so that it can be described as follows:

The direct effect of the number of loading and unloading on the number of head trucks and the number of CC on the number of head trucks has a positive and significant effect at a p value of 0.001, and also the direct effect of the number of RTGs has a positive effect on the number of head trucks but is significant at a p value of 0.637.

The direct effect of the number of loading and unloading has a positive effect on effective time and is significant at a p value of 0.001, and also the direct effect of the number of RTGs on effective time has a positive and significant effect at a p value of 0.438. Likewise, the number of CCs has a positive and significant effect on the p value of 0.563.

The indirect effect of the number of loading and unloading to the effective time mediated by the number of head trucks shows a value of 5.97 > 1.98 where the indirect effect of the number of loading and unloading to the effective time is significant and there is mediation of the number of head trucks. The relationship between the indirect effect of the number of RTGs on effective time and the mediation of the number of head trucks shows a value of 0.40 <1.98 where the indirect effect of the number of RTGs on effective time is not significant or there is no mediation. Likewise, the relationship between the number of CCs on effective time mediated by the number of head trucks shows a value of 0.57 <1.98 where the indirect effect of the number of CCs on effective time is not significant or there is no mediation.

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