

YOR Analysis at Jakarta International Container Terminal

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Abstract. PT. Jakarta International Container Terminal (PT. JICT) is one of an affiliate company with PT. PELINDO built at 1999. Located in North Jakarta, PT. JICT specialized in discharge and loading service business of container, export, and import. There are many factors that influence the YOR (Yard Occupancy Ratio). For instance dwelling time, cargo volume, yard capacity, and crane operations. The purpose of this research is to identify crane operation, in this case crane operating hours and dwelling time have relation or not to yard occupancy ratio and how big those variables influence YOR. In this research, we use quantitative method by using multiple linear regression with data from PT. JICT. From analysis of the last 5 years data, we found out the result of analysis and discussion of crane operating hours and dwelling time to YOR by equation of double linear regression line, that is $Y = 0,283 + 0,133X_1 + 5,771X_2$. Dwelling time has medium and positive relation to yard occupancy ratio with 25.90% contribution to YOR. This means if dwelling time is high then yard occupancy ratio will be high. And for crane operating hours has low and positive relation to yard occupancy ratio with 15.60% contribution to YOR which means if crane operating hours is high then yard occupancy ratio will also high but the increase is low.

Keywords: yard occupancy ratio, dwelling time, container terminal port

1. Introduction

As the country that dominated coast and waters, sea transportation has a strategic functions in Indonesia, that makes the condition of ports become the most important things to support economics in Indonesia. Port is one of the facility that used to serve activities even in or out of ships, cargoes and passengers. Port divided into two types, there are general port and the special/specific port. General port managed by the government by one of business entity. Meanwhile, the special/specific port is used as the individual business and supporting certain activities for own cargo.

This case actually brings the consequences to the port's business segment management in order to make the operational runs effective, efficient which make port's service become include safe and faster with the competitive price. Theoritically, as part of sea transport's chain which means function of the port, as an interface of transportation's mode or more.

PT. Jakarta International Container Terminal (JICT) is one of big company that do business in handling container service of import and export container, which is a subsidiary company of PT.PELINDO has beginning since 1999. JICT's service history should be said very good, because it has served nearly and even more than three million TEUs (per year), so can be conclude that the company is including one of the busiest container terminal in Indonesia, actually in Tanjung Priok. That all because it always develop all of component which supports the flow of containers, the first one is enlarge the stack fields more than 3, 5 ha also added jetty's area more than 552 meters.

JICT also is the part of industrial's activity, portrait of international modernization port. Located in West Java near the industrial entity make it commitments to increase the service. For

shipping routes and technology, no doubt, it always try to develop it in order to keep the integrity and fulfill customer's satisfaction.

Become the maritime country make the ship has an important role in doing export import of goods in Indonesia. With a big capacity, ship can carry any kind of cargo that shaped into a box, containers, liquid, etc. To implement the shipping well, it needs the infrastructure that support all of ship activities. The most needed and should be prepared is the Port. Port should be prepared in order to create all activities running well. Unfortunately in this era, port of JICT has been facing the phenomena which come and to be avoided. Firstly, that's called as dwelling time. Dwelling time is time that count for import container since they discharged from ship's berthing until gate out. Its used to occurs for around 3,8 days only in average counts.

Based on the description above and the limitations of capability also time, authors focused only to the two factors that will be analyzed, which are dwelling time and nett crane hours that influence the yard occupancy ratio in JICT. However, although this case are too many to be researched, there has been limited research reported use the variable that authors choosed. The purpose of the present study is we would like to see how large is the influence of dwelling time to yard occupancy ratio, how big is the influence of nett crane hours to yard occupancy ratio, and how big are the influence of dwelling time and nett crane hours simultaneously to yard occupancy ratio.

2. Literature review

2.1. Container Terminal Port

Port is meeting point of all of service in several categories such as passanger, cargo, even container, and also area of ship's activity including docking, discharge and loading, and another activities related to the ship [1]. Port has important function, firstly as the link or chain or transport, secondly as a gate way of goods traffic, next as interface of goods on the sea side and landside, the last is as the industry entity or supporting the development of industry around port [2]. Inside the port, there is a place that used as the area of all process, it called as Terminals, which can be described as center area of transportation activities, start from process of discharge and loading cargo or containers from origin port to destination port and even for passangers [1]. Nowadays, shipping company mostly implement the containerization system because it cut off the cost cheaper and easy to moves, no need another equipment to discharge and loading the cargo which is extra costly (X. Yang & Yip, 2019). Following the dominant of using container, half of terminals in Indonesia serve the containers. Container is the big special box that permanently made to run the move process of good easier, which able to used routinely when it empty and needed by unitized all goods inside in one area according to kinds of goods [5](Taringan, 2018). Container terminals used to defined as the external interfaces from two aspects, from the discharge and loading containers that known as the quayside and trucking process of containers as the landside which operated by qualified labors and equipments (Steenken, Voß, & Stahlbock, 2004).

2.2. Discharge and loading

After containership arrives at the jetty, containers will be discharged to container yard or might be loaded into the ship by using equipments that have legally chose, for instance container crane (the most needed), head truck, chassis, RTGC (Rubber-Tired Gantry Cranes), forklift, etc. (W. Yang & Liang, 2015) (Timur, 2016). There are many factors which caused the bad terminals operations, example performance of labors, totals and sizes of containers, totals of equipments, yard capacity and period of containers storaged in yard or it called as dwelling time. (Hendra Gunawan, Suhartono, 2008). However, activities in container terminals used to consists of 4, there are **Stevedoring**, which means process of moving the containers from board to the yard or probably to quayside and moving the containers from yard to the ship that helped by equipments needed. Secondly is **Cargodoring/quay transfer**, defined as process of

moving the containers from side of sea to the port's warehouse even to the CY and from port's warehouse or CY to the side of sea to be loaded. Next is **Receiving/Receividing**, means process of put the containers from outside to the port area. And the last is **Delivery/Deliverydoing**, that known as process of shipping the containers from port area/warehouse until get out from the port. These activities generally matters in port, special in container terminals. (ISWANTO, 2016)(Drs. Ec.Herman Budi Sasono, 2003). Receiving/Delivery including the process of taking the containers from port's warehouse or container yard until the containers out from port area, or even taking the containers from outside to enter the port area. Usually, R/D related to the customs clearance, because before the containers want to take out, should be finished the payment or taxes, by showing the supporting documents like state of ownership documents, manifest, etc. R/D in the practical is the really end step of discharge and loading activities, means if the tax hasn't be paid by container's owner, will get no permission from customs clearance to bring out the container from port, end it clearly, and stevedoring company has to move fast in confirmate the containers to the owner so they can prepare all the duty (Rasyid, Santoso, & Prananingtyas, 2017).

2.3. Dwelling time

Dwelling time known as temporary time for storage of container actually for import goods, which counted from discharge of container from ship, put it in the yard while finishing the administration by customs department until the container out of gate took by owner. The process of dwelling time also known as the pending process especially for import containers because there's a duty which have to be finished quickly, those process called as customs cleareance, might be there's payment that hasn't paid yet or the containers in red area where they must be checked physically by the related staffs, and all activites which related to the step of container's out (Taringan, 2018). Dwelling time has so many reasons to happen, one of them is the system of permission that complicate all of consignee/cargo owner, which impact the fee of storage (Ricardianto, Suhalis, & Sirait, 2018).

2.4. Yard occupancy ratio (YOR)

Yet, for the implementation, in reality, container lived too long in the yard that influenced density level of yard where the yard can't be stored for a while in the yard because there's no place can be used anymore. This tragedy common sense and used to known as YOR (yard occupancy ratio)(Abdul Rahman et al., 2016). YOR could be defined as ratio between the yard capacity used with available yard capacity (in percentage). Consequently, if YOR is uncontrol well or we can called it as "overload the capacity", will caused the congesti which make productivity reducing, density of truck increasing in or out of terminals, complain from customer, delay of goods, etc. YOR'S limit are different in every company because they have different target and procedure in handle terminals, means not always same but there's an average has made, not more than 75% (Louis, 2013). Dwelling time and YOR become the serious case because will attracted country's economics. Every country has different DT, one day or two days or up to seven days. But it back the port management. If the management is good, port will be condusive and stabile. (Witjaksono, Marimin, Marimin, & Rahardjo, 2016). Around 2015, Government of Indonesia actually Ministry of Transportation makes a rule about the dwelling time that maximum allowed around three days in case to reduce the density of containers in the terminals and keep the terminals runs well (Sangian, 2015). The relation between YOR and dwelling time become so tight because logically and in reality, if the volume of goods are overcapacity than the capacity of yard, it will attract process of discharge and loading. Because trucks will park in the area and average of productivity will be reduced, beside of that, port has a function as the industry entity, that means if the moving of containers are slow, industrial activity will be slow and in trouble (Witjaksono et al., 2016). As the solution of dwelling time, overbrengen used to be the alternative way to reduce it, overbrengen means move the containers to the temporary storage area by looking and focus to target, that's

from side of the longest dwelling time containers, so there will no density in terminals, and performance still doing good. (Louis, 2013)

2.5. Nett crane hours / box crane hours

Equipment means all of things that used and needed to supporting the flow of discharge and loading of cargo, especially in containers sector, which is dominantly with heavy or big capacity of equipments (Marzuki, 2008). Equipment becomes an important component beside all, because the equipment that will be used should be handled and prepared based on the function, capacity, totals, also the container's size (Park, Yoon, & Park, 2014). Nett crane hours or with Box Crane Hour (BCH), is condition where the equipments actually container crane can lift containers in scale per hours according to totals of containers that can be grabbed or shortly how many containers that can produced by container crane in each hour in order to increase the quality of terminals. (Valentonia, Karnowahadi, & Paniya, 2018) (Devi & Yuwono, 2015). Box Crane Hours (BCH) is attracted by several factors, there are from aspect of ship/vessel, variation of containers, truck, jetty, handling, etc.(Devi & Yuwono, 2015).

3. Research method

This research use quantitative method. Quantitative method emphases on collecting numerical data to explain particular occurrence (Babbie, 2010). Data from PT. JICT analyzed with multiple linear regression. Multiple linear regression is regression analysis with one dependent variable and more than one independent variable (Uyanık & Güler, 2013). Dependent variable is yard occupancy ratio as Y. Independent variables are dwelling time as X1 and net crane hours as X2.

4. Discussion and result

4.1. Influence of nett crane hours and dwelling time to yard occupancy ratio

The result from multiple regression equation is $Y = 0.283 + 0.133X_1 + 5.771X_2$. Constant value of 0.283 meaning if yard occupancy ratio (Y) is not affected by dwelling time (X1) and nett crane hours (X2), it means the mean value of yard occupancy ratio is 0.283. Regression coefficient for dwelling time (X1) is positive, shows there is relation between dwelling time (X1) with yard occupancy ratio (Y). Regression coefficient value of dwelling time (X1) is 0.133 meaning for every increase on dwelling time (X1) will increase the yard occupancy ratio (Y) to 0.133. Regression coefficient for nett crane hours (X2) is positive meaning there is relation between nett crane hours (X2) with yard occupancy ratio (Y). Regression coefficient value of nett crane hours (X2) is 5.771 meaning for every increase on nett crane hours (X2) will increase the yard occupancy ratio (Y) to 5.711. The result from correlation analysis between dwelling time and net crane hours with yard occupancy ratio from the last 5 years is shown in table below:

Table 1. Multiple correlation coefficient

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.735 ^a	.540	.523	.066

^a Predictors : (constant), net crane hours, dwelling time

Based on the table above, the correlation coefficient between independent variables and dependent variable is 0.735. The correlation coefficient is positive meaning if independent variables are increase then dependent variable is also increase. Correlation coefficient value is 0.735 shows the correlation is strong.

Table 2. Correlation

		Dwelling time	Net crane hours	YOR
Dwelling time	Pearson correlation	1	-.237*	.509**
	Sig. (1-tailed)	-	.034	.000
	N	60	60	60
Net crane hours	Pearson correlation	-.237*	1	.395**
	Sig. (1-tailed)	.034	-	.001
	N	60	60	60
YOR	Pearson correlation	.509**	.395**	1
	Sig. (1-tailed)	.000	.001	-
	N	60	60	60

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

From correlation table above, it shows the correlation between dwelling time (X1) and yard occupancy ratio (Y) is 0.509 meaning the correlation is medium, constant and significance. The correlation between nett crane hours (X2) and yard occupancy ratio (Y) is 0.395 meaning the correlation is low, constant and significance. Both correlation is positive.

Coefficient of determination used to measure the amount of dependent variable described by the predictors (Zhang, 2016). The result of coefficient of determination is shown on table below:

Table 3. Coefficient of determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.735 ^a	.540	.523	.066

^a Predictors : (constant), net crane hours, dwelling time

The table shows that R^2 (R Square) is 0.540 or 54% meaning the independent variables (dwelling time and net crane hours) have contribution to dependent variable (yard occupancy ratio) in the amount of 54% although the rest of 46% is other variable that not included in this research.

Hypotesis testing used to find if independent variables (dwelling time and net crane hours) have significance influence or not to dependent variable (yard occupancy ratio). The result of hypothesis testing is shown on table below:

Table 4. Anova^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.293	2	.146	33.405	.000 ^b
	Residual	.250	57	.004		
	Total	.543	59			

^a Dependent variable : YOR

^b Predictors : (constant), net crane hours, dwelling time

Based on anova table, the F_{count} is 33.405. And then the F_{table} based on signification level $\alpha = 0.05$, $df_1 = k-1$ ($3-1$) = 2, $df_2 = n-k$ ($60-3$) = 57. The value of F_{table} is 3.16. Both value of F_{count} and F_{table} compared will result that F_{count} is larger than F_{table} ($33.405 > 3.16$). This comparison meaning H_0 is rejected and H_a is accepted. As a result independent variables (dwelling time and net crane hours) has influence to dependent variable (yard occupancy ratio). Based on table 4, it shows that value of signficancy is 0.000 which smaller than 0.005 ($0.000 > 0.005$) meaning independent variables (dwelling time and net crane hours) has significance influence to dependent variable (yard occupancy ratio).

5. Conclusions

The highest of dwelling time occurred on June and the lowest occurred on April. For net crane hours, the highest is happened on January meanwhile the lowest is happened on June. On yard occupancy ratio, the highest is on July and the lowest is on March.

The multiple regression equation is $Y = 0.283 + 0.133X_1 + 5.771X_2$. Dwelling time has medium, significance and constant correlation to yard occupancy ratio at PT. Jakarta International Container Terminal. This proved by correlation analysis that dwelling time has 0.509 correlation value to yard occupancy ratio. Nett crane hours has low, significance and constant correlation to yard occupancy ratio at PT. Jakarta International Container Terminal. This proved by correlation analysis that nett crane hours has 0.395 correlation value to yard occupancy ratio. Dwelling time and net crane hours which carried out simultaneously has strong, significance and constant to yard occupancy ratio at PT. Jakarta International Container Terminal. This proved by multiple correlation coefficient analysis which shows that dwelling time and nett crane hours which carried out simultaneously has 0.735 correlation value to yard occupancy ratio.

Dwelling time and nett crane hours have contribution in the amount of 54% to yard occupancy ratio because the R Square is 0.540 or 54%. The result of hypothesis test which carried out simultaneously indicate that dwelling time and net crane hours have significance influence to yard occupancy ratio at PT. Jakarta International Container Terminal because $F_{\text{count}} > F_{\text{table}}$ ($33.405 > 3.16$).

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