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Yard Occupancy Ratio Insights: Investigating Dwelling Time and Throughput at Jakarta International Container Terminal

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Abstract: Yard Occupancy Ratio (YOR) measures capacity usage in the container stacking area. The higher the YOR, the more containers will enter the port terminal. However, sometimes, an increase in YOR can be a problem for the container terminal itself, and this is the primary phenomenon in this research. The research aims to determine and analyze the relationship between Dwelling Time, Throughput, and Yard Occupancy Ratio at Jakarta International Container Terminal. The research design used is an associative-quantitative method. Data was collected by surveying by distributing questionnaires to 132 respondents of JICT employees and customers, each totaling 68 people, using convenience sampling. Multiple Regression Analysis is used to test the results of hypothesis data testing, that is it is Y= 9.102 + 0.354 X1 + 0.417 X2. This research found a positive and significant relationship between the two independent variables, Dwelling Time and Throughput, with the dependent variable, Yard Occupancy Ratio.

Keywords: *dwelling time, throughput, yard occupancy ratio, container terminal, loading unloading service*

1. Introduction

Indonesia is a state that has the characteristics of a maritime country with many ports essential in supporting the domestic and world economy and trade. Tanjung Priok is the busiest and largest port in Indonesia. Among several terminal facilities in the Tanjung Priok Port area, one of them is the Jakarta International Container Terminal (JICT), which is the largest container terminal in Indonesia and was founded in 1999 in collaboration between Hutchison Port Holding Group (HPH Group) and PT Pelabuhan Indonesia (Persero). JICT management is under the port authority, responsible for providing loading and unloading services for container ships and facilitating the inspection of container documents for sailing ships. Operational activities at JICT include receiving operations, unloading/loading operations, delivery operations, and berthing contact.

Loading and unloading activities are crucial for the operational efficiency of ports and the Indonesian economy. Efficient and productive loading and unloading activities can significantly contribute to achieving the predetermined loading and unloading production targets. Loading and unloading activities include various activity processes, which include

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stevedoring (unloading and loading goods from or into a ship), cargodoring (releasing goods slings from the cargo hook of the ship at the dock and transporting the goods from the dock to the stacking yard, or vice versa), as well as receiving and delivery (receiving and handing over goods in or from the warehouse). Every movement of export and import goods must be regulated in a good system and control, and this is where the role of port managers becomes crucial.

Dwelling time is a very important factor in determining the efficiency and productivity of loading and unloading activities at a port. Dwelling time refers to the duration measured from when the container is discharged from the vessel and hoisted out of the port terminal through the main exit. It directly impacts port operational efficiency and ship waiting times at the port. Therefore, reducing dwelling time is one of the initiatives at enhancing productivity and effectiveness within ports. One of the consequences of inefficient handling of the loading and unloading process is an increase in the number of goods piled up in the stacking area.

Apart from dwelling time, throughput is also a very important factor in determining the efficiency and productivity of loading and unloading activities at a port. Throughput is the total volume of goods that pass per unit of time (Kosasih & Soewedo, 2019). To support the smooth management of the flow of goods, sufficient storage space is needed to accommodate the number of goods available. Is the ratio of total area capable of being proportional to total throughput? If throughput is too high, then goods storage will be hindered. However, if it is too low, the total yard area will become empty, and productivity will not run smoothly. elain dwelling time.

Based on previous research conducted by (Affiat et al., 2021), Throughput and Dwelling Time (a study at PT IPC Pelabuhan Sunda Kelapa), it was found that Throughput and Dwelling Time significantly influence Yard Occupancy Ratio at PT IPC Pelabuhan Sunda Kelapa, accounting for 95.5% of the variance. Another study (Narahawarin, 2017) on the impact of Throughput and Dwelling Time (a study at Terminal Peti Kemas Koja) revealed that Throughput and Dwelling Time significantly affect Yard Occupancy Ratio at Terminal Peti Kemas Koja, explaining 76.2% of the variation. Another study conducted by (Febryani et al., 2019) titled Dwelling Time and Nett Crane Hours (study at the Jakarta International Container Terminal) explains that Dwelling Time has a medium and positive relation to Yard Occupancy Ratio with 25.90% and Crane Operating Hours has a low and positive relation to Yard Occupancy Ratio with 15.60%.

Regarding the background, the central focus is analyzing the factors affecting the yard occupancy ratio, specifically dwelling time and throughput. Yard Occupancy Ratio is selected as it is the most significant factor influencing container terminal operations (Zhen, 2016) the objective of this study is to determine the extent of Dwelling Time influence on the Yard Occupancy Ratio, the extent of Throughput influence on the Yard Occupancy Ratio, and the combined influence of Dwelling Time and Throughput on the Yard Occupancy Ratio.

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2. Literature review

2.1. Container Terminal

A container is a specially designed packaging with specific dimensions intended for repeated use and designed to store and transport its contents (Suyono, 2007).

A terminal is a port facility consisting of a berthing pool and a place for ships to dock or moor, a place for piling up, a place for waiting and boarding and disembarking passengers, and a place for loading and unloading goods (*Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 134 Year 2016 on The Management of Ship Security and Port Facilities*, n.d.). It can be concluded that a container terminal is a special place for transferring container cargo from sea to land or vice versa, equipped with loading and unloading facilities and a storage area.

As per the findings of (Witjaksono et al., 2016), a container terminal functions as a central hub for different transportation methods, wherein containers carried by ships, trucks, or trains are briefly held in container yards before proceeding with their journey through the same or alternative transportation modes. A container terminal consists of the following components:

Unit Terminal Container (UTC)

It is a specialized terminal within a seaport, featuring a spacious and hardened yard area for loading/unloading and stacking containers that are either being unloaded from or loaded onto a vessel.

Container Yard (CY)

A designated area within the port is used to store Full Container Load containers to be loaded onto or unloaded from ships.

Container Freight Station (CFS)

An area used for storing Less Container Load containers, conducting stuffing/unstuffing operations, and storing break-bulk cargo destined for stuffing into containers or unstuffing from containers.

Inland Container Depot (ICD)

Located in inland or non-port areas and supervised by customs authorities, an ICD is used for storing FCL containers that will be delivered to consignees or received from shippers.

2.2. Loading and Unloading

Loading and/or unloading are the activities of lowering and raising goods from/to ships (Lasse, 2016). Cargo unloading can occur directly from the ship (direct delivery) to trucks, trains, or barges, or the cargo may pass through a warehouse or yard (indirect delivery) while awaiting pickup by the owner. Loading can also be conducted directly (direct delivery) from trucks, trains, or barges or through a warehouse or yard (indirect delivery) to optimize loading planning or to accommodate the vessel's arrival.

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Cargo Handling Company is an Indonesian legal entity in the form of a Limited Liability Company that engages in transport-related services in the maritime sector, specifically for cargo handling activities (Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 152 Year 2016 on the Organization and Implementation of Cargo Handling From and to Ships, n.d.).

As outlined in (Lasse, 2016), the operational sequence of ship cargo handling proceed in the following order: 1. Ship Operation, involving the unloading of cargo directly onto trucks or railway wagons and/or onto barges and through warehouse or yard storage; 2. Quay Transfer Operation covers cargo movement from the dock, particularly to warehouses or yards; 3. Storage or Shed and Yard Operation, responsible for arranging cargo systematically within warehouses or yards; 4. Receiving & Delivery Operation encompasses cargo transfer, which can occur at the dock (to trucks or barges) or on the landward side in warehouses or yard storage areas.

2.3. Dwelling Time

Dwelling Time is the average number of days per ton, cubic meter, or container stacked per month (Kosasih & Soewedo, 2019). According to Raja Oloan Saut Gurning and Eko Hariyadi Budiyanto, Dwelling Time, or the average duration goods are stacked, is the total number of days on average that each ton or item is stacked during one month (Affiat et al., 2021). According to (Ellenlies et al., 2021), factors influencing the length of dwelling time in a port include: 1. Pre-Clearance, where containers are placed in a temporary storage area and Import Goods Notification (PIB) document preparation; 2. Customs Clearance, involving physical inspection of containers (especially for red lane shipments), document verification by customs authorities, and issuance of the Goods Release Approval Letter; 3. Post-Clearance, where containers are transported out of the port, and payment is made to the port operator.

According to (Ricardianto et al., 2019), several causes occur high dwelling time at the port Tanjung Priok namely, 1) Growth relatively high activity in the Ocean Going (21%/year), Domestic (23%/year), 2) Not ready infrastructure and superstructure, 3) The quality of human resources is still lacking (loading and unloading equipment operator, workforce customs inspector, inspector quarantine), 4) Risk Management System and methods of inspection of goods not optimal, 5) Examination Place Integrated Physical (TPFT), which is not yet running well, and 6) the attitude of the owners goods/importers are impressed to make port as a storage place goods.

2.4. Throughput

Throughput is the quantity of ship tonnage or goods passing through a facility per unit of time (Kosasih & Soewedo, 2019). According to Alan E. Branch, Throughput represents the comprehensive magnitude of commerce within a specific timeframe and under defined conditions, such as the complete tonnage moving through a warehouse

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or terminal, the overall number of passengers traversing a terminal, or the total quantity of cars manufactured at a factory within 24 hours (Lasse, 2016).

According to (Mohseni, 2011), Terminal throughput involves three primary elements: (1) Waterside Throughput. It measures the container volume, expressed in TEUs, loaded onto and offloaded from the quay. The magnitude of waterside throughput is contingent on factors like the quay's length, the number of operational quay cranes, the diversity and quantity of horizontal transportation equipment employed, and the circulation capacity on the quay's traffic side during quay transfer operations. (2) Container Yard Throughput, pertains to the cumulative TEU visits made by containers of all kinds, including inbound, outbound, and transshipment, as they traverse the container yard throughout the year. Determining CY throughput is critical in evaluating the container yard's capacity and selecting suitable crane types for the yard's handling equipment. (3) Landside throughput, deals with the total number of TEUs that move through the terminal gates, traveling to and from the hinterland. The calculation of landside throughput is vital for the assessment of the handling capacity of stack handling operations and the overall traffic circulation system's capacity within the terminal.

2.5. Yard Occupancy Ratio (YOR)

According to (Lasse, 2016), Key Performance Indicators (KPIs) are essential tools for management, particularly for operational control, such as terminal managers or operations supervisors. KPIs represent performance parameters and target achievement measures, including 1) Service to vessels; 2) Cargo and container handling output; 3) Utilization of port facilities and equipment; and 4) Cost per ton handled.

The yard and equipment utilization metric is referred to as utilization, which is the ratio of facility usage to available capacity. Fundamental facility utilization encompasses: 1) Docks; 2) Warehouses/Yards; and 3) Floating equipment and cargo handling tools.

The utilization of yard facilities is expressed as the Yard Occupancy Ratio, which is the percentage of capacity used compared to the total yard capacity, measured in percentage (%). Yard Occupancy Ratio (YOR) is the measure of container stacking utilization at the terminal relative to its total capacity over one year (Kosasih & Soewedo, 2019).

A container yard is an area expressly set aside for storing both loaded containers, which are the property of a shipper or receiver, and empty containers waiting for shipment. The yard occupancy ratio calculation involves assessing how effectively the container yard facilities are used for the total yard capacity, which is expressed as a percentage. This metric is employed to gauge the efficiency of the Yard Occupancy Ratio to estimate the usage of the dock facilities at the port (Triatmodjo, 1996).

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The yard occupancy ratio is a measure that assesses how efficiently storage space is used in comparison to the available operational storage capacity. It is calculated using ton-days or cubic meter-days and is presented as a percentage. This ratio is a performance indicator for the port (Mulyono, 2016).

If the YOR exceeds its capacity, several consequences may ensue: 1) Congestion might occur at terminals leading to decreased performance, 2) Congestion of transporting trucks within and outside the terminal, 3) Delays in raw material arrivals at their destinations, consequently hindering factories/industries from adhering to their schedules, 4) Disruptions in the exportation of goods potentially disappointing international buyers, 5) Stakeholder complaints/claims, 6) Increased cost in the economy, 7) Difficulties for ships to adjust schedules to the subsequent ports due to delays, 8) Reduction in investor trust, and 9) Necessitating a prolonged duration to lower the YOR (Verawati & Damawaldi, 2020).

In the context of this research, a conceptual framework is necessary to establish the relationships between the variables, which are as follows:

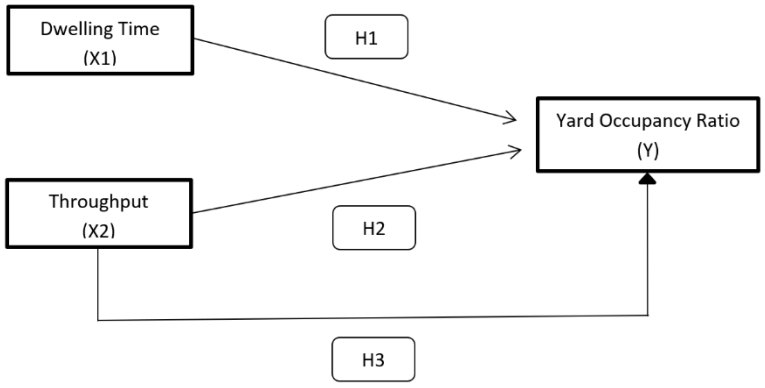

Fig. **1** Conceptional Framework

H1 = Dwelling Time is suspected to significantly influence Yard Occupancy Ratio in JICT.

H2 = Throughput is suspected to significantly influence Yard Occupancy Ratio in JICT.

H3 = It is suspected that Dwelling Time and Throughput simultaneously significantly influence Yard Occupancy Ratio in JICT.

3. Research method

This research used associative-quantitative methods. Associative research is a type of research that entails formulating inquiries concerning the correlation or connection

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between two or more (multiple) variables (Sugiyono, 2019). In this research, associative research is used to determine the strength of the relationship between variables X (independent variable) consisting of dwelling time (X1) and throughput (X2) with variable Y (dependent variable), namely yard occupancy ratio.

Quantitative research methods can be explained as research methods based on the philosophy of positivism, conducting research on a specific population or sample, using research tools to collect data, and quantitative/statistical data analysis with the purpose of testing predetermined hypotheses (Sugiyono, 2019). The purpose of this research is to test the proposed hypothesis by measuring the significance of the relationship between the independent and dependent variables. Quantitative analysis shows how one variable affects other variables (Creswell, 2012).

According to Ismiyanto, the population is the whole or all research subjects, be they objects, people, or something else from which important information can be taken as research data (Roflin et al., 2021). The population of this research includes all employees working in Jakarta International Container Terminal and service users of Jakarta International Container Terminal. The sampling technique used in this research is convenience sampling when the researcher does not have data about the population in the form of a sampling frame and then selects samples based on the principle of ease in taking/selecting samples (Abdillah & Hartono, 2015). The sample size is determined by a formula: the sample size should be between 100-200 respondents (Hair et al., 2018). It is because the minimum and maximum sample size is at least five to ten times greater than the number of question items based on the indicators used, resulting in a sample of 132 respondents consisting of 68 JICT employees and 68 JICT service users.

Data collection techniques were obtained using questionnaires distributed via Google Forms media. A questionnaire is a primary data collection method using several question items or statements in a specific format (Abdillah & Hartono, 2015). This research used a questionnaire survey to obtain information and responses from employees and customers regarding Dwelling Time, Throughput, and Yard Occupancy Ratio at JICT. The scale that was used in creating the questionnaire is an ordinal scale, often called a Likert scale, which contains five levels of response preference (Ghozali, 2018). The five response preference levels used in the questionnaire for this research are: Strongly disagree, marked with point "1"; Disagree, marked with point "2"; Neutral, marked with point "3"; Agree, marked with point "4"; Strongly agree, marked with point "5".

Subsequently, the authors employed Multiple Regression Analysis using SPSS Version 29. SPSS, an acronym for "Statistical Product and Service Solution," represents a computer program for statistical analyses. Within this context, the tests conducted encompassed assessments of validity, reliability, Classical Assumption Testing, and Significance Testing.

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4. Results and Discussion

This section shows a general overview of the outcomes of analytical research data regarding the correlations between research variables that were investigated. This data analysis aims to determine the relationship between Dwelling Time (X1), Throughput (X2), and Yard Occupancy Ratio (Y) at JICT in 2023. This data was obtained based on answers from 136 respondents, 68 of whom are JICT employees and JICT service users. as many as 68 people.

Table 1 Demographic aspects of the survey participants

No	Characteristic	Frequency	Percentage
1.	*Gender*		
	Female	40	29,41%
	Male	96	70,59%
2.	*Level of Education*		
	Senior high school	39	28,89%
	Associate degree	20	14,81%
	Bachelor degree	72	53,33%
	Master degree	4	2,96%
3.	*Status*		
	JICT employee	68	50%
	JICT customers	68	50%

Source: Author's results (2023)

Based on Table 1 above, the sample in this research was dominated by male respondents; most respondents had their final education at Bachelor's level.

4.1. Validity Test

The item validity test serves as an instrument to gauge the accuracy of data items in measuring the intended metrics. An item is deemed valid when it exhibits a significant correlation with its total score, indicating the item's support in revealing the intended aspect (Purnomo, 2016).

In this research, we employed the Pearson Correlation Method. Testing item validity using Pearson correlation involves correlating item scores with their respective total scores. The significance test was conducted with criteria using the critical value from the t-distribution at a significance level of 0.05, employing a two-tailed test. The specifics of the Pearson Correlation Method are detailed as follows.

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Table 2 Pearson Correlation Model Assessment Criteria

Criteria	Explanation	
Pearson Correlation	r count ≥ r table	Valid
	r count < r table	Invalid
	r table < 0.05	Valid
	r table > 0.05	Invalid
Correlation Coefficient Value (r)	0.00 – 0.199	Very Weak
	0.20 – 0.399	Weak
	0.40 – 0.599	Moderate
	0.60 – 0.799	Strong
	0.80- 1.000	Very Strong

The following are the data processing results based on three variables with 24 questions.

Table 3 Pearson Correlation Test Results

Variable	Indicators	Pearson Correlation	r table	Conclusion
Dwelling Time (X1)	X1.1	0.849	0.000	Valid
	X1.2	0.851	0.000	Valid
	X1.3	0.709	0.000	Valid
	X1.4	0.704	0.000	Valid
	X1.5	0.824	0.000	Valid
	X1.6	0.847	0.000	Valid
	X1.7	0.774	0.000	Valid
	Total	1.000		
Throughput (X2)	X2.1	0.807	0.000	Valid
	X2.2	0.789	0.000	Valid
	X2.3	0.695	0.000	Valid
	X2.4	0.762	0.000	Valid
	X2.5	0.777	0.000	Valid
	X2.6	0.728	0.000	Valid
	X2.7	0.768	0.000	Valid
	X2.8	0.710	0.000	Valid

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	X2.9	0.772	0.000	Valid
	Total	1.000		
Yard Occupancy Ratio (Y)	Y1.1	0.909	0.000	Valid
	Y1.2	0.900	0.000	Valid
	Y1.3	0.864	0.000	Valid
	Y1.4	0.913	0.000	Valid
	Y1.5	0.917	0.000	Valid
	Y1.6	0.884	0.000	Valid
	Y1.7	0.928	0.000	Valid
	Y1.8	0.896	0.000	Valid
	Total	1.000		

Source: Author's results (2023)

		Dwelling Time	Throughput	YOR
Dwelling Time	Pearson Correlation	1	.769**	.721**
	Sig. (2-tailed)		.000	.000
	N	136	136	136
Throughput	Pearson Correlation	.769**	1	.749**
	Sig. (2-tailed)	.000		.000
	N	136	136	136
YOR	Pearson Correlation	.721**	.749**	1
	Sig. (2-tailed)	.000	.000	
	N	136	136	136

**. Correlation is significant at the 0.01 level (2-tailed).

Fig. 2 Pearson Correlation

Utilizing the data presented in Table 3, it concluded that all indicators related to research variables have an r count above 0.5. R count values that exceed this threshold are sufficient to meet the criteria. Therefore, all the data in the table shows that all indicators are considered suitable or valid for this research and can be analyzed further. The data presented in Figure 1 illustrates a correlation of 0.721 between Dwelling Time and YOR and a correlation of 0.749 between Throughput and YOR. This indicates a robust relationship between Dwelling Time and Throughput concerning Yard Occupancy Ratio.

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4.2. Reability Test

Reliability testing is utilized to assess the accuracy or consistency of a measurement tool, typically involving questionnaires, to ascertain whether the measurement instrument yields consistent measurements upon replication (Purnomo, 2016).

The approach adopted for this study encompasses the utilization of the Cronbach Alpha method. Its application aims to ascertain the reliability of the instrument, stipulating the threshold at 0.6. Sugiyono (2018:220) asserts that an instrument is deemed reliable when the reliability coefficient reaches a minimum of 0.6. Consequently, any measuring tool exhibiting a Cronbach Alpha value < 0.6 is considered unreliable.

The following are the data processing results based on three variables with 24 questions.

Table 4 Reability Test Results

	Cronbach's Alpha
X1	0.902
X2	0.906
Y	0.967

Source: Author's results (2023)

Utilizing the data presented in Table 4, it concluded that each variable has a Cronbach's alpha value above 0.6. Cronbach's alpha values that exceed this threshold are sufficient to meet one of the reliability criteria. Therefore, all the data in the table shows that all indicators are reliable for this research and can be analyzed further.

4.3. Classic Assumtion Test

As per Ghozali (2018:159), determining the accuracy of a model requires testing several classical assumptions, namely, normality testing, multicollinearity testing, and heteroscedasticity testing.

Table 5 Classic Assumtion Test Criteria

Criteria	Explanation	
Normality Testing	$R^2 \leq 0.25$ (25%)	Weak relationship
	R^2 0.26 – 0.74 (26% - 74%)	Moderate relationship
	$R^2 \geq 0.75$ (75%)	Strong relationship
Multicollinearity Testing	$Q^2 < 0$	Variables and data cannot predict the model well

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	$Q^2 > 0$	Variables and data can predict the model well
Heteroscedasticity Testing	≤ 0.05	The influence between variables is significant
	> 0.05	The influence between variables is not significant

Normality Test

The following are the data processing results based on three variables with 24 questions.

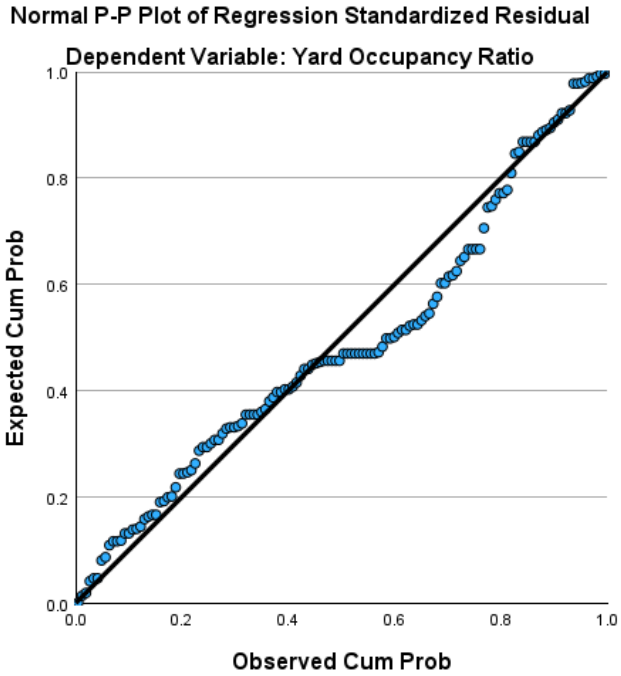

Fig. 3 Normality Test

From the figure above, it is evident that the points scatter around the line and adhere to its diagonal path, there by indicating a normal distribution for these residual values.

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Multicollienarity Test

One of the methods employed to detect the presence of multicollinearity involves assessing the Variance Inflation Factor (VIF) and Tolerance values. When the VIF is below 10 and the Tolerance exceeds 0.1, as outlined by Ghozali (2011), it is inferred that multicollinearity is absent.

The following are the data processing results based on three variables with 24 questions.

Table 6 Multicollienarity Test

	Tolerance	VIF
X1	0.408	2.450
X2	0.408	2.450

Source: Author's results (2023)

From the outcomes above, it is evident that the Tolerance values for both variables stand at 0.408, exceeding the threshold of 0.10. Furthermore, the VIF is computed at 2.450, falling below the stipulated threshold of 10. Hence, the conclusion is the absence of multicollinearity among the independent variables.

Heteroscedasticity Test

Heteroskedasticity refers to the uneven residual variance across all observations within a regression model. Ideally, a sound regression model should not exhibit heteroskedasticity (Purnomo, 2016).

Examining heteroskedasticity involves employing Spearman's rho correlation coefficient to correlate the independent variable with its residuals. The significance level for this test is set at 0.05, utilizing a two-tailed test. If the significance of the correlation between the independent variable and the residual surpasses 0.05, it implies the absence of heteroskedasticity issues.

The following are the data processing results based on three variables with 24 questions.

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			X1	X2	Unstandardized Residual
Spearman's rho	X1	Correlation Coefficient	1.000	.719**	.010
		Sig. (2-tailed)	.	<.001	.906
		N	136	136	136
	X2	Correlation Coefficient	.719**	1.000	.031
		Sig. (2-tailed)	<.001	.	.718
		N	136	136	136
	Unstandardized Residual	Correlation Coefficient	.010	.031	1.000
		Sig. (2-tailed)	.906	.718	.
		N	136	136	136

**. Correlation is significant at the 0.01 level (2-tailed).

Fig. 4 Heteroscedasticity Test Results

From the preceding outcomes, it's observable that the correlation between the variables Dwelling Time (X1) and Throughput (X2) with the Unstandardized Residual yields a significance value (Sig 2 tailed) exceeding 0.05. Given that the significance value exceeds 0.05, the deduction drawn lacks heteroskedasticity issues.

4.4. Hyphotesis Testing

Multiple linear regression analysis examines the linear influence or relationship between two or more independent variables and a single dependent variable (Purnomo, 2016). Assessing the accuracy of the sample regression function in estimating actual values can be accomplished through the examination of the R-squared test, F-test, and Partial Test.

R-Squared Test

The R Square (R^2) or square of R signifies the coefficient of determination, subsequently transformed into a percentage. This percentage reflects the proportion of contribution made by the independent variables towards the dependent variable. The following are the data processing results based on three variables with 24 questions.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782[a]	.612	.606	3.171

a. Predictors: (Constant), Throughput, DwellingTime

Fig. 5 R-Square Test Results

Derived from the data in Figure 5, the R^2 value for the yard occupancy ratio (Y) stands at 0.612 or 61.2%. This signifies that the impact of the independent variables,

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namely dwelling time (X1) and throughput (X2), in elucidating the yard occupancy ratio (Y) amounts to 61.2%. The remaining portion, which accounts for 38.8%, is attributed to other variables beyond the scope of this study that contribute to the explanation.

F-Test

ANOVA, or Analysis of Variance, represents a collective regression coefficient test (F-test) utilized to assess the significance of the collective impact of multiple independent variables on a dependent variable. This analysis is more fittingly applied within various regressions. Specifics regarding the F-test at a 5% alpha level are outlined below.

Table 7 Anova Model Assessment Criteria

Criteria	Explanation	
F-Test	Probability < 0,05	A collectively significant influence exists of the independent variables on the dependent variable.
	Probability > 0,05	The independent variables have no collectively significant impact on the dependent variable.

The following are the data processing results based on three variables with 24 questions.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2110.814	2	1055.407	104.976	<.001[b]
	Residual	1337.157	133	10.054		
	Total	3447.971	135			

a. Dependent Variable: Yard Occupancy Ratio (Y)

b. Predictors: (Constant), Throughput (X2), Dwelling Time (X1)

Fig. 6 Anova

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From the data presented in the above figure, the significance value (sig.) in the ANOVA table is obtained as < 0.001. This value is smaller than 0.005, indicating a collectively significant influence between the independent variables, namely Dwelling Time (X1) and Throughput (X2), on the dependent variable, Yard Occupancy Ratio (Y).

T-Test

The t-test is employed to assess a hypothesis within multiple linear regression analysis. It is used to evaluate each variable's partial effect individually. The t-test results can be observed in the coefficients table under the "sig." column using the following criteria:

Table 8 T-test model assessment criteria

Criteria	Explanation	
T-Test	Probability < 0,05	It can be affirmed that a partial influence of the independent variables exists on the dependent variable.
	Probability > 0,05	It can be asserted that there is no partial influence of the independent variables on the dependent variable.
Ha/H0 approven if	T count < t table	No influence
	T count > t table	Influential

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	9.102	1.753		5.193	<.001
	Dwelling Time (X1)	.354	.084	.355	4.198	<.001
	Throughput (X2)	.417	.074	.476	5.630	<.001

a. Dependent Variable: Yard Occupancy Ratio (Y)

Fig. 7 Coefficients

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From the coefficient table, the equation is Y = 9.102 + 0.354 X1 + 0.417 X2. With a significance level α = 0.05 and degrees of freedom df = n-k-1 = 136-2-1=133, the calculations reveal that Dwelling Time (X1) yields a significance value of sig—less than 0.001, which is smaller than 0.05. The t-value of 4.198 is less than the tabulated t-value of 1.97796. Consequently, it can be inferred that the Dwelling Time variable (X1) significantly influences the Yard Occupancy Ratio (Y). Similarly, the Throughput (X2) computation results in a significance value of less than 0.001, also smaller than 0.05. The t-value of 2.828 exceeds the tabulated t-value of 1.97796. Hence, it can be concluded that the Throughput variable (X2) significantly affects the Yard Occupancy Ratio (Y). The regression coefficient β1 of 0.354 signifies that an increase in variable X1 will lead to a corresponding increase of 0.354 in variable Y. Furthermore, the β2 coefficient of 0.417 suggests that an increase in Throughput corresponds to a proportional increase of 0.417 in the Yard Occupancy Ratio.

5. Conclusion

Based on the analysis findings, a derived conclusion indicates that the primary indicator influencing Yard Occupancy Ratio in Dwelling Time revolves around expediting ship loading and unloading activities. In contrast, the least impactful indicator involves reducing handling time and acquiring approvals from pertinent authorities. On the other hand, the foremost indicator impacting the Yard Occupancy Ratio in Throughput pertains to the company's loading and unloading equipment meeting physical requirements. In contrast, the least influential hand guarantees the security of loading and unloading processes in adherence to established protocols.

The regression model presented is Y = 9.910 + 0.354 X1 + 0.417 X2. Dwelling Time demonstrates a robust and statistically significant relationship with the Yard Occupancy Ratio at PT. Jakarta International Container Terminal. This is evidenced by the correlation analysis, where Throughput exhibits a correlation coefficient of 0.721 with a Yard Occupancy Ratio and a significance value below 0.001, indicating its significance (smaller than 0.05). Furthermore, the t-value of 4.198 falls below the critical t-value of 1.97796, reinforcing the substantial and significant correlation between Throughput and Yard Occupancy Ratio.

Similarly, Throughput displays a substantial correlation with the Yard Occupancy Ratio at PT. Jakarta International Container Terminal. The correlation analysis unveils a coefficient of 0.749 between the Throughput and Yard Occupancy Ratio, with a significance level of less than 0.001, underscoring its significance (also smaller than 0.05). Moreover, the t-value of 2.828 surpasses the critical t-value of 1.97796, affirming the robust and significant relationship between Throughput and Yard Occupancy Ratio. Concurrently examining Dwelling Time and Throughput reveals a strong and significant association with the Yard Occupancy Ratio at PT. Jakarta International Container Terminal. This is validated

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by the multiple correlation coefficient analysis, demonstrating a correlation coefficient of 0.782 when Dwelling Time and Throughput are concurrently assessed against the Yard Occupancy Ratio.

The collective influence of Dwelling Time and Throughput on the Yard Occupancy Ratio amounts to 61.2%, as indicated by the R Square value of 0.612 or 61.2%. The hypothesis test conducted concurrently shows the substantial and significant impact of Dwelling Time and Throughput on the Yard Occupancy Ratio at PT. Jakarta International Container Terminal, as the calculated T-value exceeds the critical T-table value (5.139 > 1.97796).

6. Implications

Dwelling time and goods throughput influence the Yard Occupancy Ratio. Companies must pay more attention and continuously assess dwelling time management, especially regarding reducing handling time and obtaining approvals from relevant authorities. The same applies to throughput, particularly in ensuring the security of loading and unloading processes in accordance with established procedures. These efforts aim to maintain container stacking and loading/unloading activities at JICT. Improving performance and facilities in managing dwell time and throughput will encourage customers to remain loyal to JICT's services and create a positive image for the company.

7. Research limitations

The obstacles in this research are limited time and access to collecting sample data. By involving more respondents, research results can be more representative, and generalizations can be made better. Apart from that, many other factors can influence the Yard Occupancy Ratio at JICT, such as weather factors, government policies, or factors not discussed in this research.

References

Abdillah, W., & Hartono, J. (2015). *Partial Least Square (PLS) - Alternative Structural Equation Modelling (SEM) dalam Penelitian Bisnis*. CV Andi Offset.

Affiat, M. R., Fadli, F., & Mafrudoh, L. (2021). Throughput and Dwelling Time on Yard Occupancy Ratio Sunda Kelapa Harbor. *Jurnal Manajemen Bisnis Transportasi Dan Logistik, 7*(2). https://doi.org/http://dx.doi.org/10.54324/j.mbtl.v7i2.661

Creswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research (4th ed.)*. Pearson.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/altr

Ellenlies, E., Siahaan, L. D., Ayutia, Y., Andarini, A., Hiero Rio Kasenda, M., & Parhusip, V. (2021). Perbaikan Kinerja Dwelling Time Di Terminal Peti Kemas KOJA di Pelabuhan Tanjung Priok. *Jurnal Sistem Transportasi & Logistik*, *1*(2). https://doi.org/http://dx.doi.org/10.54324/jstl.v1i2.1034

Febryani, J., Hutagalung, W., Nasution, S., Setiawati, R., & MR, T. (2019). YOR Analysis at Jakarta International Container Terminal. *GLOBAL RESEARCH ON SUSTAINABLE TRANSPORT & LOGISTICS*, *2*. https://doi.org/https://doi.org/10.25292/atlr.v2i0.163

Ghozali, I. (2018). *Aplikasi Analisis Multivariate Dengan Program IBM SPSS 25*. Badan Penerbit Universitas Diponegoro.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). *Multivariate Data Analysis* (8th ed). Cengage Learning.

Kosasih, E., & Soewedo, H. (2019). *Manajemen Perusahaan Pelayaran: Suatu Pendekatan Praktis dalam Bidang Usaha Pelayaran* (Cetakan ke-5). RajaGrafindo Persada.

Lasse, D. A. (2016a). *Manajemen Kepelabuhanan* (Cetakan ke-2). RajaGrafindo Persada.

Lasse, D. A. (2016b). Manajemen Muatan: Aktivitas Rantai Pasok di Area Pelabuhan. In *116* (Cetakan ke-3). RajaGrafindo Persada.

Mohseni, N. S. (2011). *Developing a Tool for Designing a Container Terminal Yard*.

Mulyono, T. (2016). *Rekayasa Fasilitas Pelabuhan: Dasar-dasar Perencanaan* . Universitas Negeri Jakarta.

Narahawarin, O. B. (2017). *Pengaruh Throughput dan Dwelling Time Terhadap Yard Occupancy Ratio Lapangan Penumpukan di Terminal Petikemas Koja*. ITL Trisakti.

Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 134 Year 2016 on The Management of Ship Security and port Facilities. (n.d.).

Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 152 Year 2016 on the Organization and Implementation of Cargo Handling From and to Ships. (n.d.).

Ricardianto, P., Suhalis, A., & P. Sirait, D. (2019). Integration Between Dwelling Time And Loading-Unloading at Tanjung Priok Port. *Jurnal Manajemen Transportasi & Logistik (JMTRANSLOG)*, *5*(3). https://doi.org/10.54324/j.mtl.v5i3.265

Roflin, E., Liberty, I. A., & Pariyana. (2021). *Populasi, Sampel, Variabel Dalam Penelitian Kedokteran*. PT. Nasya Expanding Management.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/altr

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alphabet.

Suyono, R. P. (2007). *Shipping: Pengangkutan Intermodal Ekspor Impor Melalui Laut* (Edisi Keempat). PPM.

Triatmodjo, B. (1996). *Pelabuhan*. Beta Offset.

Verawati, K., & Damawaldi, D. O. (2020). Optimization of Open Storage's Vehicles in PT Indonesia Kendaraan Terminal Jakarta. *Manajemen Transportasi & Logistik*, *07*(03). https://doi.org/http://dx.doi.org/10.25292/j.mtl.v7i3.481

Witjaksono, A., Marimin, Machfud, & Rahardjo, S. (2016). Pengelolaan Waktu Endap dan Tingkat Kepadatan Lapangan Penumpukan Peti Kemas di PT Jakarta International Container Terminal. *Jurnal Manajemen Teknologi*, *15*(1), 11–35. https://doi.org/10.12695/jmt.2016.15.1.2

Zhen, L. (2016). Modeling of Yard Congestion and Optimization of Yard Template in Container Ports. *Transportation Research Part B: Methodological*, *90*, 83–104. https://doi.org/10.1016/J.TRB.2016.04.011