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The Effect of Crane Performance and Loading/Unloading Productivity on Sales Growth at PT Jakarta International Container Terminal

Indra Gunawan[1], Lira Agusinta[2], Euis Saribanon[3].
[1]Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia, indra123.gunaone@gmail.com.
[2]Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia, lir4agusinta@gmail.com.
[3]Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia, nengnonon04@gmail.com.

Corresponding Author: indra123.gunaone@gmail.com[1]

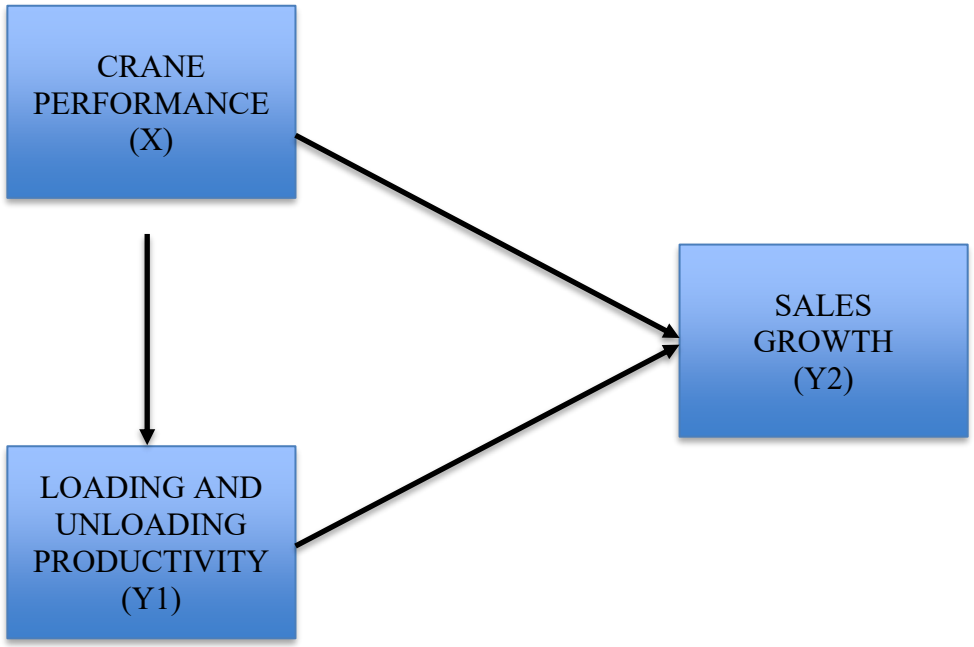
Abstract: The background of this study is based on the critical role of the logistics sector, particularly ports, in supporting the national economy through cost efficiency and increased competitiveness. However, data shows that PT JICT's sales growth declined from 2014 to 2018, indicating problems in maritime transport management, particularly in port operations. The decline in crane performance and fluctuations in loading and unloading productivity are suspected to be the main factors causing this decline in sales growth. Low crane performance slows loading and unloading, while unstable loading and unloading productivity hinder the effectiveness of port services. This study aims to analyze the effect of crane performance and loading and unloading productivity on sales growth at PT Jakarta International Container Terminal (JICT). Therefore, this study was conducted to empirically determine the extent to which crane performance and loading and unloading productivity affect sales growth at PT JICT, with the hope that the results will serve as a basis for evaluating and improving port operational management. This study aims to analyze the effect of crane performance and loading and unloading productivity on sales growth at PT Jakarta International Container Terminal (JICT). Therefore, this study was conducted to empirically determine the extent to which crane performance and loading and unloading productivity affect sales growth at PT JICT, with the hope that the results can serve as evaluation material and a basis for improving port operational management. This study uses a quantitative method, SEM-PLS analysis. The results show that crane performance has a positive, highly significant effect on sales growth at PT Jakarta International Container Terminal, while loading and unloading productivity also has a positive, significant impact on sales growth. However, crane performance does not have a direct or indirect effect on loading and unloading productivity, and loading and unloading productivity does not mediate the relationship between crane performance and sales growth.

Keyword: Crane Performance, Loading/Unloading Productivity, Sales Growth.

INTRODUCTION

Logistics plays a significant role in a country's economy. Low-cost, fast logistics can increase companies' competitiveness, especially those that export and trade outside the region (Ginny, 2019). Logistics encompasses the planning, organizing, and controlling of goods and services from suppliers to consumers (Jamaludin, 2022). Logistics encompasses various subsectors, including sea shipping. Sea shipping by ship involves ports as places for loading and unloading export-import goods and shipping to other regions (Kwartama et al., 2025). Ports play a significant role in boosting a country's logistics sector competitiveness. Smooth port loading and unloading can reduce logistics costs, which have been a significant obstacle in Indonesia (Mangeswuri & Budiyanti, 2024). Therefore, professional and efficient port management is essential to ensure the smooth running of trade and distribution activities. Ports are also an important infrastructure in the maritime transportation system that drives national economic growth. The operational efficiency of ports will facilitate the flow of goods and passengers, which are indicators of active economic activity in a region.

PT Jakarta International Container Terminal (JICT), as the manager of Tanjung Priok Port, has a big responsibility to ensure that port management is carried out professionally. Good management can attract more ships to dock, increase loading and unloading volumes, and ultimately increase company revenue. However, the data show that PT JICT's revenue declined from 2014 to 2018. This decline indicates problems in maritime transportation management that require attention. One factor that is thought to have contributed to this decline is the fluctuating performance of cranes. Cranes are the primary equipment used in loading and unloading at ports, so their performance greatly determines the speed and efficiency of container transfer. Poor crane performance will result in longer loading and unloading times and reduce the volume of containers that can be moved. In addition, loading and unloading productivity is also an important factor that affects sales growth. Loading and unloading productivity describes the ability to move goods to and from ships effectively. If productivity is low, the port's overall performance will decline.



Hypotheses

1. Crane performance has a direct positive effect on sales growth.
2. Loading and unloading productivity has a direct positive effect on sales growth.

3. Crane performance has a direct positive effect on loading and unloading productivity.
4. Crane performance has an indirect positive effect on sales growth through the mediation of loading and unloading productivity.

METHOD

This research was conducted at PT Jakarta International Container Terminal (PT JICT) from March to April 2019. The research process included collecting financial report data, processing and analyzing it, and compiling the research into a thesis. This study used a quantitative method, a scientific approach that aims to obtain valid data to test the relationship between variables objectively through statistical analysis (Riyanto & Hatmawan, 2020). The quantitative approach was chosen because it can measure relationships between variables numerically and allows for systematic, measurable hypothesis testing.

The population of this study is the financial statements of PT JICT during its operational period. Due to time constraints, this study did not use the entire population; instead, it used a sample. The sampling technique used was non-probability purposive sampling, which selects samples based on specific criteria (Sudarmanto et al., 2021). In this case, the sample used was PT JICT's financial reports for the 2014–2018 period. The source of data for this study was secondary data, namely, data that had been processed and published by other parties, in this case, PT JICT. Data collection was carried out using the documentation method, namely, through reports, records, and official company documents related to the research variables, such as financial reports and operational data.

The data analysis methods included descriptive statistics, requirements testing, and path analysis. Descriptive analysis was used to provide an overview of the research data through mean, maximum, minimum, and standard deviation values, as well as trend analysis. The analysis requirements test used the Kolmogorov-Smirnov normality test to ensure the residual data were normally distributed before further analysis. The main stage of the analysis used path analysis with SmartPLS (Partial Least Squares). Path analysis was used to determine the cause-and-effect relationship between variables, both directly and indirectly (Ghodang, 2020). PLS was chosen because it can analyze models with small sample sizes and does not require data normality. The analysis results were then tested using a t-test to determine the significance of the influence between variables. If the t-count was greater than the t-value from the t-table, the influence was considered significant. With this method, the study was expected to comprehensively describe the influence of crane performance and loading and unloading productivity on sales growth at PT JICT.

RESULTS AND DISCUSSION

This study consists of three research variables, namely: crane performance, loading and unloading productivity, and sales growth. Data for each research variable were obtained through internal document searches at PT Jakarta International Container Terminal (PT JICT). The total sample size was 60, spanning 5 years. An overview of the conditions for each research variable is presented as descriptive statistics, including minimum, maximum, average, and standard deviation, obtained from SPSS 22 and Microsoft Excel. The results of the descriptive statistical calculations for each indicator and each research variable are shown in the attached table.

Table 1 Descriptive Statistics of Research Variables

Variabel	Minimum	Maximum	Average	Deviation Standart
Crane Performance (hours)	1.852,9	6.700,8	4.562,8	797,9
Loading and Unloading	18,18	29,80	26,51	2,55

Productivity (GCR)					
Sales (Teus)	Growth	-0,639	1,847	0,016	0,318

Crane Performance

The crane performance variable has a minimum of 1,852.9 hours, a maximum of 6,700.8 hours, an average of 4,562.8 hours, and a standard deviation of 797.9 hours. The average of 4,562.8 hours indicates relatively moderate crane performance. Meanwhile, the standard deviation of 797.9 hours indicates that the deviation in crane performance data is relatively small, as it is smaller than the average. The development of average crane performance shows a tendency to fluctuate, as shown in Figure 4.1. In 2014, the average crane performance was 4,522.8 hours; in 2015, it increased to 4,798.3 hours; in 2016, it increased to 4,919.0 hours; in 2017, it decreased to 3,952.2 hours; and in 2018, it increased again to 4,622.0 hours.

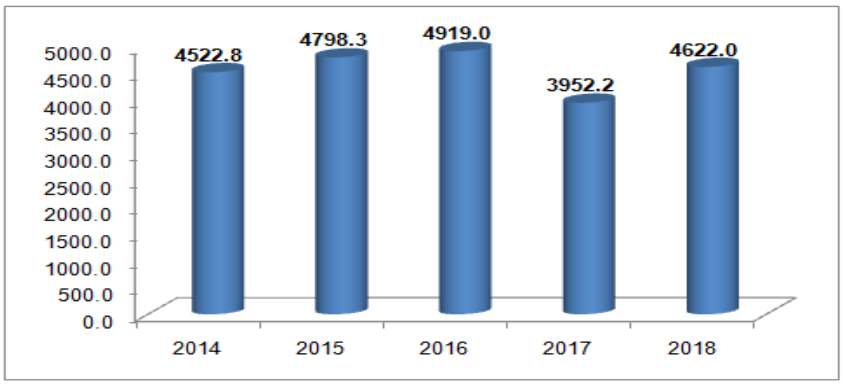
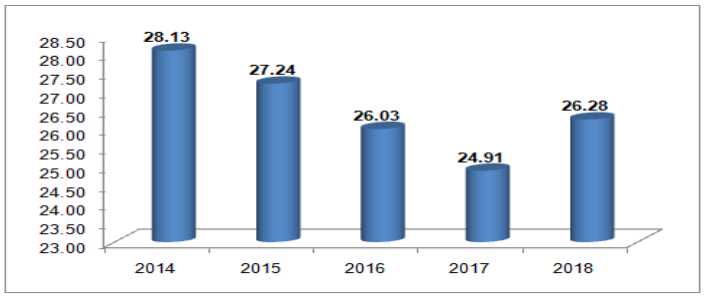


Figure 1 Average Monthly Crane Performance

Loading And Unloading Productivity

The loading and unloading productivity variable has a minimum value of 18.18, a maximum value of 29.80, an average value of 26.51, and a standard deviation of 2.55. The average loading and unloading productivity of 26.51 indicates that the sample companies have relatively moderate productivity. Meanwhile, the standard deviation of 2.55 indicates that the deviation in loading and unloading productivity data across the sample companies is relatively small, as it is smaller than the average. The annual average development of loading and unloading productivity shows a tendency to fluctuate, as shown in Figure 4.2. In 2014, loading and unloading productivity was 28.13. In 2015, it decreased to 27.24. In 2016, it decreased again to 26.03; in 2017, it fell to 24.91; and in 2018, it rose to 26.28.



Sales Growth

The sales g ı value of 1.847, an average of 0.016, and a standard deviation of 0.318. The average of 0.016 indicates that the sample companies have relatively low sales growth. Meanwhile, the standard deviation of 0.318

indicates that the sales growth data for the sample companies exhibit relatively large variation, as it exceeds the average. The average annual sales growth fluctuates, as shown in Figure 4.3. In 2014, the average sales growth was -0.004; in 2015, -0.005; in 2016, -0.028; in 2017, -0.242; and in 2018, 0.362.

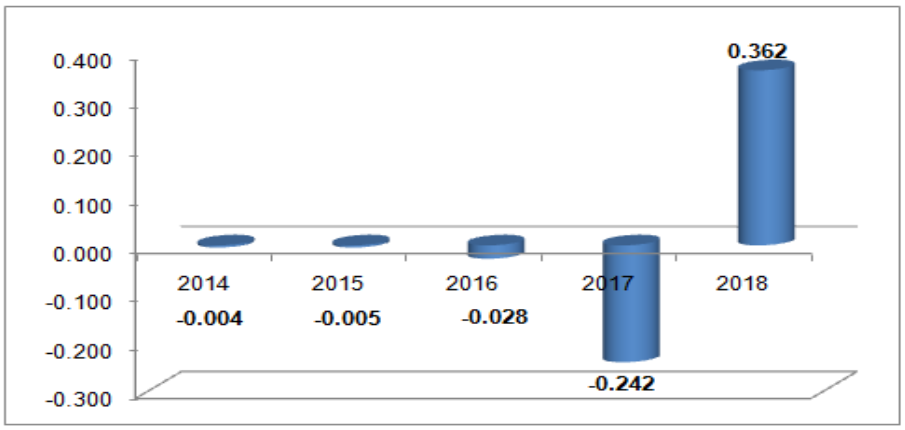


Figure 3 Average Monthly Sales Growth

Requirements Testing Analysis

In this study, the analysis requirements were tested using the Kolmogorov-Smirnov normality test in SPSS 22. The normality test was used to assess the normality of the data residuals, namely, to determine whether the residuals followed a normal distribution. This was done because hypothesis testing using parametric statistics requires, among other things, that the data residuals be normally distributed. The testing condition is that the data residuals are normally distributed if Ho is accepted and are not generally distributed if Hi is accepted. Based on the calculations using the Kolmogorov-Smirnov formula, the results are shown in the following table:

Table 2 Normality Test Results

DESCRIPTION	STATISTICAL TEST RESULTS
$X \rightarrow Y_2$	
Test Statistic	0,165
Asymp. Sig.	0,000
$Y_1 \rightarrow Y_2$	
Test Statistic	0,179
Asymp. Sig.	0,000
$X \rightarrow Y_1$	
Test Statistic	0,152
Asymp. Sig.	0,001

The normality test of crane performance (X) against sales growth (Y2) obtained a test statistic of 0.165 with an asymp. Sig value of 0.000 < 0.05, indicating that the residuals are not normally distributed. For loading and unloading productivity (Y1) against sales growth (Y2), a test statistic of 0.179 was obtained, with an asymptotic p-value of 0.000 < 0.05, indicating that

the residuals are not normally distributed. Moreover, for crane performance (X) on loading and unloading productivity (Y1), a test statistic of 0.152 was obtained with an asymp. Sig value of 0.001 < 0.05, indicating that the residuals are not normally distributed.

Hypothesis Testing

Direct Effect of Crane Performance on Sales Growth

The results of the path coefficient calculation and t-test to test the hypothesis of the direct effect of crane performance on sales growth are presented as follows:

Table 3 Path Coefficient and t-value of the Direct Effect of Crane Performance on Sales Growth

Sample Size (n)	Path Coefficient	t_{value}	t_{tabel}	
			α= 0,05	α= 0,01
60	0,51	3,87**	2,00	2,66

The path coefficient of the direct effect of crane performance on sales growth is 0.51. The path coefficient is positive, indicating that an increase in crane performance can drive higher sales growth. Meanwhile, the t-value obtained is 3.87, while the t-table value for n = 60 at an error rate (α) of 1% is 2.66. The t-value is greater than the t-table value at α = 0.01 (1%), indicating that Ho is rejected and H1 is accepted. Thus, it can be concluded that crane performance has a direct, positive, and highly significant effect on sales growth.

Direct Effect of Loading and Unloading Productivity on Sales Growth

The results of the path coefficient calculation and the t-test for the hypothesis of a direct effect of loading and unloading productivity on sales growth are presented below.

Table 4 Path Coefficients and t-value of the Direct Effect of Loading and Unloading Productivity on Sales Growth

Sample Size (n)	Path Coefficient	t_{value}	t_{tabel}	
			α= 0,05	α= 0,01
60	0,37	2,15*	2,00	2,66

The path coefficient of the direct effect of loading and unloading productivity on sales growth is 0.37. The path coefficient is positive, indicating that higher loading and unloading productivity can boost sales growth. Meanwhile, the t-value obtained is 2.15, while the t-table value for n = 60 at an error rate of 5% is 2.00. The t-value exceeds the t-table value at α = 0.05 (5%), indicating that Ho is rejected and H1 is accepted. Thus, it can be concluded that loading and unloading productivity has a direct, positive, and highly significant effect on sales growth.

Direct Effect of Crane Performance on Loading and Unloading Productivity

The results of the path coefficient calculations and t-tests to test the hypothesis of the direct effect of crane performance on loading and unloading productivity are presented as follows:

Table 5 Table 5 Path Coefficients and t-values for the Direct Effect of Crane Performance on Loading and Unloading Productivity

Sample Size (n)	Path Coefficient	t_{value}	t_{tabel}	
			α= 0,05	α= 0,01
60	-0,45	-3,38^{ns}	2,00	2,66

The calculation results show that the path coefficient for the direct effect of crane performance on loading and unloading productivity (Py1.x) = -0.24. The negative path coefficient indicates that high crane performance can reduce loading and unloading productivity. The t-value obtained is -3.38, while the t-table value for n = 60 at an error rate (□) = 0.05 (5%) is 2.00. The t-value is less than the t-table value at α = 0.05 (5%), which means Ho is accepted and H1 is rejected. Thus, it can be concluded that crane performance does not directly affect loading and unloading productivity.

The Indirect Effect of Crane Performance on Sales Growth with the Mediation of Loading and Unloading Productivity

The results of the path coefficient calculation and the t-test for the indirect effect of crane performance on sales growth, mediated by loading and unloading productivity, are presented below.

Table 6 Path Coefficients and t-count of the Indirect Effect of Crane Performance on Company Growth with Mediation

Sample Size (n)	Path Coefficient	t_{value}	t_{tabel}	
			α= 0,05	α= 0,01
60	-0,16	-1,45^{ns}	2,00	2,66

The path coefficient for the indirect effect of crane performance on sales growth, with loading and unloading productivity as a mediating variable, is -0.16. The path coefficient is negative, indicating that crane performance, as supported by loading and unloading productivity, can reduce sales growth. Meanwhile, the t-value obtained is -1.45, while the t-table value for n = 60 at an error rate of 5% is 2.00. The t-value is < t-table at □ = 0.05 (5%), which means Ho is accepted and H1 is rejected. Thus, it can be concluded that crane performance does not indirectly affect sales growth through the mediation of loading and unloading productivity.

The overall results of the path coefficients and t-tests of the effect of crane performance and loading and unloading productivity on sales growth are summarized as follows:

Table 7 Path Coefficient Results and t-Tests

Path	Path Coefficient	t_{value}	t_{tabel}	
			α= 0,05	α=0,01
$X - Y_2$	0,51	3,87**	2,00	2,66
$Y_1 - Y_2$	0,37	2,15*	2,00	2,66
$X - Y_1$	-0,45	-3,38^{ns}	2,00	2,66
$X - Y_2 - Y_1$	-0,16	-1,45^{ns}	2,00	2,66

The results of the study indicate that crane performance has a direct positive and highly significant effect on sales growth, loading and unloading productivity has a positive and

significant effect on sales growth, crane performance does not have a significant effect on sales growth, and crane performance does not have an indirect effect on sales growth mediated by loading and unloading productivity. The path coefficients and t-calculated values can be seen in the following figure:

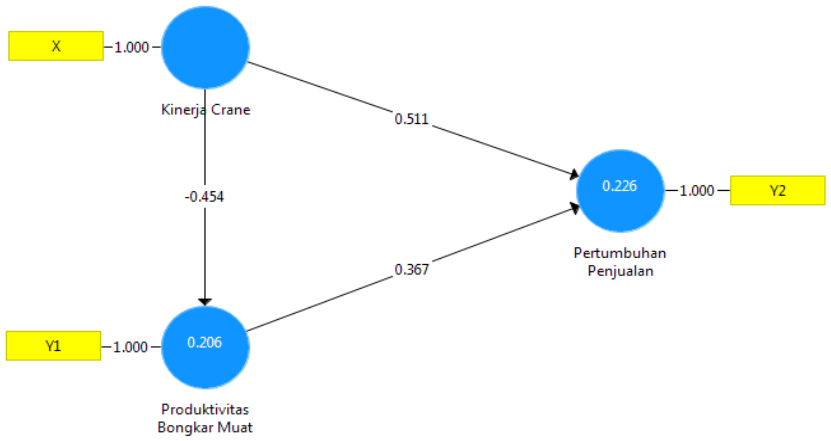


Figure 4. Path Coefficients of Crane Performance and Loading/Unloading Productivity on Sales Growth

The path coefficient of crane performance (X) on sales growth (Y2) is 0.51, meaning that crane performance has a positive effect on sales growth. The path coefficient of loading and unloading productivity (Y1) on sales growth (Y2) is 0.37, meaning that loading and unloading productivity has a positive effect on sales growth. The path coefficient of crane performance (X) on loading and unloading productivity (Y1) is -0.45, meaning that crane performance hurts loading and unloading productivity.

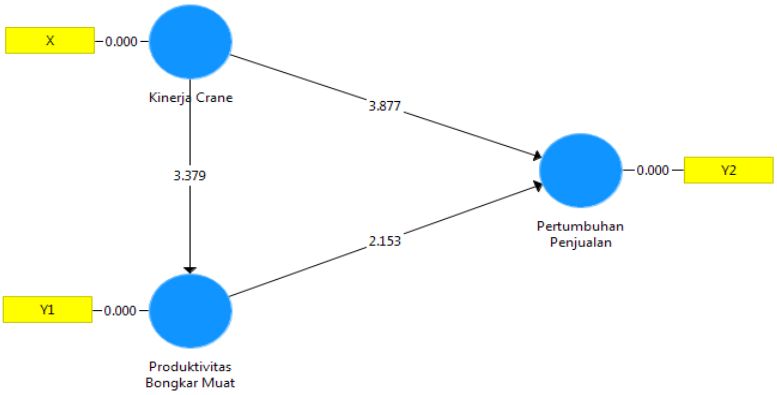


Figure 5. t-value of the Effect of Crane Performance and Loading and Unloading Productivity on Sales Growth

The t-value of crane performance (X) on sales growth (Y2) is 3.87, meaning that crane performance has a very significant effect on sales growth. The t-value for the loading and unloading productivity (Y1) on sales growth (Y2) is 2.15, indicating that loading and unloading productivity has a significant effect on sales growth. The t-value of crane performance (X) on loading and unloading productivity (Y1) is -3.38, meaning that crane performance does not have a significant effect on loading and unloading productivity.

Discussion

The results of this study show that crane performance has a direct, positive, and highly significant effect on sales growth. This is indicated by a path coefficient value of 0.51 and a t-

value = 3.87 > t-table at a = 0.01 (2.66). Crane performance is the level of task completion that shows the crane's achievement in completing work relative to a target during a given period, measured as crane working hours (net crane hours). When the crane works longer hours to load and unload, more containers will be successfully loaded and unloaded—the more containers that are loaded and unloaded, the greater the company's revenue. With increased revenue, sales growth—the ratio that shows the increase/decrease in sales a company can achieve—also increases. The results of this study align with Palinggi's (2016) research, which shows a relationship between machine capacity and production capacity. Thus, the findings of this study support previous studies that crane performance has a direct positive effect on sales growth, with the object of research being PT Jakarta International Container Terminal.

The results of this study also show that loading and unloading productivity have a direct, positive, and significant effect on sales growth. This is indicated by a path coefficient value of 0.37 and a t-value = 2.15 > ttable at a = 0.05 (2.00). Loading and unloading productivity is the ability to unload goods from ships to docks/barges/trucks, or load goods from docks/barges/trucks onto ships, until they are arranged in the ship's hold using ship cranes or land cranes, as indicated by the GCR (gross crane rate). With high loading and unloading productivity, more containers will be unloaded from ships and loaded onto docks, or vice versa. Successful container loading and unloading will increase the company's revenue. Increased month-to-month revenue leads to sales growth, a ratio that shows the increase/decrease in sales the company can achieve, as measured by the sales volume indicator. The results of this study align with Sugiyarto's (2016) findings, which concluded that there is a positive relationship between labor productivity and sales. Thus, the findings of this study support previous studies that loading and unloading productivity has a direct positive effect on sales growth, with the object of research being PT Jakarta International Container Terminal.

Meanwhile, this study's results indicate that crane performance does not affect loading and unloading productivity. This is indicated by a path coefficient value of -0.45 and a tcount value of -3.38 < ttable at a = 0.05 (2.00). Crane performance is the level of task completion that shows the crane's achievement relative to a target over a given period of time, using the crane working hours indicator (net crane hours). Crane working hours that are not supported by the efficient use of crane equipment will not achieve the maximum crane capacity in loading and unloading work, thus not affecting loading and unloading productivity, which is the ability to unload goods from ships to docks/barges/trucks or load goods from docks/barges/ truck into the ship until they are arranged in the ship's hold using a ship crane or land crane. The results of this study are not in line with Gunawan's (2008) research, which concluded that the loading and unloading process time affects loading and unloading productivity. Thus, the findings of this study do not support the results of previous research that loading and unloading productivity has a direct positive effect on sales growth, with the object of research at PT Jakarta International Container Terminal.

In addition, this study's results show that crane performance does not have an indirect effect on sales growth through the mediation of loading and unloading productivity. This is indicated by a path coefficient value of -0.16 and a tcount value of -1.45 < ttable at a = 0.05 (2.00). This finding is consistent with the results of other hypothesis tests that crane performance has a direct positive effect on sales growth, loading and unloading productivity has a positive effect on company growth, but crane performance does not have a direct effect on loading and unloading productivity. This means that although crane performance and loading and unloading productivity affect growth, crane performance does not affect loading and unloading productivity, ruling out an indirect effect of crane performance on growth through loading and unloading productivity. These findings are inconsistent with those of previous studies by Palinggi (2016), Sugiyarto (2016), and Gunawan (2008). Thus, the findings of this study do not support previous studies that found crane performance has an indirect effect

on sales growth through the mediation of loading and unloading productivity, with the research object at PT Jakarta International Container Terminal.

CONCLUSION

Based on the analysis and discussion, it can be concluded that crane performance has a direct, positive, and highly significant effect on sales growth at PT Jakarta International Container Terminal. This is evidenced by a path coefficient of 0.51 and a t-value of 3.87, which exceeds the 0.01 significance level, indicating that better crane performance is associated with higher company sales growth.

In addition, loading and unloading productivity shows a positive and significant effect on sales growth, with a path coefficient of 0.37 and a t-value of 2.15, which exceeds the t-value at the 0.05 significance level. This means that increased loading and unloading productivity also drives sales growth. However, the study's results show that crane performance does not directly affect loading and unloading productivity.

This is evident from the path coefficient of −0.45 and the t-value of −3.38, which do not meet the significance criteria. This finding indicates that an increase in crane performance is not automatically reflected in increased loading and unloading productivity at the port. In addition, crane performance also has no indirect effect on sales growth through loading and unloading productivity as a mediating variable. The path coefficient of −0.16 and the t-value of 1.45, which is below the t-table value, indicate that loading and unloading productivity does not mediate the relationship between crane performance and sales growth. Thus, it can be concluded that although crane performance and loading and unloading productivity have a positive effect on sales growth directly, the two do not significantly influence each other in an indirect relationship.

Based on the research conclusions, the proposed policy implications emphasize the importance of improving crane performance and the efficiency of loading and unloading equipment as key drivers of company growth. Companies need to optimize crane working hours to increase productivity and sales growth. In addition, the efficiency of loading and unloading equipment must be improved to increase the volume of containers handled, thereby positively impacting sales performance. The recommendations are for companies to continue maximizing crane working hours, use equipment efficiently, and encourage further research with a larger sample size and a longer observation period. Further research is recommended to include additional variables, such as dwelling time, occupancy ratio, and berthing hours, to provide a more comprehensive picture of the factors affecting company sales growth.

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