

The Effectiveness of Foreman Work and TKBM Behavior on Equipment Performance in Supporting Productivity

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Abstract:- Research is used by using quantity method, with the number of samples is 78. The data collected through a Likert scale that has been tested. Research using linear regression analysis techniques, partial, and Simultaneous, path analysis as well. First Result of research can be concluded that the direct effect is positive and significant effect on the effectiveness of foreman work (X1) on the performance of loading and unloading equipment (Y) of 54.6%, the second behavior of TKBM (X2) on the performance of loading and unloading equipment (Y) of 26.5%, the third foreman's work effectiveness (X1) on loading and unloading productivity (Z) is 34.4%, the fourth TKBM behavior (X2) on loading and unloading productivity (Z) is 6.3% and the fifth is loading and unloading equipment performance (Y) to the productivity of loading and unloading (Z) of 28.2%. Likewise, there is an indirect effect of foreman's work effectiveness (X1) on loading and unloading productivity (Z) through the performance of loading and unloading equipment (Y) of 15.3% and TKBM behavior (X2) on loading and unloading productivity (Z) through the performance of loading and unloading equipment. (Y) of 7.4%.

Keywords:- Effectiveness; Behavior; Equipment Performance; Productivity.

I. INTRODUCTION

Ports support industrial and trade activities such as distribution, production and consolidation of cargo or goods. Consolidation of cargo using containers by 70% is controlled by the 7 largest operators in the world of global alliance controlling the volume of 1/3 of the world's market share or an average of 6,346 TEUs per ship (Kalla et al., 2017) [1]. Therefore, sea transportation is one of the main choices.

As operators in loading and unloading services, at the port, they need to prepare superior Human Resources (HR), qualified loading and unloading equipment performance

supported by the use of digital technology and information (Wibawa et al., 2019) [2]. An effective port performance may be determined by the high technical efficiency, cost efficiency, and working effectiveness.

One of the Container Terminal (TPK) managements in Tanjung Priok Port is Koja Container Terminal (TPK). Koja Container Terminal (TPK) is a subsidiary of PT Indonesian Port Corporation and PT Hutchinson Wamphoa Ltd. However, Koja Container Terminal (TPK) is also part of the container terminal operator that carries out activities at the Tanjung Priok Port in the mooring area.

Koja Container Terminal continues to strive to increase loading and unloading productivity to be more effective and efficient. Good port performance may be determined by high technical efficiency, cost efficiency, and work effectiveness. Pursuant to Regulation of the Minister of Transportation No. 60 Year 2014, concerning the implementation and exploitation of cargo loading and unloading from and to the port, especially for loading and unloading workers (TKBM) managed by cooperatives or foundations. However, its utilization is made under amperage adjusted to the needs of the Container Terminal. In the main duties of the Koja Container Terminal, field operators at the wharf consist of quay crane container tool operators, solo, whiskey, and foreman as supervisors for the field operators at the wharf. A foreman has an authority to expedite and supervise loading and unloading container activities. Therefore, it is considered that the analysis activities of the effectiveness of loading and unloading activities at the Koja Container Terminal are important. The purpose is to provide improvements to the activities carried out by the field operators at the wharf such as Foreman, Solo/Whiskey, Loading and Unloading Workers (TKBM) etc. safely and securely (safe action), and reduce idle time to increase utilization, reliability, and availability of working tools (quay cranes, yard cranes, trucks, etc.). According to (Dundovic & Hess, 2005) [3], the facilities and effectiveness of loading and unloading activities at the

terminal are highly dependent on the performance of the equipment.

On the basis of the aforesaid description, the purpose of this study is to obtain empirical evidence concerning the effect of effectiveness of foreman's work and TKBM behavior on equipment performance in supporting loading and unloading productivity. It is expected that the benefits of this research may theoretically add and improve information, knowledge, references or references for further research on the effectiveness of field operators at the wharf/ jetty, loading and unloading workforce behavior, loading and unloading equipment performance and productivity to the relevant party especially loading and unloading companies in optimizing and finding the right solution for the transportation sector, especially at the Container Terminal in order to be able to maximize its contribution to the port performance.

A leader in seeing the effectiveness of one's work may observe the quality of work, quantity of work, timeliness and targets.(Muchlisin Riadi, 2020) [4], however, according to (Mahmudi, 2005) [5], the working effectiveness consists of relatedness between output and goals, the greater the contribution of output to the achievement of goals, the more effective the company, program or activity would be.(Muchlisin Riadi, 2020) [6], he also considers that the working effectiveness constitutes a measure and ability to carry out organizational functions, tasks, programs in accordance with targets (quantity, quality, and time have been achieved). Pursuant to the study result conducted by (Kartika & Hastuti, 2011) [7] she stated that working attitude is not a determining factor for the creation of work effectiveness but to other factors, it has a relationship with each other, while working effectiveness has a positive influence on the work location(Anggraeni & Yuniarsih, 2017) [8].

(Robbins, 1996) [9] describes three indicators that must be considered, namely individual work (individual task outcomes), frequent behavior (behavior) and individual character (traits). Meanwhile, (Fitriana et al., 2015). [10] said that there was a relationship between the variables of age, work status, years of service, knowledge, education and attitudes towards worker behavior. According to (Lasse, 2012) [11], work accidents are caused by two groups of causes, namely human actions that do not meet safety (unsafe action) and unsafe environmental conditions (unsafe conditions). However, the occurrence of accidents in the company is caused by dangerous conditions (unsafe conditions) and dangerous behavior (unsafe action). Definitely, any and all parties need to pay attention to this matter in order to prevent any fatalities that have an impact on work effectiveness, cessation of loading and unloading equipment, and productivity. On the basis of the study result conducted by (Bambang Suryantoro, 2020) [12], it is clarified that the loading and unloading equipment partially affects loading and unloading productivity, and labor partially affects loading and unloading productivity.

To measure the quality of equipment performance, it may be measured through the level of utilization (utilization) of the tool, the level of reliability (reliability) and readiness

(availability) of the tool ((Effendi & Rangkuti, 2017) [13], pursuant to the provisions of the Minister of Transportation concerning the National Port Order (Menteri Perhubungan, 2002) ([14] that in measuring the performance and capacity of the container terminal, they may use and apply the Tool Capability Calculation approach and dock productivity. From the study result of (Efektivitas Dan Efisiensi Sterilizer et al., n.d.) [15], it described that the value of reliability, maintainability and availability shows improvement, but the availability of the machine needs to be increased without the addition of other factors.

Productivity is the contribution of the output (results) produced in the direction of the input (input). If the productivity increases, it may be due to increase of efficiency (time, material and manpower) and work systems, production techniques or skill improvement of the workforce (Hasibuan, 2012) [16]. According to (Koleangan, 2008) [17], loading and unloading activities define the activity of moving goods by land transportation means in order to carry out cargo or container transfer activities, so that adequate facilities or equipment are needed in a service method or procedure. Under the study result of (Amril, 2016) [18], it clarifies that there is a relationship between ship services and loading and unloading operators on the performance of container terminals, while (Pratama, n.d.) [19] states that a strong test of the relationship between worker characteristics and unsafe action has a variable that has a relationship with knowledge.

Based on the theoretical basis as mentioned hereinabove, the previous research was inconsistent, then the framework of thought may be arranged as follows:

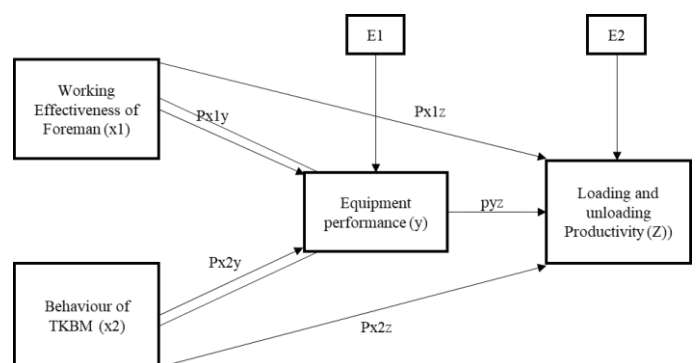


Fig. 1. Research Framework

Based on the framework of thought, then the hypothesis of this study is set forth as follows:

- H1: It is suspected that there is a direct effect of Foreman's work effectiveness on tool/ equipment performance;
- H2: It is suspected that there is a direct influence on the behavior of the loading and unloading workers (TKBM) on the performance of the equipment;
- H3: It is suspected that there is a direct effect of equipment performance on loading and unloading productivity;
- H4: It is suspected that there is a direct effect of foreman's work effectiveness on loading and unloading productivity;
- H5: It is suspected that there is a direct influence of the behavior of loading and unloading workers (TKBM) on productivity;

- H6: It is suspected that there is an indirect effect among work effectiveness variables on productivity through equipment performance;
- H7: It is suspected that there is an indirect effect among the behavior of loading and unloading workers (TKBM) on productivity through equipment performance.

II. RESEARCH METHOD

The object taken in the preparation of this research is the working activity of field operators at the dock in the operational service activities of loading and unloading ships at the Koja Container Terminal. The research was conducted in June 2021 by taking a population of 260 field operator employees with the following characteristics:

TABLE 1. Functions and Duties of Field Operators at Koja Container Terminal

No	Working Position	Number (person)	Percentage (%)	Sample Based on Number of Populations
1	QCC Tool Operator	28	10,8	3
2	Solo Whiskey	56	21,5	12
3	Foreman	8	3,1	2
4	TKBM	168	64,6	50
Total		260	100	78

Source: Organic & Non-organic Employee Data (processed data)

Based on the population above, the researcher took a sample of 30% ((Arikunto, 2006) [20] of the total population of field operators working positions at the dock (or as many as 78 employees). The sources of data that the researcher uses are primary data obtained from the research location directly through the distribution of questionnaires and interviews as well as observations on the object or person concerned, while other sources originated from the previous research that has links to the object under study either by library research or through literature research from books or documents that are related to the researched object.

The data analysis method uses variable descriptions consisting of conceptual and variable definitions. The conceptual description is the effectiveness of the foreman's work which includes quality, quantity, accuracy, time and work targets, the work behavior of loading and unloading workers including unsafe action and unsafe conditions, equipment performance may be measured through the level of use (utilization) of the tool, the level of reliability (reliability) tools and equipment availability, productivity may be measured by the number of tons per aisle per hour, or the number of tons of goods served is determined by the strength of the aisles including mechanical/non-mechanical equipment used and the effective time without stopping operations. While the operational definition uses a Likert scale and tabulated data from the questionnaire results. Furthermore, conducting

instrument testing, it includes validity testing, reliability testing and classical assumption testing techniques including data normality test, multicollinearity test and heteroscedasticity test and correlation test using SPSS Version 25. Then indirect correlation is tested by path analysis using the Sobel test.

III. RESULT AND DISCUSSION

Path Analysis

A. Sub-Structure Test I: $Y = \beta_{y1} X_1 + \beta_{y2} X_2 + \epsilon_1$

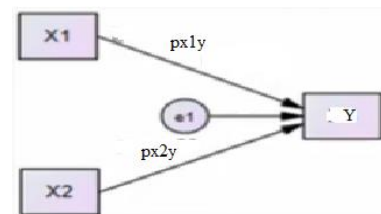


Fig. 2. Sub Structure Path Analysis Diagram I

Where: X₁= Working Effectivity of Foreman, X₂= Behavior TKBM, Y= Equipment performance

1) Correlation Significance Coefficient Test

TABLE 2. Sub-Structure I Correlation Significance Coefficient Test

		Correlations		
		Equipment performance	Working Effectivity	Working Behavior
Pearson Correlation	Equipment performance	1,000	0,662	0,503
	Working Effectivity	0,662	1,000	0,436
	Working Behavior	0,503	0,436	1,000
Sig. (1-tailed)	Equipment performance		0,000	0,000
	Working Effectivity	0,000		0,000
	Working Behavior	0,000	0,000	
N	Equipment performance	78	78	78
	Working Effectivity	78	78	78
	Working Behavior	78	78	78

Sources: Processed Primary Data

In the Correlation Significance coefficient test, the Foreman Working Effectiveness variable (X1) has a correlation coefficient of 0.662 to the Equipment performance variable (Y) with a sig value of 0.000, where the sig value of 0.000 < 0.05 indicates that the Foreman Working Effectiveness variable (X1) has a significant relationship to the Performance variable of Equipment (Y). Likewise, the TKBM Behavior variable (X2) has a correlation coefficient of 0.503 to the Equipment performance variable (Y) with a sig value of 0.000, where the sig value of 0.000 < 0.05 indicates that the TKBM behavior variable (X2) has a significant relationship to the Equipment performance variable (Y).

2) T Value Test

TABLE 3. T Value Test of Sub Structure I

Model	Coefficients						
	Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	4,307	2,609		1,651	0,103		
Working Effectivity	0,572	0,095	0,546	5,993	0,000	0,810	1,235
Working Behavior	0,277	0,095	0,265	2,909	0,005	0,810	1,235

a. Dependent Variable: Equipment performance
Source: Processed Primary Data

On the basis of Table 4.26 mentioned hereinabove, it indicates that the significance value of the Foreman Work Effectiveness variable (X1) is 0.000, where the value is 0.000 < 0.05, it may be concluded that the Foreman Working Effectiveness variable (X1) has a direct and significant effect on the Equipment performance variable (Y), such that the hypothesis is accepted. The significance value of the TKBM Behavior variable (X2) is 0.005, where the value is 0.005 < 0.05, it may be concluded that the TKBM Behavior variable (X2) has a direct and significant effect on the Equipment performance variable (Y), such that the hypothesis is accepted.

Pursuant to the above calculations, it may be concluded that the equation for testing sub-structure I is $Y = 0.546(X1) + 0.265(X2) + 0.71$.

B. Sub-Structure Test II: $Y = \rho_{zx1} X1 + \rho_{yx2} X2 + \rho_{zy} Y + \rho_{ze}$

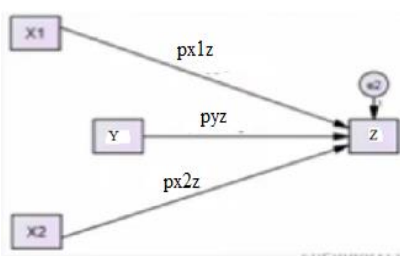


Fig. 3. Sub Structure Path Analysis Diagram II

1) Correlation Significance Coefficient Test

TABLE 4. Sub Structure Correlation Significance Coefficient Test II

		Correlations			
		Productivity of BM	Working Effectivity	Working Behavior	Equipment performance
Pearson Correlation	Productivity of BM	1,000	0,508	0,463	0,432
	Working Effectivity	0,508	1,000	0,436	0,662
	Working Behavior	0,463	0,436	1,000	0,503
	Equipment performance	0,432	0,662	0,503	1,000
Sig. (1-tailed)	Productivity of BM		0,000	0,000	0,000
	Working Effectivity	0,000		0,000	0,000
	Working Behavior	0,000	0,000		0,000
	Equipment performance	0,000	0,000	0,000	
N	Productivity of BM	78	78	78	78
	Working Effectivity	78	78	78	78
	Working Behavior	78	78	78	78
	Equipment performance	78	78	78	78

Source: Processed Primary Data

In the Correlation Significance Coefficient Test, the Foreman Working Effectiveness variable (X1) has a coefficient of 0.508 on the loading and unloading productivity variable (Z) with a sig value of 0.000 where the sig value of 0.000 < 0.05 indicates that the Foreman Work Effectiveness variable (X1) has a significant relationship to the variable of Loading and Unloading Productivity (Z).

The TKBM behavior variable (X2) has a coefficient of 0.463 on the Unloading Productivity variable (Z) with a sig value of 0.000 where the sig value of 0.000 < 0.05 indicates that the TKBM Behavior variable (X2) has a significant relationship to the Equipment Performance variable (Z).

Equipment performance Variable (Y) has a coefficient of 0.432 on the Unloading Productivity variable (Z) with a sig value of 0.000 where the sig value of 0.000 < 0.05 indicates that the Equipment Performance variable (Y) has a significant relationship to the Unloading Productivity variable (Z).

2) T Value Test

TABLE 5. T Value Test of Sub Structure II

Model	Coefficients						
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	8,262	2,946		2,804	0,006		
Working Effectivity	0,345	0,129	0,344	2,678	0,009	0,548	1,826
Working Behavior	0,282	0,111	0,282	2,530	0,014	0,728	1,374
Equipment performance	0,060	0,128	0,063	0,469	0,640	0,505	1,981

a. Dependent Variable: Loading and Unloading Productivity
Source: Processed Primary Data

The significance value of the Foreman Working Effectiveness variable (X1) is 0.009 where the value is 0.009 < 0.05, it may be concluded that the Foreman Working Effectiveness variable (X1) has a direct and significant effect on the loading and unloading productivity variable (Z), so the hypothesis is accepted.

The significance value of the TKBM Behavior variable (X2) is 0.014, where the value is 0.014 < 0.05, it may be concluded that the TKBM Behavior variable (X2) has a direct and significant effect on the loading and unloading productivity variable (Z), so the hypothesis is accepted.

The significance value of the Equipment Performance variable (Y) is 0.640, where the value is 0.640 > 0.05, it may be concluded that the Equipment performance variable (Y) has no significant effect on the dependent variable of Loading and Unloading Productivity (Z), so the hypothesis is rejected.

Based on the above calculations, it may be concluded that the equation in the sub-structure II test is $Y = 0.344(X1) + 0.282(X2) + 0.063(Y) + 0.817$

3) Indirect Effect Testing Result using Sobel Test

TABLE 5. Indirect Effect

No	Influence	Toward	Through	Significan ce
1	Working Effectivity of Foreman	Loading and Unloading Productivity	Equipment performan ce	0,01451913
2	Behavior of TKBM	Loading and unloading	Equipment performan ce	0,04873348

Source: Processed Primary Data

4) Model Compliance Test (goodness of fit test)

Model Compliance Test is made in order to test and examine if the proposed model contain compliance (fit) with the data or not.

$$R^2m = 1 - (1 - R^2_1), (1 - R^2_2), \dots, (1 - R^2_p)$$

In this matter, interpretation on R²m equals to the interpretation of determination (R²) on the regression analysis. Pursuant to the following table:

TABLE 6. R Square of Sub Structure I

Model of Summary ^b										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.704 ^a	0,495	0,482	1,888	0,495	36,789	2	75	0,000	1,554

a. Predictors: (Constant), Working Behavior, Working Effectivity

b. Dependent Variable: Equipment performance

Source: Processed Primary Data

Then, the amount of data diversity as may be clarified by model is measured on the basis of the following formula:

$$R^2m = 1 - (1 - R^2_1), (1 - R^2_2), \dots, (1 - R^2_p)$$

$$R^2m = 1 - (1 - 0,495) \times (0,495)$$

$$R^2m = 1 - (0,505) \times (0,495)$$

$$R^2m = 0,75$$

The R²m value of 0.75 indicates that the diversity of data that may be verified by the model is 75%, while the remaining 25% is verified by other variables out of the model. Thus, the research has a high predictive ability on the behavior

of the dependent variable which is characterized by a high coefficient of determination above 50%.

TABLE 7. R Square Sub-Structure II

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.576 ^a	0,332	0,305	2,095	0,332	12,275	3	74	0,000	2,409

a. Predictors: (Constant), Equipment Performance, Working Behavior, Working Effectivity

b. Dependent Variable: Loading and Unloading Productivity

Source: Processed Primary Data

Then, the amount of data diversity as may be clarified by model is measured by:

$$R^2m = 1 - (1 - R^2_1), (1 - R^2_2), \dots, (1 - R^2_p)$$

$$R^2m = 1 - (1 - 0,332) \times (0,332)$$

$$R^2m = 1 - (0,668) \times (0,332)$$

$$R^2m = 0,779$$

The R²m value of 0.779 means that the diversity of data that may be explained by the model is 77.9%, while the remaining 22.1% is verified by other variables out of the model. Thus, the study has a high predictive ability on the behavior of the dependent variable which is characterized by a high coefficient of determination above 50%.

IV. CONCLUSION

From the research and analysis in whole, the researcher may adopt several conclusions set forth as follows:

- It is considered that the effectiveness of Foreman's work is very good, in case of a disturbance or damage to the tool, it should be immediately reported to the engineering department, then it would not take long response and time for the repair of the tool performance. Therefore, hypothesis (H1) is accepted;
- It is considered that Safe actions carried out by TKBM continue improving, as such the tools continue operating due to unsafe conditions that may occur during loading and unloading activities. There is an influence of TKBM behavior (X2) on equipment performance (Y), TKBM behavior variable (X2) has a direct and significant effect on equipment performance variable (Y), so that the hypothesis (H2) is accepted;
- Supervision carried out by Foreman during loading and unloading activities ensures that loading and unloading productivity is getting better, so that the hypothesis (H3) is accepted;
- Safe action carried out by TKBM ensures that loading and unloading productivity continues improvement. There is an influence of TKBM behavior (X2) on BM productivity (Z), TKBM behavior variable (X2) has a direct and significant effect on BM productivity variable (Z), so that the hypothesis (H4) is accepted;
- If the tools that work and operate optimally without stopping, then the productivity of loading and unloading continues improvement. There is no effect of equipment performance (Y) on BM productivity (Z), equipment performance variable (Y) has no direct and significant

- effect on BM productivity variables, so that the hypothesis (H5) is rejected;
- The equipment performance is capable of being a mediator or mediating the indirect effect of Foreman's work effectiveness on loading and unloading productivity at the Koja Container Terminal; it means that a tool that works optimally without stopping as determined by the company is able to increase loading and unloading productivity, so that it is proven that the performance of the equipment as an intervening medium is functioned to strengthen the effect of Foreman's work effectiveness on loading and unloading productivity. Therefore, the hypothesis (H6) is accepted;
 - Equipment performance is capable of being a mediator or mediating the indirect effect of TKBM behavior on loading and unloading productivity, so that the hypothesis (H7) is accepted.

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