



The Effect of Spare Part Procurement and Inventory on the Smooth Operation of Floatingcrane Vessels at PT MUTIARA JAWA

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Abstract: PT Mutiara Jawa is engaged in transshipment which handles loading and unloading of coal. So that the timeliness of unloading must be considered because the company must have special attention to these activities to prioritize its efforts in providing quality loading and unloading services. Based on the data, the problems that exist discuss the procurement and supply of ship spare parts for ship operations. The purpose of this study is to find out how much influence and relationship the procurement of spare parts has on the smooth operational activities of floating crane vessels. In this study found the results of data from the influence and relationship of spare part procurement to the smooth operation of floating crane vessels.

Keywords: Ship spare parts, Ship Operational Activities.

INTRODUCTION

Coal is one of the largest export commodities in Indonesia. The process of moving coal transportation is the main thing that needs to be considered. Land and sea transportation modes as transportation infrastructure. The condition of the waters in East Kalimantan does not allow large ships to pass. Therefore, a method is needed to deal with these problems, namely by Transshipment. Transshipment is the activity of moving goods or cargo carried out in the middle of the sea from ship to ship (Ship to Ship). Transshipment is a method used for the transfer of transportation due to the condition of the waters that cannot be passed by large ships. PT. Mutiara Jawa is one of the companies that handles loading and unloading of coal in East Kalimantan (Indonesia), engaged in Coal Transshipment. As an official company, it prioritizes its efforts in providing loading and unloading services with the best quality.

In the coal loading and unloading activities carried out by PT. Mutiara Jawa cannot be separated from loading to the barge and discharging goods from the barge to the mother vessel.

So the role of floating cranes is very important to be used as a loading and unloading tool and equipment that supports its activities. In this case, it relates to ship operational activities. Thus, ship spare parts are a very important element in the loading and unloading process. The role of spare parts and how to store and maintain them is one of the most important parts related to the smooth operation of a ship. Without good and systematic handling, it can disrupt the smooth maintenance of the ship which ultimately has an impact on the smooth operation of the ship.

The availability of spare parts on the ship is very important, without sufficient availability it will have an impact on optimizing the operation of the ship. This is because the need for spare parts on the ship can be very vital at any time even the ship cannot operate just because it is waiting for the required spare parts.

In procuring spare parts, it is necessary to pay attention to the availability of spare parts on board related to the type, brand, type, number, drawing and spec of spare parts so that the specifications of the spare parts ordered are in accordance with the needs. If the spare part specifications are different from the specifications required on board, the spare part cannot be used. In the operation of the ship, something often happens that can hinder the smooth running of the work, whether it only needs maintenance, repair or even replacement of spare parts. In this case, it is necessary to make efforts to control the system for the procurement process and supply of ship spare parts. Therefore, the thing that needs to be considered in the management of spare parts on board is the control of spare part inventory which is the task of a technical superintendent to contribute to the procurement of spare parts for all maintenance needs of machine tools on board.

RESEARCH METHODS

Research time

This research was carried out when the authors conducted Land Practice at PT Mutiara Jawa for 10 (ten) months, starting from October 12, 2020 to August 12, 2021.

Research Place

This research was conducted by the author at PT Mutiara Jawa at the Graha Surveyor Indonesia Building, Lt. 16 Jl. Gatot Subroto Kav. 56, South Jakarta 12950.

Approach Method

The approach method that the author uses in this study is a quantitative method. Quantitative method is a process of finding knowledge that uses data in the form of numbers as a tool to analyze information about what you want to know.

Data collection technique

Data collection techniques used in this study consisted of the following techniques:

- a. Questionnaire
Questionnaire/questionnaire technique was used to collect quantitative data which was distributed/given to the respondents who were used as research samples.
- b. Observation
Observations or observations were made when researchers carried out Land Practices at PT Pelayaran Mutiara Jawa.
- c. Literature review
This technique is done by reading and citing important things or expert opinions from various books or references related to this research problem. In addition, it is also done by looking for various previous research results that are relevant to this study as comparison material.

Research subject

Sample isis part or representative of the population studied (Sugiyono, 2012). The samples used in this study were employees of the operational division and crew of PT. Mutiara Jawa is a place for practicing cadets, totaling 7 employees of the operational division and 23 crew members. This study did not use a sampling technique.

RESULT AND DISCUSSION

Validity Test (Test of Validity)

This validity test is used to determine the level of validity of a questionnaire used in data collection. The questionnaire is said to be valid if the questions on the questionnaire are able to reveal something that will be measured by the questionnaire. The df formula according to Ghozali (2011) is $(df = nk$ where n is the number of samples and k is the number of variables both independent and variable bound). Thus, the significant test was carried out by comparing the calculated r value with the r table value for degree of freedom $(df) = n-2$. The number of samples (n) in this study was 30, so the magnitude of df was $30 - 2 = 28$, with a significance level of 5%. A statement is declared valid if the value of rcount which is the corrected item-total correlation value (in SPSS 25) is greater than r table. In this case, the r table is 0.361. If the result of r count is greater than r table, namely 0.361, then the data can be said to be valid. The results of the validity test can be seen in the following table:

Result of Validity Test of Spare Part Procurement Variable (X1)

No.	Pernyataan	Rhitung	Rtabel	Ket
Pengadaan Spare Part (X1)				
1.	Metode pengadaan spare part yang dilakukan oleh PT. Mutiara Jawa adalah metode Request for Quotation	0,798	0,361	VALID
2.	Metode pengadaan spare part dengan metode penunjukkan langsung (Direct Procurement) akan lebih cepat diproses.	0,798	0,361	VALID
3.	Barang dan jasa yang dibutuhkan bagi kinerja utama perusahaan dan tidak dapat ditunda keberadaannya (Business Critical Asset) akan lebih diutamakan dalam proses pengadaan spare part.	0,766	0,361	VALID
4.	Pekerjaan yang bersifat spesifik karena alasan tertentu (kompleksitas, teknologi, availability) yang karena sifatnya tersebut, maka hanya dapat dilaksanakan oleh satu vendor penyedia barang/jasa ex: MacGregor.	0,605	0,361	VALID
5.	Pembuatan plan repair (rencana kerja) / unplan repair dilakukan oleh Technical Superintendent untuk pengadaan spare part kapal berdasarkan report dari officer kapal yang bersangkutan.	,586	0,361	VALID
6.	Permintaan pengadaan spare part di atas kapal akan segera diproses jikapilak kapal mengirimkan Purchase Requisition (PR) sebagai syarat proses pengadaan spare part.	0,704	0,361	VALID
7.	Penentuan vendor/ supplier untuk pengadaan spare part diatas kapal ditentukan dengan adanya Comparison Price sebagai acuan dalam menilai kewajaran harga, kualitas, dan spesifikasi spare part yang dibutuhkan.	0,661	0,361	VALID
	Setiap pengadaan spare part harus berdasarkan dokumen Request of Approval (RA) yang telah dibuat berisi semua keterangan terkait dokumen-dokumen pengadaan spare part yang telah disetujui oleh manager operasional untuk kemudian diajukan kepada P/D dan dipastikan sudah di acc sgat proses pengadaan spare part segera diproses.	0,850	0,361	

Source: Primary Data Processed

In the table above where the r-table is obtained by 0.361 with $\alpha = 0.05$. After being compared with r, it turns out that all statements are valid.

Spare Part Inventory Variable Validity Test Results (X2)

No.	Pernyataan	F _{hitung}	F _{tabel}	Ket
Persediaan Spare Part (X₁)				
1.	Persediaan spare part mempunyai peran penting dalam menunjang kelancaran kegiatan operasional kapal floating crane.	,704	0,361	VALID
2.	Diperlukan perencanaan persediaan spare part yang tepat sesuai dengan kebutuhan mana yang harus ada di kapal dan mana yang harus tersedia di gudang.	,602	0,361	VALID
3.	Adanya unsur ketidaksiapan permintaan spare part kapal sehingga perlu adanya persediaan spare part di kapal/ gudang.	,702	0,361	VALID
4.	Adanya unsur ketidaksiapan barang dari pemasok/vendor.	,778	0,361	VALID
5.	Harga spare part menjadi faktor penentu seberapa besarnya dana yang harus disediakan oleh perusahaan jika akan melakukan persediaan spare part.	,842	0,361	VALID
6.	Manajemen perusahaan harus memperhatikan perkiraan pemakaian spare part agar tidak menghambat kelancaran operasional kapal.	,805	0,361	VALID
7.	Spare part tidak boleh dalam kondisi Nil, setidaknya jika spare part belum di supply, kesalahan tidak terletak pada pihak kapal karena permintaan (PR) sudah dikirimkan.	,810	0,361	VALID
8.	Perlu nya system controlling ROH terkait data ketersediaan spare part kapal.	,506	0,362	VALID

In the table above where the r-table is obtained by 0.361 with = 0.05. After being compared with r, it turns out that all statements are valid.

Result of Validity Test of Ship Operational Smoothness Variable (Y)

No.	Pernyataan	F _{hitung}	F _{tabel}	Ket
Kelancaran Kegiatan Operasional Kapal (Y)				
1.	Proses pengadaan dan persediaan spare part di atas kapal sangat berpengaruh terhadap kegiatan operasional kapal floating crane.	,677	0,361	VALID
2.	Ketepatan waktu pemenuhan permintaan spare part di atas kapal sangat penting.	,840	0,361	VALID
3.	Kegiatan Docking dan Maintenance kapal selalu rutin dilaksanakan sesuai dengan PMS (Plan Maintenance System) demi kelancaran kegiatan operasional kapal.	,732	0,361	VALID
4.	Pemenuhan waktu yang tepat saat idle time dapat digunakan untuk perawatan dan pemeliharaan mesin kapal.	,719	0,361	VALID
5.	Kondisi cuaca sangat mempengaruhi kegiatan transshipment batubara sehingga sangat berpengaruh terhadap jadwal kegiatan bongkar muat batubara.	,694	0,361	VALID

Source: Primary Data Processed

In the table above where the r-table is obtained by 0.361 with = 0.05. After being compared with r, it turns out that all statements are valid.

Reliability Test

The reliability test aims to determine whether the data collection tool basically shows the accuracy, stability, or consistency of the tool in revealing certain symptoms from a group of individuals, even though it is carried out at different times. In determining the level of reliability of a research instrument, generally reliability in the range > 0.60 to 0.80 is good, and in the range > 0.80 to 1.00 is considered very good. To determine the reliability of the question items, the variables were tested using the SPSS 25 computer program using the Cronbach's Alpha formula.

Procurement of spare parts (X1)

Reliability Statistics

Cronbach's Alpha	N of Items
.866	8

Source: Primary Data Processed

Based on the table above, it can be concluded that the value of Cronbach's Alpha variable X is 0.866. Then the questionnaire is declared reliable because the value is 0.866 > 0.60.

Spare part inventory (X2)

Reliability Statistics	
Cronbach's Alpha	N of Items
.873	8

Based on the table above, it can be concluded that the value of Cronbach's Alpha variable X is 0.873. Then the questionnaire is declared reliable because the value is $0.873 > 0.60$.

Smooth Operation of Ships (Y) Reliability Statistics	
Cronbach's Alpha	N of Items
.778	5

Source: Primary Data Processed

Based on the table above, it can be concluded that the value of Cronbach's Alpha variable Y is 0.778. Then the questionnaire is declared reliable because the value is $0.778 > 0.60$.

Regression Test

Aims to determine whether or not there is a linearity between the independent variable and the dependent variable. The regression equation model that can be written from these results in the form of a linear regression equation is as follows:

$$Y = 1.678 + 0.586 X_1$$

From the regression equation, it can be seen that the Procurement of Spare Parts for the Smooth Operation of Floating Crane Vessels at PT.Mutiara Jawa is unidirectional (positive), this is shown in the regression coefficient or the value of b in the regression equation which shows a positive number of 0.586 which means that every the quantity of 1 unit of cargo will be followed for the smooth operation of floating crane vessels of 0.586 units. Vice versa, if the quantity of cargo is delayed by 1 unit, the smooth operation of floating crane vessels will tend to be 0.586 units. And the value of the coefficient a (intercept) is 1.678 which means that if there is no quantity of cargo ($X=0$), it is estimated that the operational activities of floating crane vessels are 1.678 units.

Based on the results of calculations using SPSS version 25 obtained a of 7.765 and b of 0.424 the form of a simple linear regression equation is as follows:

$$Y = 7.765 + 0.424 X_2$$

Judging from the regression equation that the Effect of Spare Part Inventory on the Smooth Operation of Floating Crane Vessels at PT.Mutiara Jawa is unidirectional (positive), this can be shown in the regression coefficient or the value of b which shows a positive number of 0.424 which means that every accuracy procurement of spare parts 1 unit will be followed by the smooth operation of floating crane vessels of 0.424 units. Vice versa, if the procurement of spare parts experiences a delay of 1 unit, the smooth operation of the ship's operations will tend to experience a delay of 0.424 units. And the value of the coefficient a (intercept) is 7.765 which means that if there is no spare part inventory ($X=0$), it is estimated that the smooth operation of floating crane vessels is 7,

Multiple Regression

Based on the results of calculations using SPSS version 25, obtained a of 0.917 and b1 of 0.519 and b2 of 0.91 the form of the multiple linear regression equation is as follows:

$$Y = 0.917 + 0.519X_1 + 0.091X_2$$

- 1) From the regression equation above, the effect of the procurement of spare parts on the smooth operation of floating crane vessels at PT. Mutiara Jawa is unidirectional (positive), this can be seen in the regression coefficient or b1 value which shows a

positive number of 0.519, which means that every accuracy in the procurement of spare parts will be followed by the smooth operation of floating crane vessels at PT.Mutiara Jawa as much as 0.519 as well as On the other hand, if the procurement of spare parts decreases, the smooth operation of the ship will tend to decrease by 0.519 units.

- 2) From the regression equation above that the effect of spare part inventory on the smooth operation of floating crane vessels at PT.Mutiara Jawa is unidirectional (positive), it can be seen in the regression coefficient or b2 value which shows a positive number of 0.091 which means that every readiness in spare parts inventory part will be followed by the smooth operation of floating crane vessels at PT. Mutiara Jawa as much as 0.091 and vice versa, if the readiness in spare part inventory decreases, the smooth operation of the ship will tend to decrease by 0.091 units.
- 3) And the value of the coefficient a (intercept) is 0.917 which means that if there is no procurement of spare parts and spare part supplies (X1 and X2 = 0), it is estimated that the smooth operation of floating crane vessels is 0.917 units.

Coefficient of Determination Analysis

It is the contribution of the independent variable to the dependent variable. The higher the coefficient of determination, the higher the ability of the independent variable in explaining the variation of changes in the dependent variable. Based on the SPSS output above, it is known that the R Square value is 0.919, this implies that the effect of work discipline is 91.9%.

Hypothesis testing

The hypothesis test that the author uses is the t-test Count. The t-test was used to test the significant level of the effect of the independent variable partially on the dependent variable. While the results of the table are:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,959	,919	,913	,77624

a. Predictors: (Constant), Payload Quantity

Information :

: 0.05

n : Number of samples/respondents

k : Number of variables X

While the results from the table above are as follows: The results of data processing found the following results:

- 1) The spare part procurement variable (X1) where the tcount value is 11.167 and the significance value is 0.000. In this result, the significance value is less than 5%. ($\alpha=0.05$) and a value of $11.167 > 2.052$. This means that the hypothesis is accepted because there is a significant influence on the procurement of spare parts on the smooth operation of the floating crane vessel. $t_{hitung} > t_{tabel}$
- 2) Variables spare part inventory (X2) where the value of tcount is 2.094 and a significance value of 0.046. In this result, the significance value is less than 5% ($\alpha=0.05$) and the value is $2.094 > 2.052$. This means that the hypothesis is accepted because there is a significant influence of spare part inventory on the smooth operation of floating crane vessels. $t_{hitung} > t_{tabel}$

The F test is used to determine whether all independent variables jointly affect the dependent variable, in this study the independent variables. If the independent variable has a simultaneous influence on the dependent variable, the regression equation model fits into the fit criteria. On the other hand, if there is no simultaneous effect, it will fall into the unsuitable category or not fit.

While the results from Ftable:

$$\begin{aligned} F_{table} &= F(1-\alpha)(dk=k, (dk=nk-1)) \\ &= F(1-0.05)(dk=2, (dk=30-2-1)) \\ &= F(1-0.05)(2,27) \end{aligned}$$

How to search Ftable= 2, as the numerator
= 27, as the denominator

Ftable = 3.35

It is known that the Fcount of 153,014 is greater than the Ftable of 3.35 with a significance value of 0.000, so the hypothesis is accepted. This means that the variable procurement of spare parts and supplies of spare parts has a significant influence on the smooth operation of the ship.

CONCLUSION

Based on the results of research and discussion on the variables of Procurement and Inventory of Spare Parts on the smooth operational activities of floating crane vessels, the following conclusions can be drawn: Partial procurement of spare parts (X1) is very influential because it has a positive and significant probability on the smooth operation of floating crane vessels (Y). The spare part procurement variable has an important role in the smooth operation of the floating crane vessel at PT.Mutiara Jawa. So that H1 which states that the procurement of spare parts has a positive and significant influence on the smooth operation of floating crane vessels is accepted; Partial spare part inventory (X2) is very influential because it has a positive and significant probability on the smooth operation of floating crane vessels (Y). Variable spare part inventory has an important role in the smooth operation of floating crane vessels at PT.Mutiara Jawa. So that H2 which states that spare part inventory has a positive and significant influence on the smooth operation of floating crane vessels is accepted; Testing together, states that the effect of the procurement of spare parts (X1) and supply of spare parts (X2) simultaneously has a positive effect on the smooth operation of floating crane vessels at PT Mutiara Jawa (Y). So that H3 which states that the procurement of spare parts and the supply of spare parts have a joint or simultaneous effect on the smooth operation of the floating crane vessel is accepted.

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