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RESEARCH ARTICLE

THE ANALYSIS EFFECT OF READINESS DEMURRAGE AGAINST COAL SUPPLY VESSEL, PT. INDOMINCO MANDIRI, BONTANG, EAST KALIMANTAN, INDONESIA

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ABSTRACT

Demurrage is a form of compensation due to violation of the time of loading and unloading cargo and are usually listed in the rental contract of cooperation. Demurrage can sometimes cause damage to the seller because it would increase the total cost of the transportation. In 2010, PT. Indominco accept losses due to unpreparedness of the coal supply to reach the 11 million USD. The variables used as an object of research is the actual rate of supply of coal and ship loading, coal supply is ready to sell the supply of coal production has an influence on the actual rate of replenishment ships. The analysis is conducted to find the relationship and influence in this study using the Pearson product moment correlation analysis. The data used is the average of the actual supply of coal and ship loading rate in a year. The steps in the research is to determine a hypothesis in the form of sentences and statistics and make a helper table. After the complete data correlation calculation, obtained $r = 0.674$ and relatively strong, the coefficient diterminan 45.37%, so the supply of coal to the known effect of actual charging rate is significant.

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INTRODUCTION

This study aimed to produce a system with a good flow of coal minimize demurrage due to shortage of coal supply by looking at the correlation and estimate factors that cause. The scope of the discussion revolves around the analysis of the correlation between the supply of coal to be the deciding factor of demurrage ie the actual rate of charging to ship. The variables used in the study used two kinds of variables: the supply of coal (independent) and the actual charging rate (dependent). Both of these variables have properties that influence each other. The units used in these two variables is kilotonnes (kton). While the sample used for analysis of the data is 12 samples, and each sample is the average value of each month during the study period.

TYPE OF VARIABLES

According Sugiyono (2012), in looking at the relationship of the object studied variables is more cause and effect, so that the existing research independent and dependent variables. Based on the measurement of variables can be distinguished:

Latent variables: Latent variable is a variable shape that is formed by the indicators observed in the real world. Another name for this variable are factors, constructs or unobserved variables (Liana Lie, 2009).

Variables Measured: Measured variable is a variable whose data should be sought through field research, for example through surveys. Another name for this variable is observed variables, indicator variables, or manifest variables (Liana Lie, 2009).

Based on the function of the variable in the relationship between variables, then all sorts of variables in the study can be divided into:

) Independent Variables

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-) Dependent Variables
-) Moderating variables
-) intervening variable

HYPOTHESIS

The word hypothesis comes from the Greek word that has two "hupo" (temporary) and "thesis" (a statement or theory). Because the hypothesis is a statement of truth while still weak, it needs to be verifiable. Then the expert interprets the meaning of the hypothesis is a conjecture on the relationship between two or more variables (Kerlinger, 1973 and Tuckman, 1982). Furthermore Sudjana (1992) defines a hypothesis is an assumption or conjecture on a matter that is made to explain it is often required to perform pengecekannya. It is clear that Sudjana said assumptions or allegations of a general nature, while Kerlinger and more specifically Tuckman hypothesis concerning the meaning to be guessed between two or more variables. On the basis of the above definition, so it can be interpreted that the hypothesis is a temporary answer or alleged to be tested again the truth. The research hypothesis is a working hypothesis (or the alternative hypothesis H_a or H_1) hypothesis is formulated to address the problem by using the existing theories related (relevant) to the research problem and not based on facts as well as the support of real data in the field. Alternative hypothesis (H_a) is formulated with a positive sentence. The hypothesis statistically interpreted as a statement about the state of the population (parameters) to be verifiable based on data obtained from the study sample. Thus, in calculating the test statistic is the null hypothesis (H_0).

So the null hypothesis is a statement of the absence of a relationship, influence, or the difference between statistics and parameters with opposite H_a stating the relationship, influence, or the difference between parameters and statistics. The null hypothesis (H_0) is formulated with a negative sentence (Riduwan, 2009).

There are two kinds of hypothesis are:

Alternative Hypothesis (H_a): Alternative hypothesis given the symbol (H_a) is also called a working hypothesis or research hypothesis (H_1). Parties researchers did not test (H_a), because (H_a) is the opposite (H_0). Alternative hypothesis (H_a) just expresses the belief of researchers on population sizes.

Null hypothesis (H_0): Time to use statistical tests we always work with the two hypotheses is nil or null hypothesis and the alternative hypothesis. Null hypothesis with the symbol (H_0) it is actually statistically tested and is a statement about the parameters that are contrary to the beliefs of researchers, (H_0) temporarily retained completely up to statistical testing to get evidence against or support it. If the statistics obtained from the testing decision support or agree with (H_0), it can be said (H_0) is accepted. Conversely, if the decision is obtained defected or contrary to the decision of (H_0), then action can be taken that (H_0) is rejected.

A Hypothesis Testing: According Riduwan (2009), the type of hypothesis testing is divided into two kinds, of which:

Directional hypothesis

Directional hypothesis is the formulation of the hypothesis that the direction is clear, also called hypothesis directly.

Non Directional Hypothesis: Non-directional hypothesis or hypotheses also called indirect, is a hypothesis that does not indicate a specific direction. If the formula H_a says: not equal to (\neq), then reverse the sentence reads H_0 : equal ($=$). This test uses two test sides (two-tailed test).

For hypothesis is associative can be exemplified as follows:

The authors state that there is a relationship between coal supply with the actual rate charging (loading) vessel at PT. Indominco Mandiri. On the basis of these statements the researcher wants to prove it.

The proof in the form of a sentence description and statistical models such as:

Hypothesis (H_a and H_0) in the description of a sentence

H_a : There is a relationship between coal supply with the actual rate of replenishment vesel at PT. Indominco Mandiri.

H_0 : There is no relationship between the actual rate of coal supply by charging the vessel at PT. Indominco Mandiri.

Hypothesis (H_a and H_0) in the statistical model

H_a : $p \neq 0$

H_0 : $p = 0$

Below is an example of testing that uses a two-party test or two-tailed test.

Normal distribution: The normal distribution is an important statistical tool for estimating and predicting events wider. The normal distribution is also called the Gaussian distribution, to honor as the discoverer of the equation Gauss (1777-1855). In the opinion of the statistician, the distribution of the variable in the population follow a normal distribution. The normal distribution was first introduced by Abraham DeMoivre (1733) as an approach to the binomial distribution for large n . Further developed by Pierre Simon de Laplace and is known by Theorem Moivre - Laplace. Laplace used the normal distribution for the error analysis of an experiment.

Scatter diagram: Scatter diagram or also called point diagram (distribution diagram) is a diagram showing a cluster of points after the line connecting the coordinates as deleted. Usually this diagram is used to describe the correlation or regression of data points consisting of the independent variables and the dependent variable.

Example diagram below shows the relationship variables X and Y.



Figure 2. a positive linear relationship ($r = +1$)

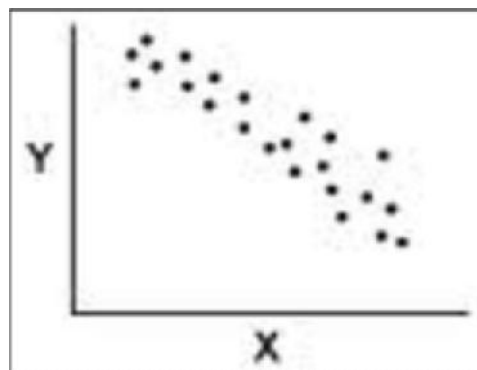


Figure 3. The negative linear relationship ($r = -1$)

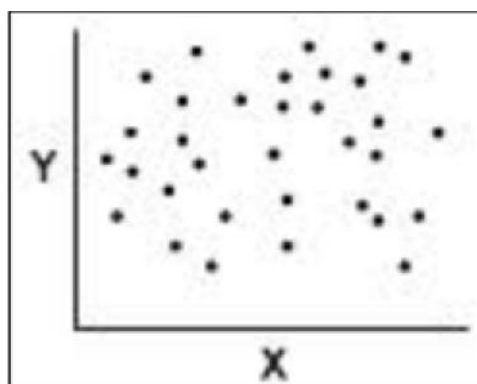


Figure 4. Did no correlation ($r = 0$)

Through this scatter diagram can be obtained two kinds of information, namely the patterns and similarities estimates of the relationship between two variables studied. The pattern of the relationship between the two variables is shown on the picture or the curve obtained from the tendency of the point spread. While the estimation equation that shows the relationship between the two variables can be determined through curve estimates obtained from the distribution point (Algifari, 2000).

Pearson Product Moment

Correlation

Test or Pearson Product Moment Correlation analysis is used to find the relationship of independent variables (X) and dependent variable (Y) and the data in the form of interval and ratio (Riduwan, 2009). The formulas presented are:

$$r = \frac{n \cdot (\phi XY) Z(\phi X) \cdot (\phi Y)}{\sqrt{\{n \cdot \phi X^2 Z(\phi X)^2\} \cdot \{n \cdot \phi Y^2 Z(\phi Y)^2\}}}$$

where:

r = coefficient of correlation

n = number of samples

Correlation PPM denoted (r) provided the value of r is not over priced (-1 < r < +1). If r = -1 means a perfect negative correlation, r = 0 means no correlation, and r = 1 means perfect positive correlation (very strong). While the price of r will be consulted with the interpretation table of r values as follows:

Table 1. Interpretation of Correlation Coefficient r value interval Coefficient Level Relations

0.0 - 0.199	Very Low
0.20 - 0.399	Low
0.40 - 0.599	Enough
0.60 - 0.799	Strong
0.80 - 1.000	Very Strong

COEFFICIENT OF DETERMINATION

The coefficient of determination is a statistical value used to determine whether there is a relationship between two variables influence. Coefficient of determination shows the percentage variation in the dependent variable that can be explained by the regression equation generated (Algifari, 2000).

According to Luke (2009), the coefficient of determination shows the percentage fluctuations or variations on a variable (Y) can be explained or caused by other variables (X). The coefficient of determination is the squared correlation coefficient (r²). To state the size of the contribution of variable X to Y can be determined by the formula determinant coefficient as follows:

$$KP = r^2 \times 100\%$$

where:

KP = the coefficient determinant

r = coefficient of correlation

Test Significance

Testing was conducted to test the t computation, where to find the amount that will be compared to t count and t tabel. The test is used to determine the quality t count significance of regression between each independent variable (X) there are significant or

not on the dependent variable (Y), the formula t count test is as follows: $t_{\text{computation}} = \frac{r\sqrt{nZ^2}}{\sqrt{1Zr^2}}$

where:

r = coefficient of correlation

n = number of samples

r² = coefficient determinant

The rules of the test as follows:

- If t count > of t table, then significant (H₀ is rejected and H_a accepted)

- If t count < from t table, it was not significant (H₀ is accepted and H_a rejected)

In the t test was performed on the degrees of freedom, with the following formula:

$$db = n - k$$

where:

db = free degree (degree of freedom)

n = number of samples or the number of observations

k = number of variables (free and bound)

TABLE t (TABLE NORMAL DISTRIBUTION)

Table t in the statistics commonly known as the normal distribution table. This table is used to help us determine the hypothesis. This is done by means of a comparison between the statistics count the test statistic. If the count statistics can be obtained by the calculation itself, it is necessary to test statistical distribution tables. Distribution table that is used is dependent on the test statistic is applied. See appendix four for a normal distribution table (Table t).

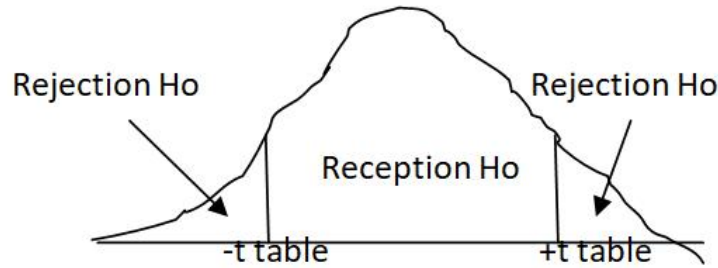


Figure 1. Test two parties Two-party testing criteria are

If $-t_{table} < t_{count} < +t_{table}$, then H_0 is accepted

To do the reading table t, it first needs to know the level of significance or probability value. Smaller values indicate the significance level of one-way (one-tail), while larger values indicate the significance level of two-way (two-tails).

THE PROVISIONS OF ERROR RATE: Any use of statistical techniques to accept or reject the null hypothesis would be to contain the risk of an error (error) decision-making. In a study will never be able to have any degree of certainty or confidence level of 100% on the empirical data to support the decision whether or not to support the hypothesis. That is a little or a lot, the refusal or acceptance of the hypothesis of containing the probability or chance of error. The smaller the chance of error, the confidence in the decision will be even greater.

Errors that occur are of two kinds, including:

Error type I

Error when rejecting null hypothesis (H_0) that should be accepted.

Error type II

Error when receiving a null hypothesis (H_0) that should be rejected.

Statistical procedure allows us to determine what are the chances for the occurrence of type I error and type II error to be used. The magnitude of the chance of type I error is called the significance level and given the symbol (α) or symbol (β) is expressed as a percentage, while the price of $(1 - \alpha)$ 100% confidence level is called. For example, if α is set at 0:05 or 5% equates to determine the confidence level of $(1 - 0.05) = 0.95$ or 95%. The amount of opportunities for the occurrence of type II error given the symbol (β) is also expressed as a percentage, while the price of $(1 - \beta)$ 100% is called the power of the test

Table 2. Model error when making inferences in testing

Conclusion	Actual Situation	
	H_0 True	H_0 is false
Accept H_0	True Conclusion	type II error
Reject H_0	Type I Error	True Conclusion
	$\alpha =$	$\beta =$

Significance level is closely related to problems in the rejection of null hypothesis error, an understanding of the significance level is very important in the use of statistics in order to test the research hypothesis. Conclusion research relies on statistical decision as mentioned above, can not be sustained by the absolute one hundred percent confidence level. That's why researchers must provide one of the few opportunities to reject the hypothesis. The amount of any opportunity to reject the null hypothesis (type I error) is called a significance level. As a researcher expressed rejection of the null hypothesis, it must be understood that it is the risk of rejection at a significance level of error. Rejection based on a small level of significance of course is more trustworthy than the rejection was based on great significance level, although it does not mean that a small significance level is always more appropriate to use than the great significance level.

PEARSON PRODUCT MOMENT CORRELATION ANALYSIS (PPM)

PPM correlation analysis was used to determine the relationship of the independent variable (X) and dependent variable (Y). In this study the dependent variable (Y) is the actual rate, while the independent variable (X) is the supply of coal. Supply of coal is a variable that has a significant influence on the relationship and the actual rate charging demurrage which ultimately impact on the ship (vessel). Furthermore, prior to the research and testing, the data is assumed to meet the requirements, namely, no Measures PPM correlation study as follows:

Creating H_a and H_0 in the form of a sentence.

H_a : There is a relationship between the supply of coal to the actual rate of replenishment vessel at PT. Indominco Mandiri.

H_0 : There is no relationship between the supply of coal to the actual rate of replenishment vessel at PT. Indominco Mandiri.

Creating H_a and H_0 in the form of statistics

- $H_a: r \neq 0$

- $H_0: r = 0$

Creating a helper table to calculate the correlation value. normal distribution and have the same pair

Table 3. Table helper to calculate the correlation PPM

January	55.74	4.13	3,107	17.04	230
February	51.07	3.91	2,608	15.29	200
March	58.55	3.46	3,428	12.00	203
April	49.73	2.18	2,473	4.75	108
May	49.11	3.36	2,411	11.29	165
June	55.13	5.04	3,039	25.41	278
July	54.28	5.72	2,946	32.77	311
August	52.51	4.59	2,757	21.10	241
September	58.04	6.20	3,368	38.45	360
October	55.41	5.41	3,070	29.27	300
November	61.38	7.45	3,768	55.56	458
December	57.28	3.95	3,281	15.61	226
	658.22	55.42	36,257	278.55	3,079
n	12				

Enter the statistics of the auxiliary table by using the formula:

From the above calculation, there is a relationship between the supply of coal to the actual rate of replenishment vessel at PT. Indominco Mandiri ($r = 0.674$) and relatively strong (see table 1)

Determining the contribution (determinan coefficient or coefficient determinant) variable X to variable Y, with the following formula:

$$KP = r^2 \times 100\%$$

$$KP = 0.674^2 \times 100\%$$

$$KP = 45.37\%$$

Thus means, influence the supply of coal to the actual rate of replenishment vessel at PT. Indominco Mandiri amounting to 45.37% and the remaining 54.63% is determined by other variables.

Test the significance of the formula tcount

$$t_{\text{count}} = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

$$t_{\text{count}} = \frac{0,674\sqrt{12-2}}{\sqrt{1-(0,674)^2}}$$

$$t_{\text{count}} = \frac{0,674\sqrt{10}}{\sqrt{120,454}}$$

$$t_{\text{count}} = \frac{0,674.3,162}{\sqrt{0,546}}$$

$$t_{\text{count}} = \frac{2,130}{0,739} = 2.882$$

Rule test

If $t_{\text{count}} > t_{\text{table}}$, then significant.

If $t_{\text{count}} < t_{\text{table}}$, it is not significant.

Based on the above calculation, to determine the confidence level of 95% and with the provisions of the error rate = 0.05 or 5%, as well as the degree of free (db) = $n - k = 12 - 2 = 10$, in order to get the value from table = 2,228. By the rules of the previous test, it can be seen $t_{\text{count}} > t_{\text{table}}$ or from $2.882 > 2.228$, it is known if the correlation of variable X with Y or coal supply relationship with the actual rate of replenishment vessel at PT. Indominco Mandiri is significant.

Conclusion

From the research conducted, the authors were able to deduce that in accordance with the purpose of research, the benefits of science, and the benefits to the agency or company which carried out the research. The conclusions that can be provided are as follows:

-) Based on calculations using the PPM correlation analysis, it can be concluded if the correlation between the supply of coal to the actual rate of replenishment ships will affect the vessel demurrage. With PPM correlation formula is used, obtained $r = 0.674$, which means the relationship between the supply of coal to the actual rate of replenishment vessel at PT. Self Indominco relatively strong.
-) The factors that cause demurrage, one of which is the reduction of the actual rate of replenishment ships. If the process flow traced by the authors look at the supply of coal which is the one of the points that determine the amount of the contribution or influence on other variables. And proven through PPM correlation calculation, it was found that the relationship affects up to 45.37%. While 54.63% is determined by other variables.
-) Through the calculation of the PPM correlation analysis, the authors determine the level of confidence at 95% and the number of free degrees in figure 10. When viewed through the table t, note the correlation between the supply of coal to the actual rate of replenishment vessel at PT. Indominco Mandiri is significant.
-) The benefits derived from this research on companies which are able to identify factors that could be the cause of the vessel demurrage and determine how much influence resulting from the flow of the process under study.
-) The benefits that can be given to science, particularly in the mining sector in the shipment is to provide an overview of the process flow can be expected, which are observation points that could be a potential for inflicting damage on a business.
-) Demurrage may be a loss if not treated properly, through this book the authors hope that the exposure of the chapter described the beginning to the end of the chapter to provide an overview of the flow of the coal business, seeing the potential loss by looking at the determining variable, find the relationship between the process can be an influence in the process next.
-) What is important in this demurrage problem is that coal mining companies need to pay attention to 2 (two) main things, namely:
 -) ETA (estimated time of arrival / estimation time of arrival)
 -) and
 -) ETR (Estimated Time of Travel / Route). this is very fatal and really attention. Also the big waves in certain months at sea or Ocean need to be studied more carefully because they affect the ship's travel time.

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