ANALYSIS THE EFFECT OF THE USE OF COLD STORAGE ON PERISHABLE GOODS HANDLING IN AIR CARGO OPERATION AT JUWATA TARAKAN AIRPORT

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ABSTRACT

One of the Class I (Main) Airport Organizing Units in Tarakan is Juwata Tarakan Airport. Determining the impact of cold storage on the handling of perishable commodities at Juwata Tarakan Airport is the goal of this study. This kind of research is descriptive quantitative and uses information from literature reviews, surveys, and observational data collection. Based on the results of the discussion, it is proven by SPSS calculations, there is an influence of variable X (use of cold storage) on Y (Handling Perishable Goods) in the form of a relation or correlation between variables with 0,683 (the correlation is quite significant) and it is known that the R Square value is 0,479 or 47,9%.

Keywords: *Cold Storage, The Effect, Cargo Terminal.*

1. INTRODUCTION

Juwata Tarakan Airport is one of the Class I (Main) Airport Operator Units located in the city of Tarakan. Tarakan City Center is located not far from the airport, around 3 KM. IATA Code: TRK and ICAO Code: WAQQ. With a Runway facility of 2250 meters long and 45 meters wide, equipped with 3 taxiways A, B, and C, and has 2 Aprons called Main Apron and West Apron. In addition to marine products, Tarakan is also one of the airports that serves pioneer aircraft that will send goods needed by the surrounding small islands. Both from durable food needs to those that are easily damaged are also included in perishable goods. So that cargo shipping services have emerged using both large and small aircraft. In Figure below is one example of perishable goods that have settled until they show signs of being unfit for storage at room temperature for too long and cause an unpleasant odor. Therefore, if there is the use of cold storage, it is expected to support the freshness of the goods from the shipping process until they are received by the consignee.

Juwata Airport is one of the providers of cargo shipping services by air that focuses on shipping goods including Perishable Goods. In shipping perishable goods, the Juwata Airport cargo terminal must pay attention to several aspects of infrastructure, technology, standardization, and cooperation. The influence of handling perishable goods is very important for Juwata Airport because it affects the quality and safety of the perishable goods being shipped. Therefore, special handling is carried out to ensure that perishable goods arrive in quality condition and maintain their freshness, of course, processed and sent according to the specified time.

Handling of perishable goods is carried out by providing the right temperature, humidity, and ventilation to maintain their quality and freshness. Improper handling will cause new problems such as exposure of perishable goods to the heat of the sun when the break down process at Juwata Airport causes an increase in the temperature of perishable goods. Therefore, facilities are needed that support a decrease in temperature when perishable goods arrive at the cargo terminal [1].

Figure 1. Cold Storage

Based on field review, in the process of shipping pioneer cargo such as Sushi Air, it relies heavily on weather as a requirement for the VFR (Visual Flight Rules) system or visual flight rules that direct pilots to operate aircraft in generally quite bright weather conditions, so that when the weather is bad, there is potential for sedimentation of perishable goods such as chicken and eggs. So cold storage is needed as a supporting facility for the freshness of cargo. In the outgoing and incoming process, perishable goods experience an up and down phase every month [2].

The presence of cold storage facilities is one of the mandatory standards in KM 29 of 2005 for the implementation of the Indonesian National Standard (SNI) 03-7047-2004 for Airport Cargo Terminals [3]. Cold storage is needed for storage equipment with low temperatures, such as vaccines, food ingredients or other cooling systems required by airlines. Observations made by the author are that cold storage facilities are not yet available. Based on the conditions that the author has explained, this is a problem that the author can use as material to study in a study entitled "ANALYSIS OF THE EFFECT OF COLD STORAGE USE ON HANDLING PERISHABLE GOODS IN AIR CARGO OPERATIONS AT JUWATA TARAKAN AIRPORT".

Referring to the background that has been described above, in this discussion, namely:
1. How does the use of cold storage affect the handling of perishable goods at Juwata Tarakan Airport?
2. How big is the influence of the use of cold storage on the handling of perishable goods at Juwata Tarakan Airport?

2. METHODS

This study is used to determine the effect of cold storage usage on the handling of perishable goods at Juwata Tarakan Airport. Therefore, this study uses a quantitative research type by conducting observation processes, literature studies, documentation, interviews, and questionnaires conducted by researchers. In conducting data analysis, the author uses a simple linear regression analysis method.

2.1 Research Design

In quantitative research, investigators decide to employ a survey approach by creating instruments—such as questionnaires and interview guidelines—as means of gathering data [4]. Then, after the data is collected, researchers will analyze the data which will then answer the problem formulation and test the proposed hypothesis with certain statistical techniques. With this analysis, whether the hypothesis can be accepted or rejected or whether this research is in accordance with the proposed hypothesis or not. Based on the quantitative research process, we can observe that quantitative research is linear, where the steps are clear, starting from formulating the problem, theorizing, hypothesizing,

collecting data, analyzing data and making conclusions and suggestions [5].
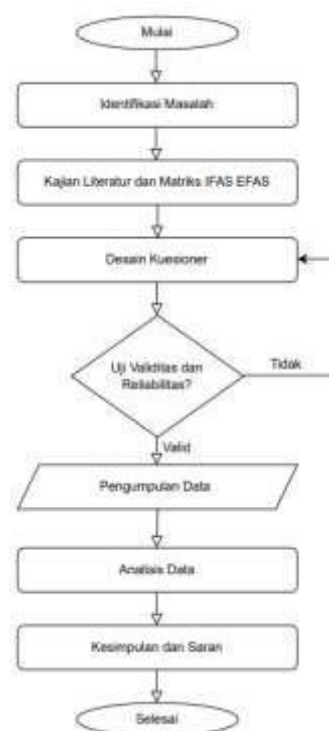

Figure 2. Quantitative Research Design

2.2 Research Variables

According to the relationship between one variable and another variable in the study, it can be divided into 2, namely independent variables (free) and dependent variables (bound). The following are the variables used in this study:

1. A variable whose value influences other variables is called an independent variable (Variable X). The use of cold storage is variable X.
2. A variable that is dependent on the values of other variables is called a dependent variable (Variable Y). The influence of handling perishable items is represented by variable Y.

The author's basis for obtaining data is based on the points contained in the variables X and Y with the aim of obtaining information in order to obtain a conclusion.

2.3 Population and Sample

In this study population, there are cargo management employees and supervisors of the Juwata Tarakan Airport Cargo Terminal which totals 30 populations [6]. The total sampling method was used in this study, where the sampling technique was carried out when all members of the population were used as samples. In this study, cargo management employees and

supervisors of the Cargo Terminal of Juwata Tarakan Airport were used, totaling 30 samples.

2.4 Research Setting

The research was conducted at Juwata Tarakan Airport in Tarakan, East Kalimantan. This location was chosen because the researcher had previously completed an on the job training program for three months, from December 2023 to March 2024. During on the job training the researcher provided the opportunity to identified certain issues at the location by observation, which led to the continuation of this final project research until July 2024.

2.5 Data Collection Techniques

The data collection technique in this study consist of questionnaires, observations and literature review. Observations are conduvted direcly in the field, while questionnaires are distributed to the cargo supervision officer and cargo management officer to find out what they think by using a closed-ended questionnaire. Literature review is a secondary data collection technique to support the analysis of the use of cold storage in theory both from to previous research.

2.5.1 Questionnaire

In this study, the author used a closed questionnaire or a questionnaire whose answers were readily available so that respondents could choose the answers that had been provided. Then, the calculation of questionnaire points is based on the Likert point scale of 1-4. The choice of answers from the Likert Scale will be scored, so respondents must describe and support the question. Here are the four points of the Likert scale [4]:

Table 1 Likert Scale

Number	Description	Skor
1.	Strongly Agree	4
2.	Agree	3
3.	Disagree	2
4.	Strongly Disagree	1

After processing the aforementioned data and multiplying each response point by the predefined weight using the value weight table, the following outcomes of the computation of the respondents' responses are generated, for instance:
1. Those who gave a strong agreement response (4) = 4 x n = n
2. Those answering "Agree" (3) = 3 x n = n
3. Those that selected Disagree (2) = 2 x n = n
4. People who provide forceful responses Contrary = 1 x n = n

From the data obtained above, it is then processed by multiplying each answer point by the predetermined weight with the value weight table, then the results of the calculation of the respondents' answers are as follows [7]:

$$\text{Rumus Index\% } = \frac{\text{Jumlah Skor yang Diperoleh}}{\text{Jumlah Skor Tertinggi}} \times 100\%$$

Table 2 Likert Scale Response Index

Percentage	Description
0% - 19,99%	Strongly Disagree
20% - 39,99%	Disagree
40% - 59,99%	Neural
60% - 79,99%	Agree
80% - 100%	Strongly Agree

2.5.2 Observation

In this study, the researcher applied unstructured observation data collection. Unstructured observation is an observation that is not systematically prepared about what will be observed. In making observations, the researcher does not use standard instruments, but only in the form of observation signs . Therefore, researchers can make independent observations, record what is of interest, conduct analysis and then draw conclusions.

2.5.3 Literature Review

The problem is discussed along with an explanation of the title of the problem raised and a variety of sources. Researchers have conducted literature studies through regulations to review things that are thought to cause problems, guidelines, and references to the meaning. Because of this, the regulations in this study that correspond with this issue can be found in:

a. PM Number 59 of 2019 concerning the Security of Cargo and Post and Supply Chain of Cargo and Post transported by Airplane .

b. SKEP/374/XII/1999 concerning Standards for Design and/or Engineering of Airport Facilities and Equipment.

c. KM 29 OF 2005, which is about the Mandatory Standards for Airport Cargo Terminals Implementation of Indonesia National Standards (SNI) 03-7047-2004.

2.6 Data Analysist Techniques

Based on the results of a questionnaire with 10 statements using the Likert scale. The results of the

questionnaire were calculated using Likert scale research instruments and calculations using SPSS and Excel software. The results of the questionnaire were used to determine the influence of the use of Cold Storage in the handling of Perishable Goods at the Cargo Terminal of Juwata Tarakan Airport. The following is the result of the calculation of each question:
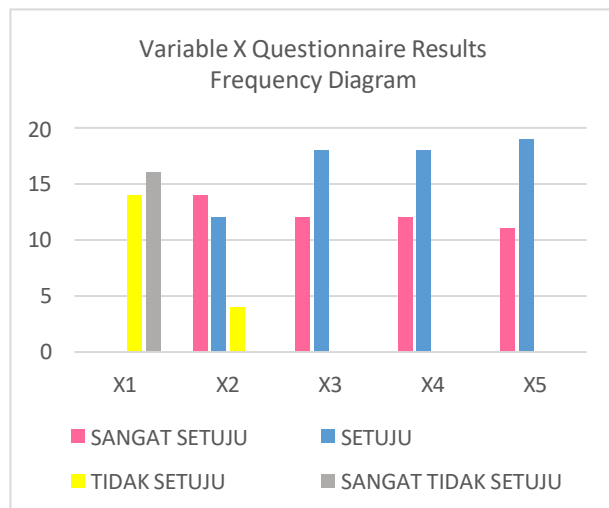

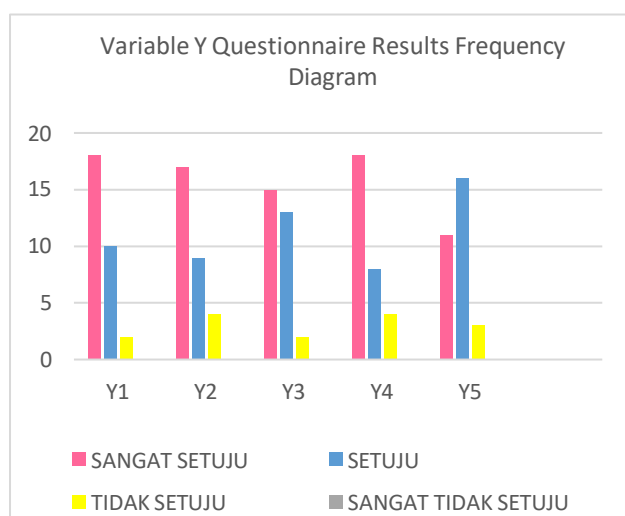**Figure 3**. Variable X Questionnaire Results Frequency

Figure 4. Variable Y Questionnaire Results Frequency

2.6.1   Validity Test

The Corrected Item Total Correlation validity test is a method by comparing the r value of the calculation and the r value of the table. Where the table is equal to the value of Corrected Item-Total Correlation. As for the value of r in the table, it is in the distribution of r tables. Where the value of r of the table is equal to the value of df = n-2 with a Significance Level (sig) of 5%. If r calculates > from r table, it is considered that the question on a variable is declared valid [8].

2.6.2   Reliability Test

Reliability is a measurement that shows the consistency or not of the answer to the question items in the questionnaire. The reliability test using the Cronbach Alpha method is a method that compares the value of Cronbach's Alpha on a questionnaire. If the value of Cronbach's Alpha > 0.60 (6%), it is declared reliable, on the other hand, if the value of Cronbach's Alpha < 0.60 (6%), it is declared unreliable [8].

2.6.3   Normality Test

The normality test aims to test whether in the regression model, the bound variable and the independent variable both have a normal distribution or not. The data normality test can be carried out using the Kolmogorov Smirnov method. If the significant > 0.05, the variable is normally distributed and the other way round, if the significant < 0.05, the variable is not normally distributed [8].

2.6.4   T-Test

The Partial Hypothesis Test (T-Test) is one of the research hypothesis tests in simple regression analysis. The T test is used to show how far an individual explanatory variable influences in explaining the bound variables [7].

2.6.5   Correlation Test

Furthermore, to determine whether there is a relationship or correlation between these variables, the correlation coefficient formula is used. The correlation coefficient (KK) is an index or number used to measure the closeness (strong, weak, or nonexistent) of relationships between variables The correlation coefficient formula used is the spearman rank correlation coefficient. After the coefficient value is known, then to determine the close relationship or correlation between these variables, the following values from the KK are given as a benchmark [9].

1.   KK = 0, No correlation

2. $0 < KK \leq 0.25$, very weak correlation

3. $0.26 < KK \leq 0.50$, low correlation

4. $0.51 < KK \leq 0.75$, high/strong correlation

5. $0.76 < KK \leq 0.99$, very high correlation

6.   KK = 1, perfect correlation

2.6.6   Simple Regression Analysis

Simple linear regression analysis is an approach method for modeling the relationship between a single dependent variable and an independent variable. In simple regression analysis, the relationship between variables is linear, where changes in variable X will be followed by changes in variable Y on a permanent basis [10]. In this research, a simple linear equation was used to determine how much influence the use of cold storage (X) had on the handling of perishable goods (Y). A

simple linear regression equation is mathematically expressed by:

$$Y = a + bX$$

Description:

Y = Regression line or bound variable

a = Constant (intercept), intersection with the vertical axis

b = Regression constant (slope)

X = Independent variable

3. RESULT AND DISCUSSION

Figure 5. X Variable's Pearson Product Moment Validity Test Result

Figure 6. Y Variable's Pearson Product Moment Validity Test Result

The validity test makes use of the Pearson Correlation approach; the pearson correlation value can be viewed in the overall table derived from the SPSS program's output. The value statement's components with significant values (p-values) less than 0.05 (alpha) are based on the table [10]. This means that all of the statement's items are deemed legitimate, and analysis of the study's questionnaire is valid.

The figure and table above show the average value of Cronbach's Alpha of the SPSS program, which

is for the statement of variable X of 0.854 and variable Y of 0.881. This shows that the statement items of variable x and variable y can be declared reliable.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X1	7.49677	6.842	.739	.805
X2	6.62763	6.514	.730	.806
X3	7.59803	7.355	.605	.839
X4	7.59803	6.823	.755	.800
X5	7.64767	7.733	.513	.861

Figure 7. Result of Cronbach's Alpha Reliability Test

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Y1	10.92320	8.490	.712	.856
Y2	11.24820	8.201	.763	.844
Y3	10.92373	8.284	.735	.850
Y4	11.24867	8.311	.751	.847
Y5	11.10793	8.701	.616	.879

Figure 8. Result of Cronbach's Alpha Reliability Test

Furthermore, the researcher conducts a normality test or conclusion to determine whether a data follows a normal distribution or not is by assessing its significant value. If the significant > 0.05, the variable is normally distributed and vice versa, if the significant < 0.05, the variable is not normally distributed. The significant value in the Kolmogorov Smirnov test was obtained after being processed using the help of SPSS (Statistical Product and Service Solutions) software. The obtained significant value is 0.151 and greater than (>) 0.05, as is known. Thus, it is possible to say that the residual value follows a normal distribution**.**

Figure 9. Kolmogorov-Smirnov Normality Test

The figure below is the output of the Spearman rank correlation test using SPSS (Statistical Product and Service Solutions) software. A correlation coefficient of 0.683 was obtained and a positive value so that the relationship between the two variables was unidirectional, so that the use of cold storage would affect the improvement of the handling of perishable goods. Since the significance value of 0.000 is less (<) than 0.05, it is established that there is a significant relationship between the x and y variables.

Figure 10. Rank Spearman Correlation Test Result

The t-count and significance values obtained in the t-test were obtained after being processed using the help of SPSS (Statistical Product and Service Solutions) software [11]. It is known that the significance value obtained 0.000 is less than (<) 0.05 and the tcal value of 5.077 is greater (>) than the ttable value of 2.048. Therefore, it can be hypothesized that there is an influence of the use of cold storage (independent variable X) on the handling of perishable goods (dependent variable Y) partially or partially.

ttabel = t(a/2 ; n – k –1)
ttabel = t (0,05/2 ; 30 – 1 – 1)
ttabel = t (0,025 ; 28)
ttabel = 2,048

Figure 11. Result of Simple Linear Regression Test

In the figure, a simple linear regression test output has been obtained. The formula for the linear regression equation in general is Y = a + bX where a is a constant number with a value of 6.859. This number is a constant number for the variable for handling perishable goods (Y) is 6,859 which means if the use of cold storage is 0 or non-existent. Thus, the constant value of handling perishable goods (Y) is 6,859. While b is the regression coefficient number of the variable X obtained a value of 0.758. This number means that for every increase in the use of cold storage (X) by one unit, the value of handling

perishable goods (Y) will increase by 0.758. The regression coefficient has a positive value so that it can be said that the direction of the influence of variable X on variable Y is Positive. Therefore, the simple linear regression equation is Y = 6.859 + 0.758X.

In the output of SPSS, it is stated that the correlation value or relationship (R) is 0.692. from this output, a determination coefficient (R Square) of 0.479 was obtained, which means that the influence of the independent variable (Cold Storage Use) on the bound variable (Handling of Perishable Goods) is 47.9%.

Figure 12. R Square Test Results or Coefficient of Determination

Based on the results of the validity and reliability test, the T test, and the normality test, the questionnaire that was distributed was eligible for the calculation of linear regression, namely with the results of the validity test of the statement of the X variable and the Y variable showing a > value of 0.361. For the tcount value, it shows that the significance value obtained is 0.000 less than (<) 0.05 and the tcount value of 5.077 is greater (>) than the ttable value of 2.048. Therefore, it can be hypothesized that there is an influence of the use of cold storage (independent variable X) on the handling of perishable goods (dependent variable Y) partially or partially. Furthermore, the normality test with the Kolmogorov Smirnov method with a result of 0.151 and greater than 0.05 and the test with the probability plot method with the result following a diagonal line which means that it is normally distributed.

Based on the results of the structured questionnaire carried out, a simple linear regression equation of Y = 6.859 + 0.758X was obtained. In addition, the effect of the use of cold storage on the handling of perishable goods at the Cargo Terminal of Juwata Takan Airport was also obtained, and in the X variable and the Y variable there was a relationship or correlation between variables with a value of 0.683 (strong correlation) and a positive value so that the relationship between the two variables was unidirectional. Based on the calculation of the correlation coefficient, it can be known that the value of R square or determination coefficient is 0.479. This indicates that in the cargo terminal of Class I (Main) Juwata Tarakan Airport, the influence of variable X (Cold Storage Use) on variable Y (Handling of Perishable Goods) is 47.9%.

4. CLOSING

4.1 Conclusion

Following the completion of the investigation into the title and issues previously discussed. As a result, scientists can make the following deductions about how the Juwata Tarakan Airport Cargo Terminal handles perishable items in relation to the usage of cold storage:

a. The use of cold storage (variable X) has an influence based on individual or partial hypothesis tests on the handling of perishable goods (Variable Y) at Juwata Tarakan Airport.

b. The value of the regression coefficient of the X variable shows the number 0.758. Also, the constant number of the variable Y is 6,859. so that the regression equation $Y = 6.859 + 0.758X$ is obtained. The correlation between variable X (Cold Storage Use) and variable Y (Effect of Perishable Goods Handling) with a calculation result of 0.683 (correlation is quite significant) and also obtained the result of the determination coefficient (R Square) of 0.479 or an influence of 47.9%.

4.2 Suggestions

Based on the conclusion above, the researcher has several suggestions as input in efforts to solve the problem, namely:

a. The author suggests to immediately realize the addition of Cold Storage at the Juwata Tarakan Airport Cargo Terminal.

b. The need to maximize existing perishable goods handling facilities Limited understanding of cargo supervisory officers and managers in operating cold storage should be provided by providing training to cargo supervisory officers and cargo management agents to improve the quality of delivery by improving facilities.

c. Researchers can then group the types of perishable goods that are allowed to use cold storage to estimate the cost of each type of perishable goods.

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