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Delay Causes Analysis of Tugu Dam Construction in Trenggalek District

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Abstract— *The purpose of the construction of the Tugu Dam is to accommodate the potential of rainwater as the main water source used for irrigation water, clean water supply, flood control, Micro Hydro Power Plant and freshwater fisheries. In the implementation of the Tugu dam construction activities, completion delays were caused by several factors. On the existing problems, a research was conducted to analyze the factors causing delays, the most dominating factors and the strategy for solving them. Quantitative methods, data analysis research using factor analysis methods and multiple linear regression analysis with SPSS program for data processing. The results of the analysis of 11 variables that affect work delays obtained 2 dominant variables affecting work delays, namely the Situation Factor where the indicator is land acquisition with an index of 73.58% and the Change factor where the indicator is a design change with an index of 73.5%. The form of the settlement strategy is with the active role of the Government and the appropriate selection of experts from planning, implementation and supervision, so that it is hoped that the construction of dams can be carried out on time and with appropriate quality.*

Keywords— *DAM, delay, conscruction.*

I. INTRODUCTION

Quantitative methods, data analysis research using factor analysis methods and multiple linear regression analysis with SPSS program for data processing. The results of the analysis of 11 variables that affect work delays obtained 2 dominant variables affecting work delays, namely the Situation Factor where the indicator is land acquisition with an index of 73.58% and the Change factor where the indicator is a design change with an index of 73.5%. The form of the settlement strategy is with the active role of the Government and the appropriate selection of experts from planning, implementation and supervision, so that it is hoped that the construction of dams can be carried out on time and with appropriate quality[1].

In the implementation of the Tugu dam construction activity in Trenggalek there were operational problems that hampered the completion of construction activities so that the progress of the Tugu dam construction in Nglinggis-Trenggalek Village was not as smooth as planned. or completed in 2017. But in fact, the completion of the construction was delayed and changed to the end of 2021[2]. Currently there is no detailed research on the causes of the delay in the construction of the Tugu bridge, so here the author wants to conduct research in more detail regarding the analysis of the factors that cause delays in construction monument dam.

According to Hassan, et al [3], delays in construction activities mean an increase in the implementation time for the completion that has been planned and stated in the contract document. Completion of activities not on time is a deficiency of the level of productivity and of course all of this will result in wastage of financing and time, both in the form of direct financing spent on government activities, as well as in the form of investment swelling and losses in private activities.

The active role of management is one of the main keys to the success of managing activities. A review of the activity schedule is needed to determine the steps for fundamental changes so that delays in completing activities can be avoided or reduced.

Fig. 1. Illustration of a dam and its attributes

II. METHOD

Location of Research Objects.

The object of the research is the construction work of the Tugu Dam construction which is located in East Java, located in Nglinggis Village, Tugu District, Trenggalek Regency. Geographically, it is located at the coordinates 08° 02' 27" South Latitude and 111° 35' 07" East Longitude, the location is on the left side of the district highway connecting the city of Trenggalek - Ponorogo, at km +15.00 from the city of Trenggalek to the west.

Fig. 2. Map of Kedungwilut Dam Construction Work Locations in Tulungagung Regency

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Fig. 3. Tugu Reservoir Lay Out Map

Research Instruments

Research instruments are tools that are selected and used by researchers in their activities to collect data so that these activities become systematic and easy. For collection in the study using a questionnaire. The questionnaire is a question that is logically related to the research problem, and each question is the answers that have meaning in testing the hypothesis. There are 2 (two) types of questionnaires based on the freedom of the respondents to provide answers to the questions posed:

1. Open questionnaire (unstructured questionnaire), is a questionnaire that is made in such a way that the answers obtained can vary.
2. Closed questionnaire (structured questionnaire), a questionnaire made in such a way that respondents are limited in giving answers to several alternatives or to only one answer.

Validity Test

Validity test is used to measure the validity or validity of a questionnaire. A questionnaire as a research instrument is declared valid if the questions on the questionnaire have high validity if the test carries out its measuring function. [4]

$$r = \frac{N(\sum XY) - (\sum X \sum Y)}{\sqrt{[N\sum X^2 - (\sum X)2][N\sum Y^2 - (\sum Y)2]}}$$

Where r is correlation coeficient. $\sum X$ is item score, $\sum Y$ is total score, while n is respondent total (suharsimi Arikunto) By using a significant level of a = 0.05 the correlation coefficient obtained from the calculation results is compared with the value of the correlation table for the value of r with degrees of freedom (n-2), which states the number of respondents. If r count > r 0.05, it is said to be valid, otherwise if r arithmetic <- r 0.05 is not valid.

Reability Test

Used in research to determine whether the data collection tool used shows the level of accuracy, level of accuracy, stability and consistency in revealing the symptoms of a group of individuals even though it is carried out at different times. To calculate the reliability test. This study uses the alpha formula from Cronbach [5] as follows:

$$r_{11} = \left[\frac{k}{k-1}\right]\left[1 - \frac{\sum \sigma_n^2}{\sigma_t^2}\right]$$

Where r, k, $\sum \sigma_n^2$, σ_t^2 denoted as instrument reability, the questions, variants and total variants. Reliability is an index that shows the extent to which a measuring instrument can be trusted or reliable. In other words, reliability shows the consistency of a measuring instrument in measuring the same symptoms (Mulyadi, et al, 2015)[6]. In this study, the reliability test uses the Cronbanch Alpha approach. The instrument is said to be reliable if the Cronbanch Alpha value is > 0.6.

Processing and Data Analysis

The data obtained from the survey results (questionnaire) will be processed to obtain information in tabular form. The results of the processed data are used to answer questions in the formulation of the problem. Data processing should pay attention to the type of data collected with an orientation towards the goals to be achieved. Accuracy in analytical techniques greatly affects the accuracy of research results[7] [8]. The data analysis techniques used are:

1. Descriptive Analysis

This analysis shows a brief and concise overview of the data obtained. Descriptive statistical analysis was carried out using the SPSS program, so that the frequency, mean and standard deviation values were obtained.

2. Factor Analysis

To find out the most influential factors, a factor analysis will be carried out. Factor analysis is carried out to simplify the number of variables that are quite large into several smaller groups. The analysis is carried out based on the same factors but retains as much of the original information as possible. Meanwhile, to reduce a number of test variables into smaller variables, component and factor analysis was carried out, which was related to the correlation between components.

III. Result and Discussion

Based on the results of the factor analysis and the results of the partial test (T - Test) further discussion will be carried out which is a mitigation step for the variables that are the main factors causing work delays, the recap results of factor analysis and partial tests (T-test) has been calculated.

Mitigation steps here start from analyzing the causes of the main factors, followed by preventive and corrective actions. The preventive and corrective actions that will be discussed are the result of interviews with experts in the construction field.

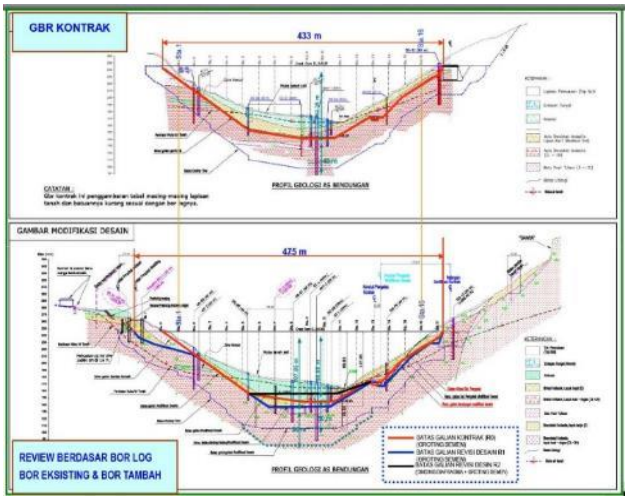

Fig. 4. Changes in the design of the geological profile of the axle of the dam

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This change factor is a technical factor which is significant/dominant in the second order that affects the delay in the Tugu Dam work with a value of = 0.577, t = 2.064 and Sig = 0.45.

This change factor is formed from several influencing indicators, namely the occurrence of design changes, planning design errors and soil investigation errors from the three indicators in accordance with descriptive analysis, the indicator of the occurrence of design changes is an indicator that greatly affects the delay in the construction of the Tugu Dam in Trenggalek with a value of index 73.58%.

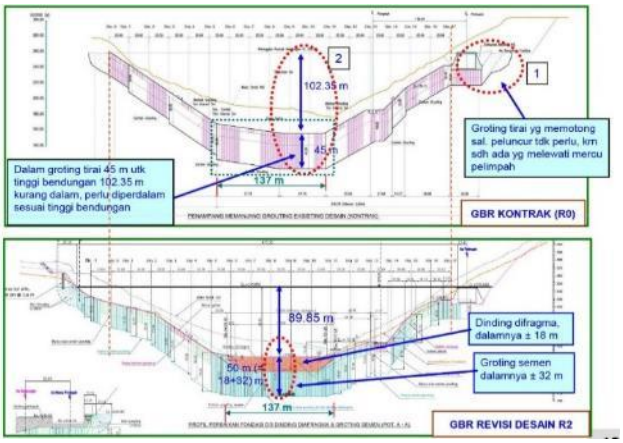

Fig. 5. Change of Dam Foundation Design (main dam) with pore pile and plastic concrete.

Fig. 6. The Construction of DAM Diaphragm wall

In the planning drawing of the geological profile of the dam in the valley section, the thickness of each layer of soil/rock does not match the description of the drill-log, so that the thickness of the collovial layer is less than it should be because the drill point is located 70 m from the planning drawing. In the current situation, it requires additional drilling and significant changes to the design of the design of the dam's axle profile because the valley section is mostly piled up in the collovial layer and advanced weathered rock, where in this layer it would be difficult to grate. In accordance with the existing implementation schedule in the initial work, which was constrained from the planning drawings, the work was delayed by 28 days due to the need for redesign and re-assessment of the soil to determine the boundaries of core trench excavation with excavation subsidence up to a layer of strongly weathered bedrock (C-class). It is necessary to re-stability analysis for the preparation of cross-sectional geological drawings of dams for excavation and embankment efficiency, which is due to the absence of geological cross-sectional drawings of dams on the planning drawings.

IV. Conclusion

In the implementation of the Tugu Dam construction activities in Trenggalek Regency, there are various problems that cause delays in the completion of these activities from a predetermined period of time. Based on the results of data analysis and discussion of the analysis of factors that influence the delay in the construction of the Tugu dam in Trenggalek Regency, the following conclusions can be drawn:

1. In the results of the Multiple Linear Analysis of the 11 factors that caused the delay in the completion of the Tugu Dam construction in Trenggalek Regency, the 2 most influential factors were obtained, namely the Situation factor and the Change Factor.
2. The dominant factor influencing the delay in the construction of the Tugu Dam is the Situation Factor with the Social and Cultural Factors indicator with an index value of 73.58% and the Change Factor with the Design Changes indicator with an index of 73.58%.
3. Problem solving by increasing the government's role in interacting with the community in order to establish good communication so that they are able to work together in supporting development for the progress of the nation, technically implementation by selecting experienced experts in dam construction activities. Selection of experts in planning consultants, soil geologists and the determination of highly competent Project Managers.

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