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Analysis of Factors Affecting the Delay of Lecture, Laboratory and Auditory Building Development Projects

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Abstract— *The results of regression analysis using SPSS that are dominant include the largest coefficient value of 0.196 on environmental variables (X7) and from the results of simultaneous regression model hypothesis testing F count > F table (5.633 > 2.390) and t test > t table (4,580>1,699) and Ho is Rejected and H1 is accepted. And the second largest coefficient value is 0.196 on the Human Resources variable (X3) and from the results of simultaneous regression model hypothesis testing F count > F table (5.633>2,390) and t-test > t table (4,580>1,699) a decision can be made Ho is Rejected and H1 is accepted. The strategy that must be carried out is to make Tribune Molds, Make Roof Frameworks and make Frames, Doors, and Glass Molds outside the project work area. Immediately make a framework of reference (KAK) as well as with a more complete and thorough planning so that it is on time.*

Keywords— *Project Delay, Regression, Variables and Strategy.*

I. INTRODUCTION

In the implementation of the project there is always a behavior and management that it demands. Critics from management science observers and practitioners in the field who deal with project implementation are of the opinion that the use of classical management which has succeeded in managing routine operational activities with a relatively stable environment is felt to be incapable or not effective enough to manage a project activity that is full of dynamics and rapid changes. So the results will not be optimal. Construction projects involve contractors, project owners, planning consultants and supervisory consultants who are interrelated in a work agreement called a contract. The success of a construction project is determined by the suitability of time, cost and quality specified in the contract document. The main cause can be traced from the behavior of project activities that are different from routine operating activities. One of the objectives of a construction project is to complete the project on time, at the right cost and with the right quality in accordance with the planned implementation schedule. In the planning and scheduling process, it is necessary to understand the factors behind the making of the project schedule. Construction projects are one form of activity that takes place within a limited period of time, with certain resources, to achieve results in the form of buildings or infrastructure. construction delays are often caused by the parties involved. Therefore, this study was conducted with the aim of knowing the factors causing delays in the implementation of construction projects according to contractors, project owners and supervisory consultants. Understanding the factors is done by reviewing the stages, including the scheduling of project activities which is basically determining when an activity should start and end. The series of activities with their respective durations that have been sorted will form a series of activity scheduling which becomes the project implementation schedule.

Construction projects always face several obstacles, both those that have been predicted previously, and those that are beyond expectations. Constraints are usually the cause of delays in the implementation of work, so that the work does not proceed smoothly. Therefore, in the implementation of a construction project there is a possibility that the time needed to complete will exceed the time specified in the work contract or in other words there is a delay in project time.

Project delays are the main contribution to project cost overruns. In general, project delays often occur due to changes in planning during the implementation process, poor managerial organization in the contractor's organization, work plans that are not well structured/integrated, incomplete drawings and specifications, and contractor failures in carrying out the work.

Project delays also occurred in the construction of the Lecture Building, Laboratory and Auditorium of the Islamic University of Malang (DOM UNISMA), where the project that was built in its implementation did not meet the expected target on time. It was proven by the fact that the unfinished building was delayed by 8% of the time specified. Where delays are estimated to be caused by several factors such as materials, equipment, labor, finances, methods of carrying out work, changes in design and work environment. These delays generally always cause adverse consequences for both the owner and contractor, because the impact of delays is conflict and debate about what and who is the cause as well as additional time and cost demands.

II. METHOD

Analysis / Descriptive hypothesis is basically a generalization test of research results based on one sample. The resulting conclusion is whether the generalization can be accepted or not. If Ho is accepted then the conclusion can be generalized to. Generalization=Descriptive hypothesis testing.

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Types of Statistics and Data		Statistical Techniques Used For Testing
statistics Parametric	Interval / Ratio	One Sample t-test
statistics Non-Parametric	Nominal	Binomial-Test
		Chi-Square
	Interval/Ratio	Run-tes

Descriptive analysis with the frequency distribution of respondents' answers was carried out with the help of a computer "SPSS" which aims to test the frequency of respondents' opinions on risks associated with factors that affect project implementation delays.

Validity test shows the extent to which the measuring instrument measures what it wants to measure. The questionnaire that has been prepared by the researcher must measure exactly what elements you want to measure. There are several things that can reduce the validity of a data, namely the accuracy of the interview and the condition of the source or respondent when interviewed.

Whether or not an instrument is valid can be determined by comparing the Product Moment Person correlation index with a significant level of 0.05 (5%) by comparing r arithmetic with r table in it can be determined the validity of the instrument with the following criteria:

r count > r table: Valid, r count < r table: Invalid

A. Multiple Linear Regression Analysis

To examine the questions related to the factors that affect the delay in the implementation of work on the Lecture Building, Laboratory and Auditorium Development Project of the Islamic University of Malang (DOM Unisma) and to get the most dominant factor influencing it, the analytical technique used is multiple linear regression test. This test is used to test or analyze the effect or relationship between independent variables and one or more variables, in the analytical technique used the annova test or f test, t test and find the coefficient of determination or R2 adjusted this calculation will be carried out with the help of the SPSS program according to linear equations multiple :

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7$$

Where:

Y = Work Execution Delay
X1 = Finance
X2 = Material
X3 = Labor
X4 = Equipment
X5 = Implementation Method
X6 = Design Change
X7 = Work Environment
b_0 = Constant

b_1, b_2, b_3, b_4, b_5, b_6, b_7 = Regression Coefficient

B. Regression Model Coefficient Hypothesis Test.

To prove the truth of the hypothesis, the F test is used with the following test criteria:

a. Hypothesis:

Ho = there is no difference in productivity index between groups.

H1 = there is a difference in productivity index between groups.

b. Conclusions are based on the probability value:

- If Probability > 0.05, then Ho is accepted.
- If Probability < 0.05, then Ho is rejected.

III. RESULT AND DISCUSSION

In this study, the sample was taken randomly using a disproportionate stratified random sampling using a formula. 3.1 are as follows:

$$N = \frac{N}{1 + N.e^2}$$

$= 29 / (1+29.(0,05^2))$
$= 27,025$

TABLE I. Number of populations and samples

Element	DOM	Population	Samples
Owner			
➢ Owner	3	3	2
➢ Institution	2	2	1
➢ Supervisi	2	2	2
Constructor			
➢ Manager	2	2	2
Unsur	**DOM**	**Population**	**Samples**
➢ Project Manager	2	2	2
➢ Site Manager	2	2	2
➢ Supervisi	2	2	2
➢ Logistic	2	2	2
➢ Drafter	2	2	2
➢ Mandor	1	1	1
➢ Personality	2	2	2
Konsultan			
➢ Site Engineering	2	2	2
➢ Quality Engineering	2	2	2
➢ Chief Inspector	3	3	3
Total		**29**	**27**

Source: The Calculation Results

The data obtained from the results of the questionnaire distribution obtained answers which were then tabulated as in table, then tested the sample data which included validity and reliability tests. After that, proceed with the analysis to determine whether there is a direct and indirect influence between the variables of Finance (X1), Materials (X2), Labor (X3), Equipment (X4), Implementation Methods (X5) and Design Changes (X6) and Work Environment (X7), for project implementation delays (Y) using descriptive analysis, factor analysis and multiple linear regression analysis.

TABLE II. Validity Test Results.

Factor	Indicator	Coefficient	Value	*P-Value*	Result
Cost (X1)	X1.1	0,812	0,381	0,000	*Valid*
	X1.2	0,778	0,381	0,000	*Valid*
	X1.3	0,617	0,381	0,000	*Valid*
	X1.4	0,917	0,381	0,000	*Valid*
Material (X2)	X2.1	0,578	0,381	0,000	*Valid*
	X2.2	0,637	0,381	0,000	*Valid*
	X2.3	0,409	0,381	0,000	*Valid*
	X2.4	0,749	0,381	0,000	*Valid*
	X2.5	0,524	0,381	0,000	*Valid*
	X2.6	0,634	0,381	0,000	*Valid*
Human Resource	X3.1	0,812	0,381	0,000	*Valid*
	X3.2	0,844	0,381	0,000	*Valid*

(X3)	X3.3	0,789	0,381	0,000	*Valid*
	X3.4	0,864	0,381	0,000	*Valid*
Tools (X4)	X4.1	0,493	0,381	0,000	*Valid*
	X4.2	0,761	0,381	0,000	*Valid*
	X4.3	0,818	0,381	0,000	*Valid*
	X4.4	0,690	0,381	0,000	*Valid*
Factor	**Indicator**	**Coefficient**	**Value**	***P-Value***	**Result**
Methods (X5)	X5.1	0,802	0,381	0,000	*Valid*
	X5.2	0,789	0,381	0,000	*Valid*
	X5.3	0,706	0,381	0,000	*Valid*
	X5.4	0,540	0,381	0,000	*Valid*
Adendum (X6)	X6.1	0,852	0,381	0,000	*Valid*
	X6.2	0,761	0,381	0,000	*Valid*
	X6.3	0,842	0,381	0,000	*Valid*
Working area (X7)	X7.1	0,906	0,381	0,000	*Valid*
	X7.2	0,761	0,381	0,000	*Valid*
	X7.3	0,748	0,381	0,000	*Valid*

Source: SPSS analysis.20

Based on Table II above, for the Validity test it can be explained that the variables are Finance (X1), Materials (X2), Labor (X3), Equipment (X4), Implementation Methods (X5) and Design Changes (X6) and Work Environment (X7), with a significance level (α) = 0.05, the critical value of rtable is 0.301.

TABLE III. Reliability Test Results.

Variabel	Cronbach's Alpha	Hasil
Finance (X1)	0,793	Reliable
Material (X2)	0,636	Reliable
Workers (X3)	0,838	Reliable
Tools (X4)	0,632	Reliable
Methods (X5)	0,675	Reliable
Addendum (X6)	0,752	Reliable
Working Area (X7)	0,711	Reliable

Source: SPSS analysis.20

TABLE IV. Descriptive Analysis of Financial Factors (X1)

Questions	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Very uninfluenced	13	7,6	12	12,0
Uninfluenced	25	14,5	23,1	35,2
Uninfluenced enough	44	25,6	40,7	75,9
Influenced	21	12,2	19,4	95,4
Very Influenced	5	2,9	4,6	100
Total	108	100	100	

Sumber: SPSS Analysis.20

TABEL V. Analisa Deskriptif Faktor Material (X2)

Question	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Very uninfluenced	32	18,6	19,8	19,8
Uninfluenced	47	27,3	29,0	48,8
Uninfluenced enough	55	32,0	34,0	82,7
Influenced	20	11,6	12,3	95,1
Very Influenced	8	4,7	4,9	100,0
Total	162	100		

Source: SPSS Analysis.20

TABEL VI. Descriptive Analysis of Human Resources Factors (X3)

Question	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Very uninfluenced	5	2,9	4,6	4,6
Uninfluenced	18	10,5	16,7	21,3
Question	***Frequency***	***Percent***	***Valid Percent***	***Cumulative Percent***
Uninfluenced enough	33	19,2	30,6	51,9
Influenced	37	21,5	34,3	86,1
Very Influenced	15	8,7	13,9	100,0
Total	108	100		

Source: SPSS Analysis.20

TABEL VII. Community value on Human Resources Factor

Variabel	Notes	Communality Value
X3.1	Unnecessary Workers	0,598
X3.2	Unskill of workers	0,705
X3.3	Limitation of workers	0,660
X3.4	Unexperienced manager	0,788

Source: Analysis Results

TABEL VIII. Community Values on Work Environment Factors

Variabel Manifes	Keterangan	Nilai Komunalitas
X7.1	Rainy	0,802
X7.2	Working Area	0,503
X7.3	Topografy	0,675

This means that the most dominant factors that determine the delay in the construction of the Dom Unisma building are environmental factors in which the sub-variables are frequent rain, workplace conditions, and topography. If we relate to the time schedule data, the delay lies in;

1. Roof changes, namely assembling the roof frame,
2. The finishing is assembling the roof framework, frame work, door windows and glass, wall and floor covering work,

Where the contractor forces himself to be assembled in the work environment with all the limitations and is not balanced with the Human Resources provided. So with a narrow and bumpy topography when sending roof skeleton material there was an accident or a steel transport vehicle overturned in the location area so the time needed to overcome it took 1.5 months. The Unisma which shows the Strategy From the table above it is known that the most dominant indicator affecting the delay in the implementation of work is the Human Resources Variable (X3), and the Work Environment Variable (X7), while at the end of the conclusion here, from the results that have been submitted to SPSS then it falls on the most dominant Work Environment variable. SPSS then falls on the most dominant Work Environment variable.

IV. CONCLUSION

The factors that affect project delays are the Material variable (X2) from the results of testing the regression model hypothesis simultaneously using the F test, then F count > F table (5.633> 2.390) and the P-Value value of 0.001 is greater than = 0 .05, and partially testing the regression model hypothesis using t-test > t table (1.864>1.699). And Ho is Rejected and H1. In the Human Resources variable (X3) from the results of testing the hypothesis of the regression model simultaneously F count > F table (5.633> 2.390) and the P-Value value of 0.001 greater than = 0.05, and partially testing

the regression model hypothesis using t-test > t table (2,700>1,699) and Ho is Rejected and H1, On the Environment variable (X7) with the results of simultaneous regression model hypothesis testing F count > F table (5.633>2,390) and the P-Value value is 0.001 more greater than = 0.05, and partial regression model hypothesis testing t-test > t table (4.580>1.699) and Ho is rejected.

What is the most dominant factor influencing the delay in getting the largest coefficient value of 0.196 on the environmental variable (X7) and from the results of simultaneously testing the regression model hypothesis using the F test, then F count > F table (5.633> 2.390) and the P-Value value of 0.001 is greater than α = 0.05, and partial regression model hypothesis testing is t-test > t table (4.580>1.699) and Ho is Rejected and H1 is Accepted. And the second largest β coefficient value is 0.196 on the Human Resources variable (X3) and from the results of testing the regression model hypothesis simultaneously using the F test, then F count > F table (5.633> 2.390) and the P-Value value of 0.001 is greater than =0.05, and partial regression model hypothesis testing using t-test > t table (4,580>1,699) and Ho is Rejected and H1 is Accepted.

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