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Research Paper

The Analysis of Factors Affecting Implementation Delay in Road Construction Project in East Kalimantan Province

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Abstract:
Implementation of road and facilities infrastructures in a form of Provincial Roads in East Kalimantan in 2021 experiencing an implementation delay. It is evident from the workpackages of Sanga sanga – Dondang road and the road intersection of Kaliorang – Talisayan road reconstruction project which evidently were experiencing work delays. Thus, this research was conducted to find out the factors that influence a project delay, and seek for the predominant influencing factors also determine type of strategies for dealing with these projects' problems at this time also in the future, for the government, contractors, and the project consultants.
The method of data analysis applied in this study were a factor analysis and multiple linear regression analysis to the questionnaire answers which distributed to 31 respondents from the local government, contractors, and the project consultants involved in the Sanga sanga – Dondang road and road intersection of Kaliorang - Talisayan road reconstruction project in East Kalimantan province which experienced a project delay in its implementation.
According to the result of the study, factors that significantly influenced project delays are the work scheduling method factor with a t_{count} value of 3,415 > from t_{table} of 2.037, then followed by the work implementation method factor with a t_{count} value of 2.171 > from t_{table} of 2.037. Further, based on the t test to research factors, the most dominant factor is the work scheduling method factor with ß coefficient value of 0.387, whereas for the strategies that can be applied to overcome project delays is, before the work begins, the owner/project implementer must prepare an implementation schedule according to the rational stages of the work implementation from the project.
***Keywords** : Project delay, project scheduling, strategy*

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I. INTRODUCTION

One of the targets of a construction project is to finish the project on time according to the planned implementation schedule. During the process of planning and scheduling, factors that must be understood are some factors underlyings the creation of a project schedule andit is important to understand those factors by assessing the stages, such as scheduling the work project activities (basically deciding the right time for an activity should begin and finish). A series of activities with their diverse durations that have been put in order (sequencial) will form a series of activity schedule that become the project implementation schedule.

In this study, the authors attempt to make a thorougly investigation to the main cause of delay from road construction project in East Kalimatan province and later be going to asked the relevant parties to propose some efforts or strategies to overcome the delay problem.

The problem of delayed project could be caused by the service provider or the service user as well from other parties that have an impact to the extra time and cost outside of the predetermined construction plan. When the delay came from the contractor (service provider), they will be subject to a late fine (fee), or when the delay originates from the service user then they will pay for the loss of the service provider, whereas for the nominal amount is referred to the work contract in accordance with the applicable laws and regulations.

So far, many discussions related to factors that affecting delay on the implementation of road construction project in East Kalimantan province has not been carried out by researchers, thus, there are some issues that will be addressed: (1) what are the influential factors that able to delay the work implementation of road construction project of Sanga sanga – Dondang and the road reconstruction project of Kaliorang –

Talisayan intersection in East Kalimatan province? (2) Which predominant factors that able to affect the delay? (3) What strategy should be taken to overcome the delay?

II. LITERATURE REVIEW

2.1. The Construction Management

A success of a project requires careful planning, coordination and supervision, these are the reasons for a project consisted of various activities. A project is defined as a complex system involving coordination of a number of division inside an organization, in which there are schedules and requirements that must be carried out within a predetermined implementation time. Therefore, a success of a problem is very dependent on the leadership of the project manager together with the work of its members (project team).

According to the above explanation, in an effort to achieve a successful project implementationrequires a reliable management, in particular from the project management aspect. A project management defines as the activity of planning and organizing a project in a form of organizational structure which constitute of the manager as the project leader who controls resources and supervise the work of its members, supported by a coordination among its members to work together aimed for the desired goals within a predetermined timeframe that asssigned for the project work.

Kerzner (2006) stated that a project management is an effort or activity to plan, organize, lead, and control the company resources to achieve a predetermined short-term goals as efficient and effective as possible. Meanwhile Sutomo, *et.al.* (2016) said the project management is a science related to leading and coordinating human and material resources using modern management techniques to achieve predetermined goals, in terms of the scope, quality, schedule, and cost of a project. A project management activities is run in vertical and horizontal direction which flows by a system approach.

Thus, the project management concept will have contents of the following main points:

a. To apply the project management concept based on its function (planning, organizing, leading and controlling the company's resources in the form of people, funds, and materials.
b. To use a system approach management
c. Has a horizontal hierarcy (flow of activities) in addition to a vertical hierarcy.
d. The work activities is managed in the short term by target that have been specifically outlined. This requires special management techniques and methods, in particular in the field of planning and control.

It explained that the project management does not intend to abolish the vertical flow of activities against classical management, further, it has a purpose to incorporate specific approaches, techniques and methods to respond any demand and challenges ahead particularly those related to the project activities.

2.2. The Management Process

According to Alan (2012) in Rohman and Wahyuni (2017) the project management process is a series or processes consisted of:(1) an *input process* which includes setting goals, objectives, information, data,resources, (2) a *managerial process*; includes planning, organizing, implementing, and controlling, and (3)*outputs* in the form of project performance optimization outputs (the cost, time, safety (K3), and project quality). In line with this statement, Austen and Neale (1994) concluded the management process or commonly called the Management Functionhas several elements as stated below:

1. Goal Setting
2. Planning
3. Controlling

2.3. A Project Delay

2.3.1. The Definition of Delay

When a work has been targeted to be completed at a predetermined time but for some reason cannot be fulfilled, then it is said the work is experiencing delays.The delay will have an impact on the original planning as well as on financial issues and delay that occur in a construction project is going to extend the projecttime duration or increase costs of the project or both.

The further consequences of delays on the owner are the loss of opportunity to put their resources into another project, increasing the direct cost incurred (which means an increase in expenses of employee's salary, equipment rent, and other, and also experiencing reduction in profits.

2.3.2. The Cause of A Project Delay

In a construction project, there are many things can happen that brings result an increase in time of work activities or a delay in the project completion time. Some of the common causes are include many changes in site/field conditions, design or specification, weather, unavailability of labor, materials or equipments which became less supportive to the work completion. Furthermore, Adinda and Nurhidayat (2017) added with causes

of project delays are the changes of plans, contract orderrs, situations and field conditions that have not been properly estimated by the owner.

2.3.3. Type of Delay

Jervis (1998) gave a classification of delay into 3 (three) types:

1. Delays in contractor's workperformance that occur due to factors beyond the control of the contractor and owner.
2. Delays in contractor's workperformance that occurs due to the contractor's mistake or not carried out the obligation stated in the contract properly.
3. Delays in contractor workperformance that occur due to the owner's mistake in fulfilling and carrying out the obligation in the contract properly. In this case, the contractor is entitled to compensation costs and an a time extention.

2.3.4. The Impact of Delay

Delay in a construction project will extend the duration of the project or increase costs or both. The impact of the delay on the owner is the loss of potential income from facilities that are not built according to the set time, while for contractors it is the loss of the opportunity to put their resources into other projects, increased indirect costs due to increased expenses for employee salaries, equipment rental and reduce profits.

2.3.5. Overcome the Delay

During a construction work process, there always a periodic scarcity from the materials needed whether of basic materials or finished goods, both local and imported products. How to deal with these scarcities varies greatly depending the project conditions, forom direct handling by special staff within the organization to the way of creating a division of responsibilities between the task givers, contractor, and sub-contractors, so that a bid for material of a project can come from the sub-contractors, suppliers or agents, importer, producer or industry, all parties of which refers or included inside the planning documents and the technical specifications that have been determined.

III. RESEARCH METHODS

3.1. Population and Sample

3.1.1. Population

Population of this study are the individuals who understand the location condition and directly involved in the road construction project in East Kalimantan Province which have experienced delays in project implementation.Total amount of the population of this study are31 people consisted of 11 people from the local government, 12 people of contractors, and 8 people as the element of supervisory consultants.

3.1.2. Sample

In this study, samples were taken by random with disproportionate stratified random sampling method (Sugiyono, 2006). By a formula invented by Slovin in Husein Umar (2007) as stated below:

$$n = \frac{N}{1+Ne^2} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (3.1)$$

Where n = sample amount
N = population amount = 45
e = percent of allowance = 0,05

3.2. Definition and Identification of Research Variables

The operational definition of a research variable is something in whatever form is determined in research to be studied, so that, information can be obtained and then a conclusion is drawn (Sugiyono, 2006). In accordance to the research's objectives, the identification of research variables of factors that influence delays in the road construction project implementation in East Kalimantan Province and to determine the predominant factors are:

- The Independent Variables (X) consisted of:
  1. Finance (X1)
  2. Human Resource/Workforce (X2)
  3. Work Scheduling Method (X3)
  4. Work Implementation Method (X4)
  5. Design Changes (X5)
  6. Material (X6)
  7. Equipment (X7)

8. Land Acquisition (X8)

- The Dependent Variable (Y) is
  1. Delays in project implementation

For obtaining the research data through questionnaire, then research questions were made and be related to these variables with their respective indicators. Then, the final questions that related to the research indicators will be given to respondent in a form of questionnaire.

As for the criteria of scoring answers in questionnaire was assessed by applying a modified Likert scale as stated below:

1 = Very unimportant
2 = Not important
3 = important
4 = very important

3.3. Data Collection

Data collection was carried out through a questionnaire with statement items relating to the factors that influence delays in the implementation of road construction projects in East Kalimantan Province and to determine the predominant factors influencing it by employing a modified Likert scale with a range of 1 to 4 (very unimportant to very important) for avoiding the median value, so certain/assure answers from the respondents to the questionnaire can be obtained. The items in the research variables are designed with positive questions, where number one is the code for a very negative respondent's response to one question's item and number four is a very positive response from the respondents to one of the question items.

3.4. The Instrument Validity Test

3.4.1. Validity Test

The validity test aimed at to what extent the accuracy of the measuring instruments' usage for the symptoms that researchers want to measure. The questionnaire said to be valid if the questions inside the questionnaire are able to reveal something that will be measured by the questionnaire (Singarimbun and Efendi, 2006). Whether an instrument is valid or not can be determined by comparing the Product Moment Person correlation index with a significant level of 0.05 (5%) as the critical value with formula 2.1 by comparing r Mung with r table, then, the validity of the instrument can be determined with the following criteria:

r count > *r table* : valid
r count < *r table* : not valid .

3.4.2. Reliability Test

Reliability is an index showed the extent to which a measuring device can be trusted or relied upon. In other words, realibility shows the consistency of a measuring device for assessing the same symptoms (Singarimbun and Efendi, 2006). In this study, the Cronchbach Alpha approach is selected for the realibility test with formula of 2.2, and an instrument is said to be reliable when its Crochbach Alpha value is > 0.6

3.5. Analysis and Tabulation Data

The data from the questionnaire result will be processed to obtain the information in tabular format, and the result of the tabulation data then used to answer questions stated on the formulation of the study problem.

Data processing should consider to type of data collected by orienting to research's goal. The accuracy of the analysis technique greatly affects the accuracy of the research result. There are two types of data analysis technique applied in this study: the factor analysis and multiple linear regresssion analysis.

The result data from questionnaire ranging from 1 to 4 from each of these variables then re-scored, so each variable containing several indicators will produce only one score which then will be analyzed with factor analysis and multiple linear regression analysis. The data tabulation process is conducted by the help of Statistical Package For Social Science (SPSS)/ for Windows program.

3.5.1. A Factor Analysis

The application of factor analysis in this study was aimed to reduce and analyze the factors that used as an illustration of implementation delay. This analysis able to produce information of data structure from the implementation delay. Result from the factor analysis to 7 variable suspects that causing implementation delay will be tested for the variable feasibility to seek the relationship between variables/indicators. If the MSA value < 0.5, this value will be excluded and re-calculated until the MSA value > 0.5, so the value becomes eligible for the further factor analysis, which later will be extracted into several main factors with smaller dimensions compare to the total number of indicators (Ghozali, 2006).

Factors with higher eigen value than one (A > 1) for example the F1 and F2, has to be put into attention

of the size of these factors in each variable. Whereas for factors with smaller eigen value than one (A < 1) then this rule can be ignored.

There are several stages in factor analysis with reduction stages are explained as follow:

1. The Component Selection

   The test applied in this study were the KMO (Kaiser Meyer Olkin) Measure of Sampling Adequacy and Barlett's Test, and it was based on a correlation matrix. The entire result of questionnaire were tested by KMO (Kaiser Meyer Olkin) Measure Of Sampling Adequacyto test the accuracy of factor analysis. The sample is accepted when the KMO Measure Of Sampling (MSA) value for the anti-image index ranges from 0 to 1. The index will be 1 when all elements of the correlation matrix have a value of 0 which indicates that all attributes can be predicted without error. This means that if the anti-image index is close to one, it will more assuring that all attributes can be predicted with smaller errors.

   Kaiser-Mayer-Olkin Measure Of Sampling Adequacy is a statistic for identifying the proportion of variance in components that can be used as a basis for using factor analysis. The highest value (close to 1.0) generally identifies the most useful factor analysis used on the data. If the value is less than 0.50 then the factor analysis results will be less useful. Whereas, Barlett's test of Sphericity is conducted to test the hypothesis, whether the correlation matrix is an identity matrix that will identify the factor analysis result later will be useful for the applied data.

2. Determining the Number of Factors

   This stage is applied with the determination based on eigen value step, where only factors that have an eigen value greater than 1 will be included, while factors with eigen value below 1 are not included in the model. Eigen Value is obtained through an extraction process by Principal Components Analysis (PCA) method.

3. Classification of Components into Factors

   After determining the factors amount, then a component classification is conducted to be included into the factorsby looking at the factor loading values that are in the same column and insert these components to the same factor. In this stage, the varimax method is used with the aim of maximizing the loading value of each factor where concluded into each group by the help of Confirmatory Factor Analysis (CFA) analysis.

3.5.2. Multiple Linear Regression Analysis

To test research questions related to factors that influence delay in the implementation of road project in East Kalimantan province, also seeks the predominant factors that influencing the delay, this study is using a multiple linear regression analysis as its analytical technique. This test applied to analyze the effect or the relationship between the independent variable to one or more dependent variables with the aid of ANNOVA test/f test, T-test and find the determination coefficient or R2 adjusted as the analysis techniques. This calculation will be carried out with the help of SPSS program according to the double linear equation below:

$Y=b_o+b.X,+b2X2+b3X3+b.X,+bsXs+b.X, +b7X7$

Where:

Y = Implementation Delay
X1 = Financing
X2 = Human Resource/Workforce
X3 = Project Scheduling Method
X4 = Work Implementation Method
X5 = Design Changes
X6 = Material
X7 = Equipment
X8 = Land Acquisition
bo =Constant
$b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8$, =Regression Coefficients

- **Test The Regression Model Coefficient Hypothesis**

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

  a. Hypothesis:
     H0 = there is no difference found in probability index between groups.
     H1 = there is a difference in the probability index between groups.
  b. The conclution is based on the probability value:
     - If the probability > 0.05, then Ho is accepted.
     - If the probability < 0.05, then Ho is rejected.

1. The Influence of Independent Variable Simultaneously to the Dependent Variables

The F test is used to test the independent variables together with the dependent variableby comparing the calculated F value with the F label value or comparison with the sig F value. The conditions for accepting or rejecting the hypothesis are as follows:

If F count > F label sig value F < 0.05: Ho is rejected

If F count <F label sig F value > 0.05: Ho is accepted.

It means the independent variables have an influence to the dependent variable. The F test is applied to test the regression coefficient simultaneously into the hypothesis.

Whereas the detailed description about these hypothesis will be explained below:

- Ho : The influencial factors consisting of Financing (Xl), Human Resources (X2), Work Scheduling Methods (X3), Work Implementation Methods (X4), Design Changes (X5), Materials (X6), Equipment (X7) and Land Acquisition (X8) has no simultaneous effect on delays in project implementation (Y).
- H1 : Influencial factors consisting of Financing (Xl), Human Resources (X2), Work Scheduling Methods (X3), Work Implementation Methods (X4), Design Changes (X5), Materials (X6), Equipment (X7) and Land Acquisition (X8) has a simultaneous effect on delays in project implementation (Y).

- F-test is used with $\alpha = 5\%$ with explanation:

Hypothesis:

Ho : βI = β2 = β3 = β4 = β5 = β6 = β7 = β8 =O

This means that there is no significant effect between the variables Xl, X2, X3, X4, X5, X6, X7, X8 simultaneously on the Y variable.

Basis for decision making:

If P :≤ 0.05 then Ha is accepted and Ho is rejected

If P > 0.05 then Ha is rejected and Ho is accepted

2. Testing the effect of the independent variables in partial to the dependent variable.

T test is held to seek any influence from variables: Financing (Xl), Human Resources (X2), Work Scheduling Methods (X3), Work Implementation Methods (X4), Design Changes (X5), Materials (X6), Equipment (X7) and Land Acquisition (X8) by the following formula:

$$t_{count} = \frac{\beta}{se(\beta 1)}$$

Where : t = $t_{\text{count regression}}$

βi = coefficient of regression

$se(\beta i)$ = standard deviations of the variable

- If $t_{count} < t_{table}$ at the 5% test level then Ho is rejected and H1 is accepted, meaning that the independent variables affect the dependent variable. If: $t_{count} > t_{table}$ or sig t value < 0.05: Ho is rejected, $t_{count} < t_{table}$ or sig t value < 0.05: Ho is not rejected.

The T test is used partially to assess the hypothesis between variable X and variable Y which costitutes of factors :

Ho : Financing (Xl), Human Resources (X2), Work Scheduling Methods (X3), Work Implementation Methods (X4), Design Changes (X5), Materials (X6), Equipment (X7) and Land Acquisition (X8)**has no partial effect** on the implementation delay (Y).

H1 : Financing (Xl), Human Resources (X2), Work Scheduling Methods (X3), Work Implementation Methods (X4), Design Changes (X5), Materials (X6), Equipment (X7) and Land Acquisition (X8)**has no partial effect** on the implementation delay (Y).

Then, t-test is applied with a = 5% error with an explanation:

Hypothesis:

Ho : βI = 0 This means that there is no significant positive effect between variable X partially on variable Y.

Ha: β1 > 0 means that there is a significant positive effect between variable X partially on variable Y

Basis for decision making:

If p ≤ 0.05 then Ha is accepted and Ho is rejected.

If p > 0.05 then Ha is rejected and Ho is accepted.

The hypothesis test was carried out with a significant or 5% error rate with the consideration that this research was a survey method and the t-test performed in two-way regression analysis (on SPSS R 15) whereas the t-test hypothesis formulated in one-way research. The obtained P-value was divided in half, so that the test results with a one-way level can be applied into a two-way test.

$T_{count} > t_{table}$ and α – value < α 5% : Ho is rejected.

- **The Assumption Test for the Regression Model**

To acquire the estimation parameters from the applied dynamic used in this study, the OLS (Ordinary Least Square) estimation was selected, the use of this model was accompanied by the underlying assumptions of: normality, non-multicollinearity, homoscedasticity, and non-autocorrelation.

1. Assumption of Normality

To test whether the research sample is include to type of normal distribution, the Kolmogorov-Smirnov Goodness of Fit Test is used for each variable. The hypothesis in this test will be:

Ho : F(x) = Fo(x) is the distribution function of the population represented by the sample, and Fo(x) is the distribution function of a normally distributed population.

HI : F(x) ≠ Fo(x) or abnormal population distribution.

The decision making whether Ho is accepted or rejected is based on (Santosa, 2001):

If probability > 0.05, then Ho is accepted.

If probability < 0.05, then Ho is rejected

2. Assumption of Multicollinearity

The method used to detect the existence of multicollinearity in this study is by using the Tolerance and Variance Inflation Factor (VIF) (Aliman, 2000). The Rule of Thumb is used as a guideline when the VIF of a variable exceeds 10, where this occurs when the value of R2 exceeds 0.90, then a variable is said to be very highly correlated. The formula 2.4 is used to find out the magnitude of VIF.

3. Assumption of Homoskedastisitas

Mathematically this assumption can be written by applying formula 2.5 while the method that will be discussed here is the Rank Spearman correlation method.As the name implies, this method uses rank X and $|ei|$ Spearman correlation coefficient formulated according to formula 2.6. The significant level of the correlation coefficient rs obtained by the above formula is tested with t-test statistics using the formula 2.7.When the calculated t value exceeds the critical t value, we can accept the hypothesis that there is heteroscedasticity, or in other words the assumption of homoscedasticity is not met.

4. Test of Non-Autocorrelation

To detect autocorrelation in this study, then the Durbin Watson method was used with the following steps:

1. Perform the OLS regression and get the residual ei.
2. Calculate *d* by employing the formula 2.9
3. For a given sample size and a certain number of explanatory variables, try to find the critical values of dl and du.
4. When the null hypotension (Ho) has no serial correlation, then, if
   d > dU and 4 - d > dU : accept Ho (no serial correlation/autocorrelation).
   d > dL and 4 - d > dL : reject Ho (there is serial correlation/autocorrelation).

3.6. Stages of Strategy Determination

There are three steps for determining the strategy in this study as stated:

1. Observe the result of multiple linear regression analysis to the independent variables that have significances.
2. Determine the independent variable (factor) than mostly affected by the implementation delay. The most dominant variable is the variable that significantly affected and also has the largest β coefficient value.
3. From the result of these steps, then it can be determined the strategy criteria to the significant variables.

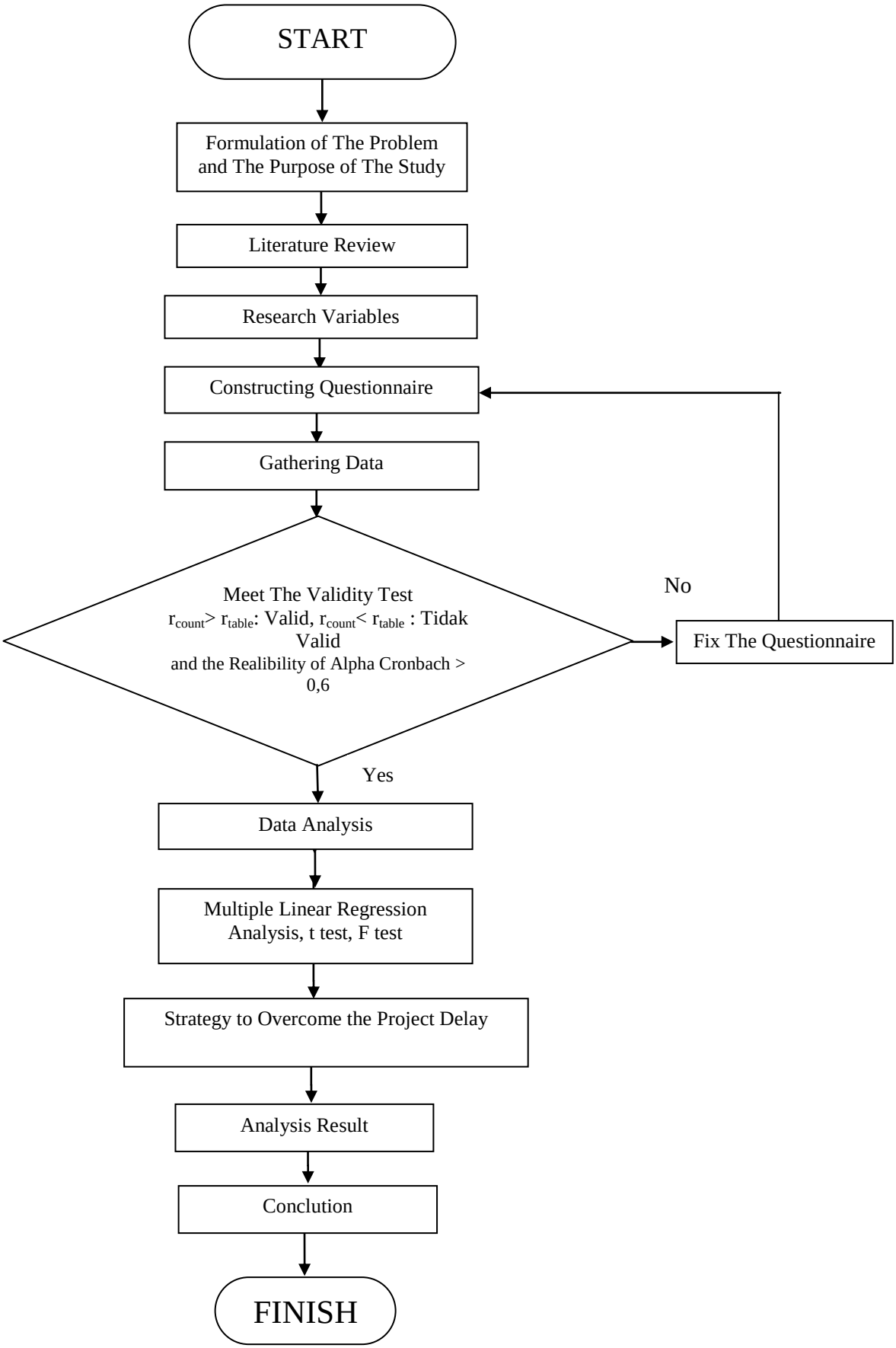

Figure1.Research Methods

IV. RESULT AND DISCUSSION

4.1. Result of Multiple Linear Regression Analysis

4.1.1. The Multiple Linear Regression Analysis

The multiple linear regression analysis is applied to seek factors that affect delays and also find which one is the predominant factor that affecting the implementation delay. In processing the research data by a multiple linear regression analysis, there were several stages carried out to find the relationship between the independent and dependent variables. According to the tabulation data aided by SPSS 15 software, then the following summary is obtained:

Table1.The Summary of The Regression Analysis Result

Variable	B Coefficient	T_{count}	*P-value*	Annotation
Constant	0,144	0,112	0,912	Not Significant
Factor of Financing (X1)	-0,097	-0,827	0,414	Not Significant
Factor of Human Resources (X2)	-0,058	-0,404	0,689	Not Significant
Factor of Work Scheduling Method (X3)	0,387	3,415	0,002	Significant
Factor of Work Implementation Method (X4)	0,227	2,171	0,037	Significant
Factor of Design Changes (X5)	0,084	0,616	0,542	Not Significant
Factor of Materials (X6)	0,069	0,508	0,615	Not Significant
Factor of Equipments (X7)	0,194	1,359	0,184	Not Significant
Factor of Land Acquisition (X8)	-0,078	-0,504	0,721	Not Significant
α = 0.05 R^2 = 0.420 R = 0648 F-count = 3,314 F-table (0.05,7,32) = 2.230 *p-value* = 0.009 t-table (0.05,32) = 2.037				

Source : Analysis, 2023

Based on table 4.1, it can be seen that not all independent variables have a significant value. Independent variables that have significant value (significant effect on delay) are the factors of the work scheduling method (X3) and the factors of the work implementation method (X4). While the variables that do not have a significant value (influence but not significant to delay) are factor of financing (X1), factor of human resources (X2), factor of design changes (X5), factor of materials (X6) and factor of equipment (X7). The interpretation of the regression model based on table 4.1 above is stated as follow:

Y=0,144-0,097X1-0.058X2+0.387X3+0.227X4+0.084X5+ 0.069X6+0.194X7– 0,078 X8 + £

Where :

Y :Project Implementation Delay
X1 : Factor of Financing
X2 : Factor of Human Resources
X3 : Factor of Work Scheduling Method
X4 : Factor of Work Implementation Method
X5 : Factor of Design Changes
X6 : Factor of Material
X7 : Factor of Equipment
X8 : Factor of Land Acquisition

1. β_1 = -0,097
   The regression coefficient is negative, which means that if the financing Factor (X1) is getting better, there will be a decrease in project delays (Y).
2. β_2 = -0,058
   The regression coefficient is negative, which means that if the human resource factor (X2) is getting better, there will be a decrease in project delays (Y).
3. β_3 = 0.387
   The regression coefficient is positive, which means that if the workscheduling method factor (X3) is getting worse, there will be an increase in project delays (Y).
4. β_4 = 0.227
   The regression coefficient is positive, which means that if the workimplementation method factor (X4) is getting worse, there will be an increase in project delays (Y).
5. β_5 = 0.084

The regression coefficient is positive, which means that if the design changesfactor (X5) is slower, then, there will be an increase in project delays (Y).

6. $\beta_6 = 0.069$

The regression coefficient is positive, which means that if the material factor (X6) are good and available, there will be a decrease in project delays (Y).

7. $\beta_7 = 0.069$

The regression coefficient is positive, which means that if the equipment factor (X7) is available according to its function, there will be a decrease in project delays (Y).

8. $\beta_8 = -0,078$

The regression coefficient is negative, which means that if the land acquisition factor (X8) is getting better, there will be a decrease in project delays (Y).

R^2 value is the determination coefficient which basically measure the length of the regression model's ability to explain the diversity of the dependent variable (Y) which in this study has a value equal to 0.420. it means, the regression model obtained able to explain 42.0 % varieties of project delay variables (Y). The R value is a correlation that explains the closeness relation between independent variables (X) to the dependent variable (Y) with amount of 0.648. Then, to determine the predominant factor that influences the project delay, the author compare the value of β coefficient of each independent variable (factor) found on the project delay. The variable that has the most dominant effect to the project delay is the variable that has the greatest influence and has the biggest β coefficient value.

According to table 4.1, the work scheduling method (X3) is the variable (factor) that has the biggest β coefficient value, and when this result is related to this study, it is found that the predominant factor that able to influence the project delay is the work scheduling method (X3). In other words, the delay is most influenced by a factor of the work scheduling method (X3). A positive β coefficient value indicates that the better the Wob Scheduling Method (X3), the more likely the project implementation can be completed on time.

4.1.2. Hypothesis Test of The Regression Model Coefficients

The next stage is testing the regression model that has been obtained, both simultaneously and partially. The simultaneous testing of the regression model was carried out by employing the F test (ANOVA) while the partial test of the regression model was conducted by employing the t test.

1. Simultaneous Testing to The Regression Model

Simultaneous testing is performed to show whether all the factors used in the regression model have significant impact on the project delay. All of these factors were tested simultaneously by the F test or ANOVA. With the help of SPSS software, the F test results are obtained as stated in the table below:

Table2. The Simultaneous Testing to Regression Model

Model	Sum of Squares	df	Mean Square	F	Sig.
1. Regression	3.993	7	.570	3.314	.009[a]
Residual	5.507	32	.172		
Total	9.500	39			

The hypothesis applied in testing the regression model coefficients in simultaneously is presented in table 4.3.

Table 3. The Hypothesis Testing of Regression Model Simultaneously

Hipotesis	Nilai	Keputusan
$H_{0\ :}\ \beta_{i\ =}\ 0$ (there is no significant impact of X1, X2, X3, X4, X5, X6, X7and X8to project delay) $H_{a\ :}\ \beta_i \neq 0$ (there is significant impact of X1, X2, X3, X4, X5, X6, X7and X8to project delay) $\alpha = 0.05$	F = 3,314 *p-value* = 0.009 F_{table} = 2,320	H_0 is rejected

Source: Analysis, 2023

According to table 4.3, the testing of regression model hypothesis was conducted simultaneously or in unison by employing the F-Test. In the F distribution table, the value of F_{table} with degrees of freedom (df) n1=7 and n2=32 is 2.320. When the calculated Fvalue in table 4.18 is compared to F_{table}, then F_{count} of the calculated results is greater than F_{table} (3.314>2.320). In addition, table 4.18 also obtained a p-value of 0.009. When the p-value is compared to a=0.05 then the p-value is less than a=0.05. From the two comparisons, it can be concluded that Ho is rejected at the level of a=0.05. So it can be concluded that there is a significant effect simultaneously between Xl, X2, X3, X4, X5, X6, X7 and X8 on project delays (Y).

2. Partial Test to the Regression Model

Partial regression model testing is used to determine whether each independent variable that formed the regression model (individually) has a significant effect on the project delay or not. To test this relationship, the t-test is used by comparing the value of $t_{count}$to t_{table}. The independent variables forming the regression model are said to have a significant effect if $t_{count} > t_{table}$ or p-value <a = 0.05. The partial regression model testing will be explained below.

a. Factor of Financing (Xl)

Based on table 4.1, testing the hypothesis of the regression coefficient of financing factor (X 1) can be written in table 4.4 as follows:

Table 4. Hypothesis Test of Regression Coefficient of Financing Factor (X1)

Hypothesis	Value	Decision
H_0 : β_1= 0 (Financing factor (X1) has no significant impact to project delay) Ha : $\beta_1 \neq$ 0 (Financing factor (X1) has significant impact to project delay) α = 0,05	t = -0,827 p-value = 0,414 t_{table} = 2,037	H_0 Accepted

Source : Analysis, 2023

The financing factor (Xl) has a regression coefficient of -0.097. By using SPSS software, the t-test statistic value was -0.827 with a p-value of 0.414. The value of the t test statistic is smaller than t_{table}(-0.827 <2.037) and also the p-value was greater than a = 0.05. This test showed that Ho is accepted. So it can be concluded the financing factor (X1) has no significant impact to the project delays.

b. Factor of Human Resources (X2)

Based on table 4.1, testing the hypothesis of the regression coefficient of the human resources factor (X2) can be written in table 4.5 as follows:

Table5. Hypothesis Test of Regression Coefficient of Human Resource Factor (X2)

Hypothesis	Value	Decision
H_0 : β_1= 0 (Human resource factor (X2) has no significant impact to project delay) Ha : $\beta_1 \neq$ 0 (Human resource factor (X2) has significant impact to project delay) α = 0,05	t = -0,404 p-value = 0,689 t_{table} = 2,037	H_0 Accepted

Source : Analysis, 2023

The human resource factor (X2) has a regression coefficient of -0.058. With the help of SPSS software, the t-test statistic was -0.404 with a p-value of 0.689. The value of the t test statistic is smaller than t_{table} (-0.404 <2.037) and also the p-value was greater than a = 0.05. This test showed that Ho is accepted. So it can be concluded that the human resource factor (X2) has no significant impact on project delays.

c. Factor of Work Scheduling Method (X3)

Based on table 4.1, testing the hypothesis of the regression coefficient of work scheduling method (X3) can be written in table 4.6 as follows:

Table6. Hypothesis Test of Regression Coefficient of Work Scheduling Method Factor (X3)

Hypothesis	Value	Decision
H_0 : β_1= 0 (Work Scheduling Method factor has (X3) has no significant impact to project delay) Ha : $\beta_1 \neq$ 0 (Work Scheduling Method factor (X3) has a significant impact to project delay), α = 0,05	t = 3,415 *p-value* = 0,002 t_{table} = 2,037	H_0 Rejected

Source : Analysis, 2023

The work scheduling method factor (X3) has a regression coefficient of 0.387. By using SPSS software, a t-test statistic of 3.415 was obtained with a p-value of 0.002. The value of the t test statistic is greater than t_{table} (3.415 > 2.037) and also the p-value is smaller than a = 0.05. This test shows that Ho is rejected. Then,it can be concludedthat the work scheduling methodfactor (X3) has a significant effect on project delays.

d. Factor of Work Implementation Method(X4)

Based on table 4.1, testing the regression coefficient hypothesis of the work implementation method Factor (X4) can be written in table 4.7 as follows:

Table7. Hypothesis Test of Regression Coefficient of Work Implementation Method Factor (X4)

Hypothesis	Value	Decision
H_0 : β_1= 0 (Work implementation method factor (X4) has no significant impact to project delay) Ha : $\beta_1 \neq$ 0 (Work implementation method factor has significant impact to project delay) α = 0,05	t = 2,171 *p-value* = 0,037 t_{table} = 2,037	H_0 Rejected

Source : Analysis, 2023

The Work Implementation Method Factor (X4) has a regression coefficient of 0.227. With the help of SPSS software, a t test statistic of 2.171 was obtained with a p-value of 0.037. The value of the t test statistic was greater than t_{table} (2.171 > 2.037) and also the p-value was smaller than a = 0.05. This test showed that Ho is rejected. So it can be concluded that the Work Implementation Method Factor (X4) has a significant effect on project delays.

e. Factor of Design Changes (X5)

Based on table 4.1, testing the regression coefficient hypothesis of the design changes Factor (X5) can be written in table 4.8 as follows:

Table 8. Hypothesis Test of Regression Coefficient of Design Changes Factor (X5)

Hypothesis	Value	Decision
H_0 : β_1= 0 (Design changes factor (X5) has no significant impact to project delay) Ha : $\beta_1 \neq$ 0 (Design changes factor (X5) has significant impact to project delay), α = 0,05	t = 0,616 *p-value* = 0,542 t_{table} = 2,037	H_0 Accepted

Source : Analysis, 2023

Design changesfactor (X5) has a regression coefficient of 0.084. With the help of SPSS software, the t-test statistic was 0.616 with a p-value of 0.542. The value of the t test statistic was greater than t_{table} (0.616 <2.037) and also the p-value was greater than a = 0.05. This test showed that Ho is accepted. So it can be concluded that the design changesfactor (X5) has no significant effect on project delay.

f. Factor of Materials (X6)

Based on table 4.1, testing the hypothesis of the regression coefficient of the material factor (X6) can be written in table 4.9 as follows:

Table 9. Hypothesis Test of Regression Coefficient of Material Factor (X6)

Hypothesis	Value	Decision
H_0 : β_1= 0 (Material factor (X6) has no significant impact to project delay) Ha : $\beta_1 \neq$ 0 (Material factor (X6) has significant impact to project delay), α	t = 0,508 *p-value* = 0,615 t_{table} = 2,037	H_0 Accepted

= 0,05		

Source : Analysis, 2023

Material factor (X6) has a regression coefficient of 0.069. Using the SPSS software, a t-test statistic was 0.508 with a p-value of 0.615. The value of the t test statistic was smaller than t_{table} (0.508 <2.037) and also the p-value was greater than a = 0.05. This test showed that Ho is accepted. So it can be concluded that the material Factor (X6) has no significant effect on project delays.

g. Factor of Equipment(X7)

Based on table 4.1, testing the hypothesis of the regression coefficient of the equipment Factor (X7) can be written in table 4.10 as follows:

Table 10. Hypothesis Test of Regression Coefficient of Equipment Factor (X7)

Hypothesis	Value	Decision
H_0 : β_1= 0 (equipment factor (X7) has no signfiicant impact to project delay) Ha : $\beta_1 \neq 0$ (equipment factor (X7) has significant impact to project delay), α = 0,05	t = 1,359 *p-value* = 0,184 t_{table} = 2,037	H_0 Accepted

Source : Analysis, 2023

Equipment factor (X7) has a regression coefficient of 0.194. With the help of SPSS software, the t-test statistic was 1.359 with a p-value of 0.184. The value of the t-test statistic was smaller than t_{table} (1.359 <2.037) and also the p-value was greater than a = 0.05. This test showed that Ho is accepted. So it can be concluded that the equipment Factor (X7) has no significant effect on project delays.

h. Factor of Land Acquisition (X8)

Based on table 4.1, testing the hypothesis of the regression coefficient of the land acquisitionfactor (X8) can be written in table 4.11 as follows:

Table11. Hypothesis Test of Regression Coefficient of Land Acquisition Factor (X8)

Hypothesis	Value	Decision
H_0 : β_1= 0 (land acquisition factor (X8) has no significant impact to project delay) Ha : $\beta_1 \neq 0$ (land acquisition factor (X8) has significant impact to project delay), α = 0,05	t = -0,504 *p-value* = 0,721 t_{table} = 2,037	H_0 Accepted

Source : Analysis, 2023

The land acquisition Factor (X8) has a regression coefficient of -0.078. With the help of SPSS software, the t-test statistic was -0.504 with a p-value of 0.721. The value of the t test statistic was smaller than t_{table} (-0.078 <2.037) and also the p-value was greater than a = 0.05. This test showed that Ho is accepted. So it can be concluded that the land acquisition factor (X8) has no significant effect on project delays.

4.2. The Strategies for Attempt to Overcome A Project Delay

According to the regression analysis results, it was found the factors of work scheduling method (X3) and the work implementation method (X4) are the factors that have significant impact based on table 4.1. Meanwhile, factors that have insignificant impact are factors of financing (X1), human resources (X2), design changes (X4), materials (X5), equipments (X6) and land acquisition (X8). Furthermore, factors which significantly influence the project delay can be broadly explained as:

1. The factor of work scheduling method (X3) was the reduction result of manifest variables consisted of "inappropriate/not ideal scheduling planning method" (X3.1), "work implementation scheduling method was not in match with provisions" (X3.2), and "waiting for shop drawing approval from PPK" (X3.3).
2. The factor of work implementation method (X4) was the reduction result of manifest variables consisted of "implementation stages not in accordance with the provisions" (X4.1), "work implementation near the end of the year" (X4.2) and "work implementation not in accordance with technical specifications" (X4. 3).

The next discussion will be talked through are the strategies used for the predominant factors that

significantly affect project delays.

4.2.1. The Selected Strategy for Overcoming The Factor of Work Scheduling Method

The factor of work scheduling method found to be the variable which has the highest β coefficient value in this study, hence, the predominant factor affecting project delay is the work scheduling method factor (X3). A positive β coefficient value indicates if this factor is in accordance to the ideal (right) order, then it can be said the project will be likely able to be completed according to the agreed time that stated in the contract. Next, in finding the indicators that have the most influencial impact on project delays from the work scheduling method factor (X3), it can be observed from the high communality value that presented in table 4.12. Within the table, it is evident that the indicator of X3.2 is an indicator in the work scheduling factor which has a high influencial impact on the project delays, with accompanied with other indicators that described in table 4.12 below.

Table 12. The Communality Test of Work Scheduling Method Factor (X3)

Manifest Variables	Description	Communality Values
X3.2	Work implementation scheduling method was not in match with provisions	0,703
X3.1	Inappropriate/not ideal scheduling planning method"	0,617
X3.3	Waiting for shop drawing approval from PPK	0,531

Source : Analysis, 2023

From table 4.12 it is evident that the indicator of work scheduling method factor that has the greatest influence on project delays is the method of scheduling the implementation of work not in accordance with the provisions (X3.2) with a communality value of 0.703, so the strategy taken to overcome this problem isin the beginning of work, there must be prepared an efficient implementation schedule so the work implementation can be carried out properly to reduce the time and costs,as well as every work stages can be implemented in order, and when there occurs a critical delay in work progress, a rearragement of the implementation schedule can be conducted immediately.

4.2.2. The Selected Strategy for Overcoming The Factor of Work Implementation Method

The work implementation method factor (X4) is the second variable that has the second largest β coefficient value after the work scheduling method factor (X3), which means, the project delay also has been influenced by the work implementation factor. Orders of the indicators which have the most influencial impact to project delay in the work implementation work factor is presented in table 4.13 below.

Table 13. The Communality Test of Work Implementation Method Factor (X4)

Manifest Variables	Description	Communality Values
X4.1	Implementation stages not in accordance with the provisions	0,770
X4.3	Work implementation not in accordance with technical specifications	0,647
X4.2	Work implementation near the end of the year	0,602

Source : Analysis, 2023

From table 4.13 it is evident that the indicator of work implementation method factor which has most dominant influences to project delay is the implementation stages not in accordance with the provision (X4.1) with a communality value of 0.770, then, the strategy to overcome this problem is the work implementation stages must following a set of schedule that has been planned so there will be no excess or shortage of workload, and continues to control the work progress for assuring the work is according to the implementation schedule.

V. CONCLUSION

From the discussion and analysis in this study to find out the predominant factors to the project delay on the road construction in East Kalimantan province, then the authors draw several conclutions:

1. Factors that significantly affecting the project delays in Road Construction Projects in East Kalimantan Province are stated in the most influencial factors to the least influencial factors: (a) the Work Scheduling Method (X3) with a coefficient β = 0.387, (b) the Work Implementation Method (X4) with a β coefficient = 0.227, (c)the Equipment factor (X7) with a coefficient β = 0.194, (d) the Design Changes factor (X5) with a β coefficient = 0.084 and (e) the Material factor (X6) with a β coefficient = 0.069. The highest coefficient value is the Work Scheduling Method β = 0.387 and according to the F test, it was obtained together for project delay with a value of $F_{count} = 3.314 > F_{table} = 2.230$.

2. There are two predominant factors that brought biggest influence to the project delay in road construction project in East Kalimantan province, which are the Work Scheduling Method factor (X3) with a t_{count} = 3.415 > from t_{table} = 2.037, followed by the Work Implementation Method factor (X4) a t_{count} = 2.171 > from t_{table} = 2.037.
3. The selected strategies for overcoming the project delays are:
   a. The strategy to deal with work scheduling method factor (X3) is prior to start the work, an efficient work implementation schedule must be prepared, so the work implementation can be carried out properly, and whenever there is a critical delay in progress, then a rearrangement of the schedule can be carried out immediately.
   b. The strategy to deal with the work implementation method (X4) is the work implementation stages must follow the planned schedule to make no extra/excess or shortage of workload, and must continue to control the work progress according as planned in the implementation schedule.

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