

# Analysis Of Factors Causing Delays On Harun Nafsi - Hm Rifadin Street In Samarinda East Kalimantan Maintenance Project

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**Abstract :** This study aims to identify, analyze, and describe the factors that affect the project maintenance delay on Harun Nafsi - HM. Rifadin Street in Samarinda, East Kalimantan. This research uses qualitative research method by utilizing questionnaires. The 30 participating respondents consist of 14 project implementers and 16 field implementers. The data are analyzed by descriptive statistical technique, factor analysis, and linear regression analysis. The results show that the factors influencing the delay of maintenance project of Harun Nafis - HM Rifadin Street include: (1) time factor and workmanship factor; (2) human resources and natural factors; (3) geographical conditions, late approval, plans change, and labor strikes; and (4) non-optimal working levels and changes in the scope of the project during the work are still ongoing. Based on multiple linear regression analysis, coefficient of determination value of 0.824 is obtained. It means that the four factors studied affect 82.4% of project delays and the rest of 27.6% is influenced by other variables out of this study. The results of this study also indicate that the dominant factor for road maintenance project delays is the fourth factor of the factors mentioned. The effort that the contractor needs to undertake is not to expand the employment contract if the project is underway or the contractor does not have the capability to complete another project.

**Index Terms:** Financing, Linear Regression, Project Late Factor, Project Time, Scheduling

## 1. INTRODUCTION

Human resource (manpower) is one of resources that is not easily managed. Every construction project requires resources in its completion. Resources used during the construction process are in need of manpower, materials, machines, men, methods, and money. The success of a construction project depends on the effectiveness of human resource processing (Ervianto, 2003). The human resources in the project are the entire workforce that is used as input to a series of project activities to obtain a predetermined project result (Soeharto, 2005). The quality of manpower can be influenced by two factors: internal factors resulted from within the workforce itself such as formal education, work experience, physical characteristics, as well as personal characteristics, and personality type of workforce, while the external factors affecting the quality of manpower can come from the work environment and the company's management system (Simamora, 2007).

Project delays may come from service providers or other parties that have an impact on additional time and expenses out of the plan. If the delay comes from the contractor, then the contractor may be fined, as well as if the delay arises from the user of the service, the service user shall pay the loss incurred by the service provider whose amount is stipulated in the contract in accordance with applicable legislation. Many researches have been done to determine the factors causing the delay in project completion. Assaf et al. (1995) in the Causes of Delay in Large Building Constructions Project states that the causes of project delays can be seen in terms of materials, manpower, equipment, costs, design changes, relationships with relevant agencies, scheduling and controlling, slow monitoring and testing procedures used in projects, environments, contractual issues, and the absence of professional manager consultants. As for the work of Maintenance Road on Harun Nafsi - HM Rifadin Street implemented starting in Fiscal Year of 2013 until Fiscal Year of 2016 which in the implementation does not meet the target on time expected, but given the limited time of research and data retrieval process, this research is only done on the activities of Road Maintenance of Harun Nafsi - HM. Rifadin Street in Fiscal Year of 2016, where at the end of November 2016 the project experienced a delay of 5.17%, then at the beginning of December 2016 contract addendum with the aim to optimize the achievement of the final progress of 2016 is done. Such delays generally invariably result in adverse outcomes for both the employer and the implementing contractor, so that the completion of the road construction project is in need of an in-depth study, because with in-depth studies the delays in other projects can be avoided or anticipated as early as possible.

## 2. LITERATURE REVIEW

### 2.1 Construction Projects

According to Ervianto (2005), understanding of construction can be divided into two groups which are construction

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technology and construction management. Both of these are often related to each other and synergized to improve the effectiveness and efficiency in project management. Construction technology examines the methods or techniques used to realize the physical building and project location. In English, the term technology comes from the word techno and logic. Logic, can be interpreted as a sequence in every step of the activity or procedure, for example activity X must be implemented first, then new Y and so on, while techno is the way that must be used logically. On the other hand, construction management is how to get the resources involved in the construction projects that the project managers apply appropriately. Resources in construction projects can be grouped into manpower, material, machine, men, method, and money.

## 2.2 CPM Calculation Procedure

According to Callahan (2002), delay is when an activity or construction project activity has additional time or not held in accordance with the expected plan. Project delays can be clearly identified through the schedule. By looking at the schedule caused by the delay of an activity towards other activities, it can be seen and expected to be immediately anticipated.

## 2.3 Project Delay

Float is the time allowed to be delayed. In the CPM method, there are three types of floats; they are Total Float (TF), Free Float (FF), and Interferent Float (IF) (Zhao and Tseng, 2003).

## 2.4 Type of Delay

Jervis and Levin (1988) classify delays into four types:

- Excusable delay, ie contractor performance delays occurring due to factors that are beyond the control of the contractor and owner.
- Non executable delay, ie the delay in the contractor's performance that occurs due to a contractor error which does not precisely realize the obligations under the contract.
- Compensable delay, delay in contractor performance that occurs due to the mistake of the owner to fulfill and to perform the obligations in the contract appropriately.
- Outreach and Monitoring Concurrent delay, the delay that occurs for two different reasons. If the executable delay and compensable delay occur simultaneously with non-executable delay, then the delay will be valid as excusable delay.

## 2.5 Impact of Delays

According to Lewis and Atherley (1996), delays will have an impact on the original planning as well as on financial matters. Delays in a construction project will extend the project duration or increase the cost or even both. The impact of the delays on the owner is the loss of potential income from the facility built not in accordance with the time specified, while the contractor is a loss of opportunity to place resources to other projects, the increase of indirect cost due to the run up of expenses for employee salaries, rent equipment, and reduce profits.

## 2.6 Overcome Delays

According to Ahyari (1987), to overcome the delays of materials that occur because the supplier experienced a case, it is necessary to have a backup supplier. In the preparation of

the priority list of suppliers, it is not enough once to be compiled and used further. The list of any given period should be evaluated on the supplier bias seen in the characteristics of behavior patterns, delivery patterns, and damaged goods replacement way.

## 2.7 Factor Analysis

Factor analysis is included in interdependence techniques which mean that there is no dependent variable or independence variable. The process of factor analysis tries to find the relationship (interrelationship) between a number of independent variables with each other, so that it can be made one or more sets of variables that are less than the number of initial variables (Santoso, 2005).

## 3. RESEARCH METHODOLOGY

This research is designed by using qualitative research method with data analysis technique using factor analysis and continued by using linear regression analysis. This research is conducted on Harun Nafsi - HM Rafidin Street which is administratively located in Rapak Dalam Village, Loajanan Ilir Sub-District, Samarinda City, East Kalimantan Province. Population is the whole object of research (Arikunto, 2010). Besides, according Sugiono (2011), the population can be defined as a generalization region consisting of the objects or subjects that have certain characteristics and the quantity applied by researchers to make its conclusions. From some of the above opinions, the population in this study are the project implementers consisting of general superintendent, site manager, highway engineer, quality engineer, safety engineer, surveyor, realization and field implementers of supervisory consultants and foremen who work in maintenance projects of Harun Nafsi - HM Rifadin Street in Samarinda, East Kalimantan. Based on the above concept, the population taken is 30 respondents consisting of 14 project executors and 16 field implementors on the maintenance project of Harun Nafsi - HM Rifadin Street in Samarinda, East Kalimantan. The sampling method is Saturated Random Sampling with limited population. The sample is chosen so that every possible sample has the same probability to be selected; the samples taken are 30 respondents.

### 3.1 Data Collection Techniques

Data collection is used to obtain information about factors causing delay in project maintenance of Harun Nafsi - HM Rafidin Street in Samarinda, East Kalimantan which is done by using observation technique and research questionnaire. Data collection technique, like this, is suitable for when the number of respondents is large enough or spread over a large area (Sugiyono, 2011). In this study, the questionnaire compiled in the form of statements consists of factors causing delays in road maintenance projects. The factors mentioned are as follows:

- Late payment of project caused by client
- Implementation of poor project stages caused by contractors
- Project material processing error caused by project contractor
- The existence of manpower shortage is caused by the project contractor
- The occurrence of bad weather or heavy rain causes the project site to be inundated
- Frequent occurrence of inequality or different state of the

- soil on each project
- g. Project workers always do additional work if requested by the client
  - h. Often errors in planning and specification
  - i. Uncertainty in planning and specification often occurs in project implementation
  - j. Any changes in planning and specification should be confirmed to the client
  - k. The misinterpretation of images / specifications is the responsibility of the workers
  - l. There is often a change of working methods by the contractor
  - m. Planning an inappropriate work schedule is caused by the contractor
  - n. Non-optimum project work productivity caused by the contractor
  - o. Change of work scope by consultant required by project worker
  - p. Strikes by contractors often occur in project work
  - q. Owner / client contributed to the repair work that has been completed
  - r. Fixed damage to a job resulting from strikes caused by project workers
  - s. Frequent delays in shop drawing approval by consultants
  - t. Project approval is done outside the fasting month and Eid
  - u. Implementation of project workers carried out at the beginning of the year

These factors are then changed in the form of a statement each of which is given five choices of answers: (1) is very not influential, (2) not influential, (3) is influential, (4) influential, and (5) is very influential.

### 3.2 Research Instruments

This research uses questionnaire as research instrument. Before the instrument is used, firstly the validity and reliability of the instrument are tested by using SPSS 20 for windows software.

### 3.3 Data Analysis Techniques

Data analysis in this research is done by using statistic descriptive factor analysis, and linear regression. Descriptive statistics are used to describe the distribution of respondents' answers collected using questionnaires. While the factor analysis technique is used to process, analyze, and reduce the factors that affect the delay in the maintenance of Harun Nafsi - HM Rifadin Street. To facilitate the processing and analysis of data, in this study, it is conducted using SPSS 20 for windows.

## 4. RESULTS AND DISCUSSION

### 4.1 Data of Research Results

Research on the analysis of factors influencing the cause of the delay in road maintenance project of Harun Nafsi - HM Rifadin Street, its data collection is done by using questionnaire. Data collection is conducted on 30 respondents consisting of 14 project executors and 16 field implementers on the road maintenance project of Harun Nafsi - HM Rifadin Street. The questionnaires used in the data collection process consist of 21 questions in which each represents factors affecting the delays in the road maintenance project of Harun Nafsi - HM Rifadin Street.

### 4.2 Research Instruments

#### 4.2.1 Validity Test

The validity of the data indicates the level of ability of an instrument to express something that is the object of measurement conducted with the research instrument. If a statement item is declared invalid, then the statement item cannot be used in further tests. An instrument is stated to be valid if it is able to measure what is desired and it can reveal the data of the object being studied appropriately. This study is conducted by utilizing SPSS 20 for windows software with the results as shown in Table 1.

**Table 1. Results From Validity Test**

Item	r <sub>count</sub>	p-value	Information
P1	0,815	0,000	Valid
P2	0,775	0,000	Valid
P3	0,689	0,000	Valid
P4	0,766	0,000	Valid
P5	0,815	0,000	Valid
P6	0,680	0,001	Valid
P7	0,852	0,000	Valid
P8	0,634	0,000	Valid
P9	0,540	0,003	Valid
P10	0,734	0,000	Valid
P11	0,589	0,006	Valid
P12	0,554	0,011	Valid
P13	0,775	0,000	Valid
P14	0,681	0,001	Valid
P15	0,754	0,000	Valid
P16	0,746	0,000	Valid
P17	0,708	0,000	Valid
P18	0,686	0,001	Valid
P19	0,828	0,000	Valid
P20	0,815	0,000	Valid
P21	0,775	0,000	Valid

K1	0,910	0,000	Valid
K2	0,886	0,000	Valid
K3	0,892	0,000	Valid

Based on Table 1 above, for the validity test, it can be explained that the Factor of Statement 1 to Statement 21 and Delay Factor 1 to the delay of 3 signification level which are less than 0.05, it is obtained that the critical value r table of 0.361 has a correlation coefficient of each factor greater value from r table. In addition, the p -value of each factor is less than 0.05. It can be seen from all statement

items above can be said valid so that all items can be included in further analysis.

#### 4.2.2 Reliability Test

Reliability Test is done by using SPSS 20 software. Reliability test results using Alpha Cronbach coefficient for the following variables is shown as follows:

**Table 2. Results of Reliability Test**

Variables	Alpha Index	Information
Causes of Project Delays	0.2482	Reliable
Project Delays	0.2482	Reliable

Based on Table, the Cronbach Alpha coefficient for Variable Causes of Project Delay and Project Delay are greater than 0.6, so it can be concluded that the indicators used to measure these variables can be reliable.

#### 4.2.3 Results of Linear Regression Analysis The Effects of Each Factor Partially

To test the influence of each factor partially, t Test is done. The results of t test are presented in Table

**Table 3. Results of t Test on Each Factor**

Variables	t count	Significance	t table	Description
X1	0,312	0,758	1,6973	Not significant
X2	3,736	0,001	1,6973	Significant
X3	1,014	0,320	1,6973	Not significant
X4	7,074	0,000	1,6973	Significant

Results of t test show that partially there are two factors that have significant influence and two factors that influence are

not significant to delay of road project maintenance of Harun Nafsi - HM. Rifadin Street.

#### The Effects of Simultaneous Factors on Project Delay

**Table 4. Results of F test and Determination Coefficient**

Value	F count	Significance	F table	Information
Df 1 : 4	29,236	0,000	2,7014	Significant
Df 2 : 29				
R	0,908			
R <sup>2</sup>	0,824			

Based on the results of F test, the value of F count is 29,236 and significant at 0,000 level. While the value of F table for df 1: 4 and df 2: 29 at the real level of 95% is 2,7014. Because the value of F count > F table (29.,236 > 2,7014) and significant 0,000 < 0,05, then it can be taken a conclusion to reject Ho and accept H1 or it can be

concluded that there is significant influence of Factor 1, Factor 2, Factor 3, and Factor 4 together towards the delay of the road maintenance project. The amount of influence is 82,4% and the rest of 27,6% is influenced by other variables out of this study.

#### 4.2.4 Results of Multiple Linear Regression Analysis

**Table 5. Results of Multiple Linear Regression Analysis**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
(Constant)	.904	1.164		.776	.445	
1	X1	.009	.028	.037	.312	.758
	X2	.129	.035	.513	3.736	.001
	X3	.039	.039	.129	1.014	.320
	X4	.821	.116	.598	7.074	.000

## a. Dependent Variable: Y

Based on Table, the regression equation for the relationship between Factor 1, Factor 2, Factor 3 and Factor 4 on the delay of the road maintenance project can be arranged as follows:

$$Y = 0.904 + 0.009X_1 + 0.129X_2 + 0.039X_3 + 0.009X_4 + e$$

The above regression equation can be interpreted as follows: Constant of 0,904 can be interpreted that if Factor 1, Factor 2, Factor 3, and Factor 4 are considered constant, then Y (delay of road maintenance project) still has a value of 0,904. The coefficient of regression X1 of 0,009 can be interpreted that if X1 has 1 unit increase, then Y will have an increase of 0,009. X2 regression coefficient of 0.129 can be interpreted that if X2 has increased 1 unit, then Y will experience an increase of 0,129. X3 regression coefficient of 0,039 can be interpreted that if X3 have increase 1 unit, then Y will experience increase equal to 0,039 and coefficient of regression X4 equal to 0,821 can be mean that if X4 have an increase of one unit, then Y will have increase equal to 0,821.

### 4.3 Discussion

#### 4.3.1 Factors Affecting Project Delay

Factors influencing the delay in road maintenance project of Harun Nafsi - HM Rifadin Street are (1) the factors are generally related to time factor and workmanship factor, (2) human resource and natural factors, (3) geographical condition, delay in approval, change of plan and strike of workforce, (4) unoptimal work rate and project scope change during work is still ongoing. The results above illustrate that the delay in the maintenance project on Harun Nafsi - HM Rifadin Street is caused by many human factors. It can actually be prevented if at the beginning of project planning, there is a really careful planning, both in terms of time planning and human resource planning of project implementers.

#### 4.3.2 Influence of Project Delay Factors

Road construction projects are basically not just projects owned by the government and contractors alone. However, it indirectly also requires the participation and support of the community in the project site. As stated above that there are 27,6 % other factors that affect the delay of road maintenance. The other possible factor is the lack of community participation around the project site or road users to participate in road maintenance. The road is a common means that in its use, it must be in accordance with the conditions and specifications of the road. One of the forms of road user participation is a car or truck carrying a load exceeding the road class does not pass through the road because the weight of a load that exceeds the road class will accelerate road damage.

#### 4.3.3 The Most Dominant Factors Affecting Project Delay

The results of this study reveal that the dominant delay in road maintenance projects of Harun Nafsi - HM Rifadin Street is caused by the level of work is not optimal and changes in project scope during the work is still ongoing.

Inadequate working levels can be attributed to low project management personnel who are also supported by the scope of the project. If a project is not completed yet but the project implementer is expanding the project that is undertaken, then the previously existing project becomes dormant and slow in completion

#### 4.3.3 The Efforts that Need to be Taken to Solve Project Delays

The results of the data analysis show that dominantly delay in the road maintenance project of Harun Nafsi - HM Rifadin Street is caused by the non-optimal work rate and changes in project scope during the work is still ongoing. Inadequate working level can be caused by low project manager's human resources is also supported by the scope of the project, the effort required is the contractor does not extend the contract if the project is not done yet or the contractor does not have the ability to save other projects. The inability to complete the project is caused by many factors such as low human resources or difficult natural condition, so before undertaking the project, the contractor should have the ability to analyze human resource capabilities and the geographic conditions of the project site. The result of data analysis also shows that there are other factors out of this research which have an effect on to the delay of road maintenance project implementation. The other factor can be in form of surrounding community participation project road maintenance. Therefore, another effort that can be done by the government is encouraging communities around the project to participate actively in road maintenance projects.

## 5. CONCLUSIONS AND SUGGESTIONS

### 5.1 Conclusions

Based on the results of F test, simultaneously there are significant influence factors causing delay in road maintenance project of Harun Nafsi - HM Rifadin Street namely (1) Factors related to time factor and workmanship factor, ( 2) human and natural factors, (3) geographical condition, delay in approval, change of plan and strike of labor force, (4) unoptimal work rate and project scope change during work on project delay, while based on t test result, that is partial influence, it can be concluded that there are two significant influence factors causing delay namely (2) Human resource factor and Nature factor and (4) Working level not optimal and change of project scope during work is still ongoing towards project delays. Based on the result of regression analysis, the determination coefficient value is 0,824. It means that the four factors studied have an effect of 82,4% on the delay of the road maintenance project of Harun Nafsi - HM Rifadin Street, and the rest of 27,6% is influenced by other variable out of this research. Based on the result of multiple linear regression analysis, the dominant factor influencing the delay of maintenance project of Harun Nafsi - HM. Rifadin Street is the fourth factor that is the level of work that is not optimal and changes in the scope of the project during the work is still ongoing. The effort that needs to be undertaken is that the contractor does not extend the employment contract if the project being undertaken has not been

completed or the contractor does not have ability to complete the other project.

## 5.2 Suggestions

For the Government of Samarinda City, the government should pay attention on the quality of human resources owned by the contractors. Contractors who do not meet the workforce specifications as per the project undertaken should not be included in road construction or maintenance projects. For the project contractor, the Contractor should make the best possible planning before the project starts, whether in terms of manpower planning or work scheduling planning. With a good initial work plan, the possibility of errors in workmanship and changes in work scheduling can be maximized. In addition, the contractor should also improve the quality of work of his resources in accordance with the scope of work handled. For further research, in further research, it is expected that there are more deeply similar researches. The study can analyze governmental factors or geographical conditions in East Kalimantan area that hamper road maintenance and road enhancement.

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