STRATEGIES TO OVERCOME TIME DELAYS FOR IMPLEMENTATION OF ROAD PROJECTS IN SWAMPY LAND

by Ahmad Saiful Haqqi

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STRATEGIES TO OVERCOME TIME DELAYS FOR IMPLEMENTATION OF ROAD PROJECTS IN SWAMPY LAND

Candra Yuliana[1], Retna Hapsari Kartadipura[2], Retno Tri Pamungkas[3]

[1]Assistant Professor, Department of Civil Engineering, Lambung Mangkurat University, Banjarbaru, Indonesia

[2]Assistant Professor, Department of Civil Engineering, Lambung Mangkurat University, Banjarbaru, Indonesia

[3]Undergraduate Student, Department of Civil Engineering, Lambung Mangkurat University, Banjarbaru, Indonesia

ABSTRACT

Road projects often experience delays and even construction stops in the middle of construction. The objectives of this paper is to determine the factors causing delays in the implementation time of road projects, determine the risk factors that have the most influence on these projects and provide solutions to reduce or overcome the impact of delays. This paper was specifically conducted on roads in South Kalimantan, which is an area with swampy land. Firtsly, distributing questionnaires and interviews to management staff and construction workers. Data analysis using the Severity Index method and the risk assessment matrix. The results indicate that, delay in providing heavy equipment, so must to provide heavy equipment at an earlier time. Damage to heavy equipment during project implementation, the response is to repair the equipment as soon as possible or by renting additional equipment. There was a design change when the project implementation took place, the response was to ask for more time by the owner. Apply overtime hours to change work schedules when bad weather occurs.

Keywords: Delay, Risk Management, Severity Index, Strategy

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1. INTRODUCTION

Delay in project implementation can be defined as a condition where an extension of time is needed to complete a work based on the contract introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper [1]. Delays in the implementation of one activity in the project can cause delays in other activities. This has an impact on the delay in the completion of a project as a whole. Delays in project implementation generally always have a bad impact on project owners and contractors. Because the impact of delay is conflict and debate about what and who is the cause of the delay. Therefore, it is necessary to analyze the factors causing the delay in project implementation time, as well as what steps can be taken to overcome or reduce the impact of the delay in project implementation time. From these observations, it was found that 4 (four) of the 7 (seven) projects in South Kalimantan that were reviewed experienced delays, with a delay deviation ranging from -3.15% to -4.88%.

Road projects in the South Kalimantan region, which are different from other regions, which are areas with swampy land, have different hypotheses in theory about the factors of delay in project implementation in general. objectives of this paper is to determine the most influential risk factors on the implementation time of road construction projects in South Kalimantan and the strategies that can be given to overcome or reduce the impact of delays.

2. THE MATERIAL AND METHOD

2.1. Delay and Risk Management

The definition of delay according to Ervianto (2004) is as an implementation time that is not utilized in accordance with the planned activity, causing one or several activities to follow to be delayed or not completed exactly according to the planned schedule [1]. According to Callahan in Lidwyana and Taufik (2015) explains that delay is when an activity or construction project activity experiences additional time, or is not carried out according to the expected plan [2]. Yuliana (2013) states that the delay in project implementation is an event that causes the planned goals and objectives of the project to be delayed. As a result of the delay in implementation, it can affect costs, quality and time [3]. Delays can also result in project instability or even cessation of activities.

Potential factors that can affect the time of project implementation, which consists of seven categories, namely labor, materials, equipment, characteristics of the place or work location (site characteristic), managerial, financial , and other factors [4].

The causes of delays in a project are divided into three parts [2], namely Excusable Non-Compensable Delays (act of God, forse majeure), Excusable Compensable Delays. This delay is caused by the owner client, the contractor has the right to an extension of time and a claim for the delay. The causes of delays included in the Compensable and Excusable Delay are late submission of the total project site, late payments to the contractor, errors in drawings and specifications, delays in work details, late approval of fabrication drawings [2]. Non-Excusable Delays, are delays that are entirely the responsibility of the contractor. The contractor extends the execution time of the work so that it passes the agreed completion date.

Suharto (1995), stated that the cause of delays in project work can be caused by several things, namely delays caused by the owner's fault, delays due to contractor errors, and delays not the fault of the project owner or contractor [5]. The impact of the delay on the owner is the loss of potential income from the facilities that were built not according to the planned time. While for contractors is the loss of opportunity to allocate resources to other projects, increased indirect costs due to increased expenses for employee salaries, equipment rental and reduced profits.

Risk management is needed to make decisions in dealing with risks that arise so that the project can run according to plan [6]. Risk management is the process of identifying risks, measuring and determining the magnitude of the risks, then dealing with those risks [7]. There are various methods for risk identification that can be used, one of which is by making a checklist, this risk list can be developed based on information that has been collected from past projects [8]. Risk management procedures consist of planning, identifying, analyzing, and managing risks in a project. Optimization of cost, time and quality is the target of risk management [9].

2.2. Risk Analysis

The risk of a resource utilization activity is characterized by the risk event factors (indicating the negative impact that can occur on the project), the frequency of occurrence of the risk (probability), and the severity, negative impact of the risk that occurs [8]. To find out the ranking of each of the factors causing delays based on the impact or harm caused, one of them is by using the severity index method [10]. The concept of Severity Index is a method to determine the value of probability (P) and Impact (I) in calculating the level of risk. Calculating the Severity Index (SI) using equation

$$SI = \frac{\sum_{i=1}^{5} a_i x_i}{5\sum_{i=1}^{5} x_i} \times 100\% \quad (1)$$

where

ai = value skala (a1=1, a2=2, a3=3, a4=4, a5=5)

xi = frequency of respondents (0, 1, 2,...,n)

i = 1, 2, 3, ..., n

The classification of the rating scale on probability and impact is in Table 1

Table 1 Saverity Index Classification

Scala	Information	Saverity Index
1	Sangat rendah/Sangat Kecil	$0,00 \le SI < 12,5$
2	Rendah/Kecil	$12,5 \le SI < 37,5$
3	Cukup/Sedang	$37,5 \le SI < 62,5$
4	Tinggi/Besar	$62,5 \le SI < 87,5$
5	Sangat Tinggi/Sangat Besar	$87,5 \le SI < 100$

The formula for calculating the level of risk is

$$R = P \times I \quad (2)$$

where R is the level of risk, I is the impact of the risk that occurs, and P is the probability of the risk occurring. The criteria for assessing the importance of risk are based on the Australian/New Zealand Standard Risk Management (AS/NZS 4360) (e.g. Table 2)[11]. Potential risks are risks that need to be considered because they have a high probability of occurring and have large negative consequences and the occurrence of risks is characterized by errors in time estimates, cost estimates, or design technology.

Table 2 Qualitative Risk Matrix

Frequency incident	Impact				
	Very Low	Low	Medium	High	Very High
Very High	H	H	V	V	V
High	M	H	H	V	V
Medium	L	M	H	V	V
Low	L	L	M	H	V
Very Low	L	L	M	H	H

(AS/NZS 4360:2004 Risk Management) [9]

Where:

L = Low Risk (acceptable risk so that activities can be continued)

M = Medium Risk (activities can be carried out with security has been carried out)

V = Very High Risk (unacceptable risk that requires risk control measures before activities can proceed)

2.3. Risk Allocation

Risk allocation is the distribution or assignment of risks that may occur in a project to the parties involved in the project [12]. Risk response is the most important stage in the risk management stage, because it provides a response to the risks that have been identified in the previous stage [13]. There are four actions to respond to the identified risks, namely the avoid strategy, transfer, mitigate, accept [14].

3. RESULT AND DISCUSSION

Research respondents were taken as many as 40 people, namely project managers (5 people), engineering (5 people), administrative staff (3 people), supervisory consultants (6 people), quantity control (6 people), field implementers (6 people), surveyors (2 people), supervisor (2 people), logistics (5 people). The variables of this research are labor, equipment, materials, information and communication, project site characteristics, project physical conditions, project management and unexpected events.

3.1. Risk Impact and Frequency Assessment

Respondents' assessment of the frequency of occurrence of risk indicators, for example "Poor work planning" is 17 respondents stated that the probability of occurrence is very rare (scale 1), 10 respondents stated that the probability of occurrence is rare (scale 2), 3 respondents stated that the probability of occurrence is moderate (scale 1) scale 3), 0 respondents stated that the probability of occurrence is frequent (scale 4), 0 respondents stated that the probability of occurrence is very frequent (scale 5), then the Severity Index (SI) value is:

$$SI = \frac{(1x17) + (2x10) + (3x3) + (4x0) + (5x0)}{30} x100\% = 30.7\%$$

The severity index is 30.7%, then based on Table 2 the value of the risk variable "Poor work planning" is included in the "Low" frequency category. The results of the calculation of the frequency and impact assessment for other risk variables can be seen in Table 3.

Table 3. Assessment of the Frequency and Impact of Risk Occurrence

	Variable	Frequency			Impact		
		SI (%)	Category	Scale	SI (%)	Category	Scale
A	Labor						
1	Less number of workers	32.0	L	2	29.3	L	2
2	Lack of workforce discipline	41.3	M	3	28.7	L	2
3	Lack of workforce skills and experience	34.0	L	2	29.3	L	2
4	Low labor productivity	37.3	L	3	32.0	L	2
5	Work accidents	33.3	L	2	38.7	M	3
6	Poor communication between workers and foreman	34.0	L	2	30.0	L	2
B	Equipments						
1	Delay in providing heavy equipment	42.0	M	3	38.0	M	3
2	Heavy equipment damage	40.7	M	3	38.0	M	3

	Variable	Frequency			Impact		
		SI (%)	Category	Scale	SI (%)	Category	Scale
3	Lack of operator expertise in operating the equipment	32.0	L	2	28.0	L	2
4	Low quality of equipment	32.0	L	2	30.0	L	2
5	Lack of equipment	38.0	L	2	33.3	L	2
C	Material						
1	Scarcity of required materials	30.7	L	2	30.0	L	2
2	Material delivery delay	41.3	M	3	36.7	L	2
3	Material damage	34.0	L	2	30.0	L	2
4	Poor material quality	32.0	L	2	28.7	L	2
D	Information and Communication						
1	Poor communication between contractor and consultant	29.3	L	2	35.3	L	2
2	Poor communication between consultant and owner	29.3	L	2	30.0	L	2
3	Poor communication within the contractor organization	31.3	L	2	28.0	L	2
4	Design changes before project implementation	37.3	L	3	28.0	L	2
5	Design changes during project implementation	40.0	M	3	40.7	M	3
6	Design error	33.3	L	2	40.0	M	3
7	Slow approval of working drawings	28.0	L	2	28.7	L	2
8	Owner's delay in making decisions	24.7	L	2	30.0	L	2
9	Inaccurate initial investigation/survey	31.3	L	2	30.0	L	2
E	Project Site Characteristics						
	Insufficient material storage	22.7	L	2	26.0	M	2
F	Physical Conditions on the Field						
1	Unfinished land acquisition	37.3	L	3	29.3	L	2
2	There are puddles of water around the project site	32.0	L	2	28.0	L	2
3	Poor soil conditions	33.3	L	2	36.0	L	2
4	Changes due to conditions in the field	38.0	M	3	28.0	L	2
G	Project Management						
1	Lack of control of work in the field	35.3	L	2	32.7	L	2
2	Late payment by contractor	32.0	L	2	30.0	L	2
3	Inexperienced contractor	36.0	L	2	28.0	L	2
4	Improper construction method	29.3	L	2	37.3	L	2
5	extra work	28.0	L	2	31.3	L	2
6	Poor work planning	30.7	L	2	28.0	L	2
7	Reschadule Time	36.0	L	2	29.3	L	2
H	Unexpected Events						
1	Bad weather	40.0	M	3	52.0	M	3
2	Natural disasters	28.0	L	2	33.3	L	2
3	Strike	32.7	L	2	29.3	L	2

3.2. Risk Analysis of Implementation Time

The implementation time risk analysis is carried out by plotting the results of the frequency assessment with the risk impact assessment into a qualitative risk matrix (Table 2). The analysis is to show the level of risk. This matrix will relate the impact value and the frequency of the risk, so that a combination of numbers is obtained that shows the level of risk. The results of the risk analysis can be seen in Table 4.

Table 4 Implementation Time Risk Analysis Results

	Variable	P	I	Category	
A	Labor				
1	Less number of workers	2	2	L	Low
2	Lack of workforce discipline	3	2	L	Low
3	Lack of workforce skills and experience	2	2	L	Low
4	Low labor productivity	3	2	L	Low
5	Work accidents	2	3	M	Medium
6	Poor communication between workers and foreman	2	2	L	Low
B	Equipment's				
1	Delay in providing heavy equipment	3	3	H	High
2	Heavy equipment damage	3	3	H	High
3	Lack of operator expertise in operating the equipment	2	2	L	Low
4	Low quality of equipment	2	2	L	Low
5	Lack of equipment	2	2	L	Low
C	Material				
1	Scarcity of required materials	2	2	L	Low
2	Material delivery delay	3	2	L	Low
3	Material damage	2	2	L	Low
4	Poor material quality	2	2	L	Low
D	Information and Communication				
1	Poor communication between contractor and consultant	2	2	L	Low
2	Poor communication between consultant and owner	2	2	L	Low
3	Poor communication within the contractor organization	2	2	L	Low
4	Design changes before project implementation	3	2	L	Low
5	Design changes during project implementation	3	3	H	High
6	Design error	2	3	M	Medium
7	Slow approval of working drawings	2	2	L	Low
8	Owner's delay in making decisions	2	2	L	Low
9	Inaccurate initial investigation/survey	2	2	L	Low
E	Project Site Characteristics				
	Insufficient material storage	2	2	L	Low
F	Physical Conditions on the Field				Low
1	Unfinished land acquisition	3	2	L	Low
2	There are puddles of water around the project site	2	2	L	Low
3	Poor soil conditions	2	2	L	Low
4	Changes due to conditions in the field	3	2	L	Low
G	Project Management				
1	Lack of control of work in the field	2	2	L	Low
2	Late payment by contractor	2	2	L	Low
3	Inexperienced contractor	2	2	L	Low
4	Improper construction method	2	2	L	Low
5	extra work	2	2	L	Low
6	Poor work planning	2	2	L	Low
7	Reschadule Time	2	2	L	Low
H	Unexpected Events				
1	Bad weather	3	3	H	High
2	Natural disasters	2	2	L	Low
3	Strike	2	2	L	Low

3.3. Risk Response

Risks categorized as high and very high require control measures or responses to these risks. Control of high risk is carried out by interviewing parties who have experience in road projects. The results of the interviews are shown in Table 5.

Table 5 Causes and Risk Responses with High Category

No	Risks	Causes	Risk Responses
1	Delay in providing heavy equipment	Hard-to-reach project locations	Early provision of heavy equipment
2	Heavy equipment damage	Heavy equipment used for a long time	immediately repair equipment Rent additional equipment
3	Design changes during project implementation	Inaccurate initial survey Design refinement by planner	Communicating between owners, implementers, planners, supervisors
4	Bad weather	Unpredictable rainy weather	Implement overtime work and additional manpower

4. CONCLUSION

The high risks that occur in road projects are delay in providing heavy equipment, heavy equipment damage, design changes during project implementation, and bad weather. Some of the causes of these risks are hard-to-reach project locations, heavy equipment used for a long time, inaccurate initial survey, design refinement by planner, and unpredictable rainy weather. These risks can be managed by early provision of heavy equipment, immediately repair equipment, rent additional equipment, communicating between owners, implementers, planners, supervisors and implement overtime work and additional manpower.

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