

RISK ANALYSIS ON THE CONSTRUCTION PROJECT OF THE SOUTH KALIMANTAN REGIONAL PEOPLE'S REPRESENTATIVE COUNCIL (DPRD) BUILDING

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ABSTRACT

In its implementation, construction projects are often faced with various risks that can hinder the achievement of goals. Likewise, the construction project of the South Kalimantan House of Representatives (DPRD) Building which is planned to consist of three main floors and a basement will certainly face its own challenges in the project, such as extreme weather, or even delays in material delivery, can be the main cause of risks or obstacles in the project.

In this project, data was obtained from questionnaires and interviews with the project party and competent parties outside the project. The risk analysis in this project uses *the Severity Index* method and *the Probability and Impact Matrix method*. Furthermore, the dominant risk mitigation is by conducting interviews with competent project parties.

The results of the research from the risk analysis in this project obtained 26 risk variables consisting of *the Undesirable* and *Unacceptable categories*, risk responses were obtained by means of *Risk Reduction* for 22 risk variables, *Risk Avoidance* for 3 risk variables, *Risk retention* for 1 risk variable

Keywords: Analisis risiko, *Severity Indeks*, *Probability and Impact Matrix*.

1. INTRODUCTION

Risk management is a structured process to identify, evaluate, and control risks that can affect the goals to be achieved in a project. Risk management aims to minimize the negative impact of risks that may occur.

According to the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia Number 10 of 2021 concerning Construction Safety Management System Guidelines, based on the height of the floor of the building, buildings that have a floor height of 3 to 5 floors have a moderate construction safety risk, and based on the condition of the building, this building is a building that has a semi-basement so that the construction safety risk of this building is moderate.

In the South Kalimantan Regional People's Representative Council (DPRD) Building Construction project, based on observations in the field, the implementation of this construction has various risks that allow negative impacts to occur because there is a river on the development project land, the river tends to be moist and less stable which can reduce the carrying capacity of the soil for the foundation of the multi-storey building. In addition, the building is built in a basement where the existence of a basement in a multi-storey building brings a number of risks that need to be considered, this risk can come from unstable soil conditions, and land subversion or landslides can damage the basement structure and the building above it.

2. THEORETICAL FOUNDATIONS

According to Labombang (2011) risk management is carried out by understanding, identifying and evaluating risks in a project, then reviewing the risk response that will be carried out to the risks posed and considering transferring risks to other parties or reducing the risks that occur. [1]

According to Darmawi (2006), risk identification is an analysis process to find potential losses that affect a project. Risk identification aims to describe and detail the risks that may occur in the project to be carried out. [2]

According to Labombang (2011), risk measurement is carried out to find out how big or how small a risk may occur. This is done to find out the high and low risks faced, then find out the impact of the risks and which risks need to be handled first. Risk measurement is the next stage after risk identification which aims to find or identify the possibility of the potential risks faced. [1]

Risk measurement uses risk analysis using the *Severity Index* (SI) method to determine the value of probability and also impact. To calculate the *severity index value*, it can be seen in formula (1) while the result of the *Severity Index percentage* value can be classified with a predetermined scale. The probability assessment scale can be seen in Table 1.

$$SI = \frac{\sum_{i=1}^5 ai.xi}{5(x)} (100\%) \dots\dots\dots$$

(1)

Where:

ai = Assessor constant

x_i = Frequency of respondents

$i = 1, 2, 3, 4, 5$

Table 1. Calcification Severity Index

No.	Information	Severity Index
1	Very low/ Very rare	$0,00 \leq SI \leq 12,5$
2	Low/rare	$12.5 \leq SI \leq 37.5$
3	Moderate/moderate	$37.5 \leq SI \leq 62.5$
4	High/frequent	$62.5 \leq SI \leq 87.5$
5	Very High/Very frequent	$87,5 \leq SI \leq 100$

The calculation of the percentage of *severity index* that has been obtained is then recapitated from the results of data processing to determine the risk category by converting the results of the severity index percentage into the form of a Likert scale. Calculate the risk level value, which is the multiplication between Probability (P) x Impact (I) using the probability scale value and the impact scale value. The formula for calculating the risk level value is found in formula (2). [3]

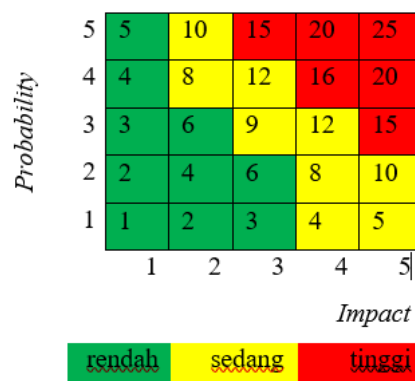
$$R = P \times I \dots\dots\dots (2)$$

Where:

R : Risk Level

I: Impact or *Impact* of risks that occur

Q: Probability of risks that occur



Picture 1. Probability and Impact Matrix

The value of the risk level is obtained by entering the multiplication value between probability and impact into the probability and impact matrix, after which risks with low to high categories are obtained [4].

The results of the data entered into the probability and impact matrix are then included in the risk acceptance scale to determine the dominant or influential risks that occur in the project. The scale of risk acceptance can be seen in Table 2 [5].

Table 2. Risk Acceptance Scale

Risk Acceptance Indicators	Risk Acceptance Scale
<i>Unacceptable</i>	$X > 12$
<i>Undesirable</i>	$5 \leq X \leq 12$
<i>Acceptable</i>	$2 < X < 5$
<i>Negligible (Negligible)</i>	$X \leq 2$

Risk Response or handling actions are carried out on the dominant or influential risk through interviews with respondents who are experts on the project to find out the causes and actions taken against the dominant or influential risk on a project [1].

3. METHOD

The construction of the South Kalimantan Regional People's Representative Council (DPRD) Building is located in the South Kalimantan Provincial Government Office Area, Banjarbaru, South Kalimantan Province. The South Kalimantan Regional People's Representative Council (DPRD) building consists of three floors and a basement.

Conduct a preliminary study by formulating a problem from the title, then make observations in the field and conduct a literature review of similar research to make a questionnaire design. Primary data was collected from the distribution of questionnaires, observations, and interviews conducted to respondents, then secondary data in the form of general project data and results from literature studies.

Conducting a validity test and reliability test on the results of the questionnaire, after being declared valid and also reliable, it is followed by a risk analysis using *the severity index* (SI) method to produce a combination of probability assessments that represent the

respondents' answers, then the value is entered into the set scale. To find out the value of the risk level, a multiplication is done between Probability x Impact.

Entering the risk level value into the risk acceptance scale to obtain variables with dominant and influential risk categories for the smooth running of the project. Providing a risk response to dominant and influential risks by conducting interviews with respondents who are experts and responsible for identifying, evaluating, and managing risks then by respondents the risks will be included in several risk categories.

4. RESULTS AND DISCUSSION

Based on the results of literature studies and observations in the field, the construction project of the regional people's representative council building in South Kalimantan province obtained 7 risk factors with 26 risk variables. These risk variables are then given codes from P1 to P26 to make it easier to conduct analysis.

In this study, the results of validity and reliability tests were obtained for 26 variables, all of which were declared valid and also reparable to the project. After the variable was declared valid, it was continued by conducting a risk analysis using the *severity index calculation method* using rumuas (1) which was then changed to a linkert scale. The results of the calculation of *the severity index* value can be seen in Table 3.

Table 3. Results of Frequency and Impact Data Processing with the Severity Index Method

Code	SI (%) (Frekuensi)	Scale	Information	SI (%) (Impact)	Scale	Information
A	Labor Factor					
P1	48%	3	Enough	53%	3	Keep
P2	62%	3	Enough	66%	4	Tall
P3	47%	3	Enough	56%	3	Keep
P4	41%	3	Enough	50%	3	Keep
B	Equipment Facts					
P5	54%	3	Enough	53%	3	Keep
P6	59%	3	Enough	53%	3	Keep
P7	60%	3	Enough	62%	3	Keep
P8	49%	3	Enough	53%	3	Keep
P9	53%	3	Enough	61%	3	Keep
C	Material Factor					
P10	49%	3	Enough	57%	3	Keep
P11	43%	3	Enough	57%	3	Keep

Code	SI (%) (Frekuensi)	Scale	Information	SI (%) (Impact)	Scale	Information
P12	53%	3	Enough	58%	3	Keep
P13	46%	3	Enough	50%	3	Keep
P14	54%	3	Enough	58%	3	Keep
P15	49%	3	Enough	49%	3	Keep
D	Cost Factor					
P16	49%	3	Enough	47%	3	Keep
P17	40%	3	Enough	44%	3	Keep
P18	56%	3	Enough	57%	3	Keep
And	Implementation Risk					
P19	40%	3	Enough	47%	3	Keep
P20	53%	3	Enough	52%	3	Keep
F	Environmental Factors					
P21	53%	3	Enough	56%	3	Keep
P22	41%	3	Enough	43%	3	Keep
P23	47%	3	Enough	51%	3	Keep
G	Natural Factors					
P24	64%	4	Often	69%	4	Tall
P25	40%	3	Enough	48%	3	Keep
P26	48%	3	Enough	56%	3	Keep

Calculate the risk level value with formula (2). The value of the risk level is obtained by entering the multiplication value between probability and impact into the probability and impact matrix, then the risk with the low to high category is obtained. The results of the plotting are seen in Table 4.

Table 4. Recapitulation of Probability and Impact Matrix Results

1					
2				P24	
3			P1, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P25, P26	P2	
4					
5					
	1	2	3	4	5
	Rendah		Sedang		Tinggi

Variables that have been included in the probability and impact matrix are then included in the risk acceptance scale, then 25 risk variables are included in the category *Undesirable* (Unexpected) and 1 risk variable that falls into the category of *Unacceptable* (Unacceptable). The risk variables that fall into these two categories are the dominant variables and affect the project.

Risk Response is carried out on dominant or influential risks by interviewing respondents who are experts in the project to obtain the causes and risk response. The results of the interview can be seen in Table 5.

Table 5. Causes and Risk Response

Risk Variables	Cause	Response
P1	Suboptimal supervision	Selective recruitment of workers
P2	Cost	Planning workforce needs
P3	Less efficient working methods	Application of more effective working methods
P4	Ineffective communication between foreman and worker	Conduct briefings
P5	The condition of the tool is not optimal, the tool is damaged	Find a tool that meets the required specifications
P6	There is an upfront payment requirement	Booking in advance
P7	The specifications of the appliance do not meet, the appliance is used continuously	Providing spare parts, carrying out proper maintenance procedures
P8	Miscommunication with the provider or ordering of the appliance	Find additional work to get the tool to work
P9	Limited availability of rental space	Ordering the appliance in advance
P10	There is an upfront payment requirement	Implement effective financial management
P11	Lack of supervision, indiscriminate summoning	Provides specialized personnel to manage materials
P12	Limited availability of materials	Booking in advance
P13	Lack of oversight and direction	Strict control of material use
P14	There is an upfront payment requirement	Booking in advance, preparing the fee
P15	The arrival of the material is frequent at night	Providing special power for material checking
P16	Inflation	Establish a contract with a supplier

Risk Variables	Cause	Response
P17	Errors in setting work standards	Evaluate project budget adjustments
P18	Incomplete administrative requirements	Ensuring administrative completeness
P19	Lack of careful planning	An in-depth review of the work plan
P20	There is a design revision by the planner	Immediately revise the working drawing
P21	Variations of soil types	Soil repositioning
P22	Rainy weather for a long time	Organize an effective drainage system
P23	Unstable weather	Building a good and adequate drainage system
P24	The project is carried out in the rainy season	Prepare anticipatory tools such as tarpaulins and PPE
P25	The soil becomes saturated with water due to rain	Building a good and adequate drainage system
P26	Global climate change	Prepare anticipatory tools such as tarpaulins and PPE

5. CONCLUSION

The results of this study obtained 26 valid and reliable risk variables, 26 of which are included in the dominant or influential category that can have a negative impact on the project being carried out.

In this study, of the 26 risk variables, 25 risk variables are included in the *Undesirable* category and 1 risk variable is included in the *Unacceptable* category, so that the 26 existing risk variables are included in the dominant or influential risk category.

Risk response is carried out in all variables, the risk response carried out includes implementing more effective work methods in order to get the work methods used efficiently, ordering materials and tools in advance to avoid delays in work in the field, implementing a good drainage system to avoid landslides, and ensuring the completeness of the administration so that the disbursement of data is not hampered.

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