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Risk Management in the Implementation of Store Building Construction in Populated Area

(Case Study: 7-Floor Home Office Building Project PT. Goautama Sinarbatuah Veteran Banjarmasin)

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ABSTRACT
The mitigation strategy is directed at analyzing, identifying, and knowing how to manage or mitigate risk in the implementation of the 7- floor home office construction project at PT. Goautama Sinarbatuah Banjarmasin is in a densely populated area. Management of risks that are classified as unacceptable and undesirable, including the dominant category (major risk). The purpose of this research is to minimize the negative things that occur in connection with the implementation of this project. The method used in this research is risk mitigation, namely risk reduction, risk retention, risk transfer, and risk avoidance.

The results of the risk analysis obtained in this study are the stages of preparing risk aspects and determining risk mitigation. In terms of acceptance, there are 2 risks that cannot be accepted (unacceptable) and the category is not expected (undesirable) as many as 41 risks with the most risk coming from material risk. Risks that are classified as unacceptable and undesirable, which are included in the dominant category (major risk) require risk mitigation. The type of risk holding/accepting risk (risk retention) does not exist because it does not include risks that require mitigation.

KEYWORDS*: heavy equipment, mechanical equipment, risk, risk identification, risk mitigation*

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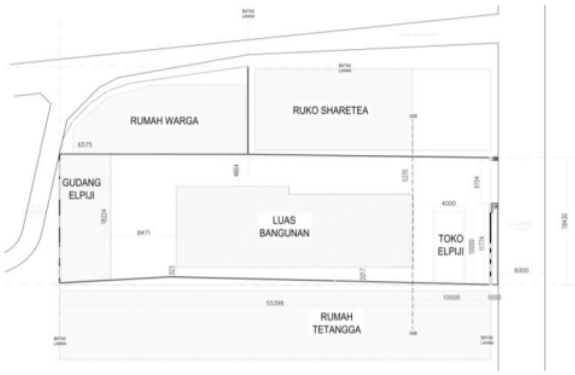
I. PRELIMINARY

1. Background

Time performance is related to the time management needed to complete the project in accordance with the time set. The selection of the right and effective tools will affect the speed of the construction process. The facts show that it is not easy to find the exact source of failure, because its occurrence is caused by many things that are related to each other. Various research results show that the main failures are caused by human errors, such as ignorance, recklessness/negligence, inattention, poor communication, unclear responsibilities, greed/corruption and bureaucracy. Recognizing the importance of project management which includes cost, quality, and time, this study tries to conduct research that discusses "Risk Management in the Implementation of High-rise Building Construction in Densely Populated Areas (Case Study: 7 Floor Home Office PT. Goautama Sinarbatuah Veteran Banjarmasin). At the implementation stage of the development project, you will face risks such as: shearwall work on an elevator with a wall thickness of 30 cm from the pit lift to the 7th floor, which requires a high pile bearing capacity and a large number of piles. After completion of the piling process, the surrounding buildings were damaged. The narrow project area greatly affects the casting process. At the time of casting with the mix pump, the position of the readymix car was on the veteran's road shoulder, while the road conditions in the veteran were many cars and vehicles passing by, causing congestion.

Movement of construction materials due to limited land, changes in planning design drawings from the owner, delays in the arrival of materials, inaccuracy of contractor workers in carrying out tasks in the field, work restrictions due to the covid virus, and erratic weather if handled incorrectly, it will result in disruption of performance. which is detrimental to cost, quality and time, and can even result in project delays.



In the picture, it can be seen that the overall layout of the building plan is with a narrow area, and densely populated areas. The distance between buildings in addition to being maximized according to the needs of the owner, so that a 7-story building was built to meet the space requirements. On the right side of the building is the Sharetea Ruko with a distance of 3,334 m, the left side of the building is a residential house with a distance of 1,169 m, on the back side of the building there is an Elpiji Warehouse with a distance of 9 m, and on the front side of the building there is an existing fence with a distance of 11.3 m. The very close distance of the surrounding buildings will greatly affect the erection time. The access road that can be used when the ground floor structure is built is 3,334 meters, so that it will complicate the process of entering and exiting building.

In the current situation of the covid pandemic, it is also very influential on the arrival of workers, where for each arrival of workers a rapid antigen must be carried out. In the implementation of the project, almost half of the workforce was affected by the COVID-19 virus, this resulted in project work being halted for approximately 14 days, resulting in delays in the project completion process. Risk management can be defined as an approach regarding risk and uncertainty by identifying, analyzing, and mitigating as the basis for actions to minimize the impact of these risks. Based on this assessment, it is deemed necessary to conduct research. The study was conducted to determine what risk factors affect the implementation of the 7- Floor Home Office project at PT. Goautama Sinarbatuah Banjarmasin and the mitigation of the risk factors that occur.

2. The problem's formulation

1. Analyze and identify any risks that affect the implementation of the 7-floor home office construction project of PT. Goautama Sinarbatuah on Jalan Veteran, Banjarmasin?
2. What are the risk factors that are included in the dominant category (major risk) that will be faced during the implementation of the 7-floor home office construction project of PT. Goautama Sinarbatuah on Veteran Street, Banjarmasin ?
3. How to manage or mitigate existing risks to minimize negative things that may occur in connection with the implementation of a construction project on a 7-floor home office construction project PT. Goautama Sinarbatuah on Veteran Street, Banjarmasin ?

3. Objectives of the Study

1. Can analyze and identify any risks that affect the implementation of the 7-floor home office construction project PT. Goautama Sinarbatuah on Jalan Veteran, Banjarmasin.
2. Can find out the risk factors that are included in the dominant category (major risk) that will be faced during the implementation of the 7-floor home office construction project PT. Goautama Sinarbatuah on Jalan Veteran, Banjarmasin.
3. Knowing how to manage or mitigate existing risks to minimize negative things that may occur in connection with the implementation of the 7-floor home office construction project PT. Goautama Sinarbatuah on Jalan Veteran, Banjarmasin.

4. Research Restrictions

1. This research was conducted in Tapin Regency as part of an infrastructure procurement project.
2. The research participants are participants in the purchase of government products and services as part of the Tapin Regency Department of Public Works and Spatial Planning's infrastructure project..

5. Research's Advantages

1. For students to be able to sharpen planning and analysis of the risks that occur in high-rise building projects in densely populated areas
2. For contractors or other parties, in order to be able to analyze work risks for future projects.
3. For Owners, as a global evaluation tool for the escalation of the RAP value (Implementation Budget Plan) for the Banjarmasin home office Veterans Project.
4. For External Parties, it can be used as a reference parameter in the preparation of the RAB and its derivative RAP, especially for private projects that have relatively similar characteristics to the 7 Floor home office Veterans Banjarmasin project in densely populated areas.
5. Can identify risks that occur and identify risk agents in the construction project of the Banjarmasin home office Veterans project.
6. Can accurately estimate the risks that will occur so that they can know how to manage these risks.

II. REVIEW OF LITERATURE

1. Risk Management

The risk management process is the systematic application of management policies, procedures and practices for communication, consulting, setting context, and identifying, analyzing, evaluating, managing, monitoring and reviewing risks. Project risk management includes the process of carrying out risk management planning, identification, analysis, response planning, project monitoring and control.

2. Risk Analysis

Risk analysis is a process to understand the nature of risk and to determine the level of risk. Risk analysis provides the basis for risk evaluation and decisions about risk treatment and includes risk estimation. According to Thompson and Perry (1991), risk analysis and management Qualitative research has two objectives, namely: risk identification and initial assessment risk, where the goal is to establish the main risk sources and describe the level of consequences that often occur, including the most potential impact occurs in the estimated cost and time. Qualitative analysis will be able to determine which is the dominant risk (major / main risk) by multiplying the frequency/likelihood by the consequence of the risk identified, if high frequency and high concentration will produce level/degree of high risk (major risk) and vice versa low frequency and low consequences will result in a low degree of risk (minor risk), then the response/handling given to the risks is carried out main, which is called risk mitigation.

2. Risk Identification

Risk identification is the process of finding, recognizing and describe risk. Risk identification involves identifying the sources of risk, event causes and causes of potential consequences, historical data, theoretical analysis, expert opinion and information, and stakeholder needs interest. Sources of risk are elements alone or in combination has the intrinsic potential to pose a risk. The source of risk can be tangible or intangible.

Identification Techniques

1. Document review.
2. Information gathering : brainstorming, Delphi method, interview, root cause analysis.
3. Checklist analysis.
4. Assumption analysis.
5. Diagram analysis: cause-and-effect diagrams, process flow charts.
6. SWOT analysis.
7. Expert judgment.

Analysis techniques:

1. Risk likelihood, risk consequences
2. Risk matrix

Risk Variables That May Occur in the Project:

1. Man

a. Lack of competent workforce.
b. Low worker productivity.
c. Fatigue due to a lot of work done overtime.
d. Lack of quality of work due to weak field supervision.
e. Lack of quality of work due to not following and carrying out input and instructions from field supervisors.
f. Workers do not use safety equipment at work.
g. There are workers who are sick or have an accident.

2. Machine (tools, equipment)

a. Lack of mechanical equipment.

b. Repeated use of the tool that affects the quality of the tool.
c. Tool delivery delay.
d. Lack of complete project security equipment that can cause accidents.
e. The use of old heavy equipment, so that it often breaks down and slows down performance.
f. The use of equipment facilities (attachment) is not in accordance with the guidelines.
3. Material
a. Limited availability of materials.
b. Delay in delivery of materials from suppliers.
c. Mismatch between the volume of work in BQ and field conditions.
d. An escalation or increase in the price of building materials during the construction period.
e. Frequent changes in material specifications by the owner.
f. Procurement of materials that are not in accordance with technical specifications.
g. Damage or loss of materials.
h. Placement of limited materials.
4. Method
a. Lack of project management implementation.
b. Sudden relocation of equipment or labor.
c. Wrong implementation method.
d. Errors in structural calculations and analysis.
5. Time
a. Time used to create working drawings is limited/inadequate.
b. Loss of time due to wrong procedures/methods in implementation.
c. Very limited time constraints for the work process (workable days).
d. Project rescheduling.
6. Environment
a. Physical conditions in a narrow field.
b. Difficult access for heavy equipment to be used during project implementation.
c. Poor soil conditions.
d. Damage to surrounding buildings.
7. External Factors
a. Incompatibility of drawings and technical specifications.
b. High and erratic rainfall that hinders work.
c. The occurrence of accidents due to the use of heavy equipment.
d. Coordination between contractors, planning consultants, supervisory consultants and owners is not going well.
e. Unclear planning and specifications.
f. Restrictions on work due to covid.
8. Change
a. There is a design change by the owner.
b. There is a change in design due to adjustments to conditions in the field.
c. Changes in planning and specifications.
d. Lots (often) additional work.

4. Risk Classification

In general, based on the likelihood of risk occurrence (likelihood) and consequences (consequences), risks can be classified as follows:

1. Unacceptable, is an unacceptable risk and must be eliminated.
2. Undesirable, is a risk that is not expected and must be avoided.
3. Acceptable, is an acceptable risk.
4. Negligible, is a completely acceptable risk

According to Godfrey, et al (1996), that the risk value is determined as the product of the tendency/frequency with the risk consequences. Likelihood is the probability of an adverse loss occurring, expressed in the number of events per year. While the consequences (consequences) is the amount of loss caused by the occurrence of an adverse event which is expressed in the value of money.

5. Risk Assessment

Godfrey, et al (1996) describe the magnitude of the impact of risk is the multiplication of the frequency (likelihood) with the consequences (consequences) of the risks that have been identified. Risk assessment is basically a calculation or assessment of the impact of the risk that has been identified, the size of the impact of

the risk will be categorized, which is a risk with a major level (major risk), which has a large and wide impact that requires management, or not (minor risk). risk), which does not require special handling because the level of risk is within acceptable limits.

The frequency scale is very often (scale 5), often (scale 4), sometimes (scale 3), rarely (scale 2) and very rarely (scale 1). The provisions for the magnitude of the consequence scale are very large (scale 5), large (scale 4), moderate (scale 3), small (scale 2), and very small (scale 1).

Mathematically the level of risk can be expressed as follows: (Wiliams, 1993)

R = P*I

With :

R = Level of risk

P = Probability of the risk that will occur

I = Level of influence/impact (impact)/(Consequence) of the risk that occurs.

After knowing the level of probability/probability and influence/impact/(Consequence) of a risk, it can be plotted on the frequency and impact matrix to find out strategies to deal with these risks.

6. Risk Acceptability

Godfrey, et al. (1996) in Purbawijaya (2018) provides guidelines on frequency, consequence, value (based on scale) of risk and level acceptance as Table above

Risk Acceptance Scale	
Unacceptable	$x \geq 15$
Undesirable	$5 \leq x < 15$
Acceptable	$3 \leq x < 5$
Neglagible	$x < 3$

7. Risk Mitigation

Risk criteria that require mitigation actions are all risks that are Unacceptable and Undesirable because they are types of risk with the main category (main/major risks)

while risks that are acceptable and negligible are risks with minor categories (minor risks) that do not have a significant impact so that they can be acceptable and can even be ignored. Mitigation/handling are actions taken to eliminate or reduce identified risks.

Methods used in dealing with risk (Flanangan and Norman, 1993):

1. Risk Retention
2. Risk Reduction
3. Risk Transfer
4. Risk Avoidance

III. RESEARCH METHODOLOGY

1. Object of research

This chapter discusses the determination of the problems that will be raised in this research. A series of preliminary studies were carried out by conducting an initial analysis of the risks that might exist in the construction work of a 7-floor home office building at PT. Goautama Sinarbatuah Veterans Banjarmasin. From here, an overview of the risks that will be faced is obtained and the basis for formulating research problems is obtained. The population and sample in this study were parties engaged in the construction sector at the 7-floor home office building project of PT. Goautama Sinarbatuah Veterans Banjarmasin, including contractors, sub-contractors, planners, project owners, and project consultants, who have a hand in these construction projects. Many samples used as many as 20-30 respondents.

2. Research Variables

The research variables were obtained from a review of materials, theories and literature studies in the form of risk variables/risk factors that may occur in high-rise building projects. Where also field observations will be carried out and additional risk variables will be obtained so that the questionnaire design can be carried out. Furthermore, from the selected variables, the identification of the dominant/influential factor can be identified, namely the risk variable that has the greatest value.

3. Data Collection

Primary and secondary data were collected for this investigation. Data is collected directly in the field for primary data. Researchers actively participated in the collection of primary data, which resulted in the collection of primary data. Primary data collected from respondents via questionnaires and conversations with informants.

4. Sampling Techniques

Questionnaires were distributed to 30 people who were directly involved in this project, then 23 respondents returned the questionnaire. So the total number of respondents in this study was 23 people, where it is hoped that these directly involved respondents can provide information about the risks that occur with their frequency and consequences. Then brainstorming is carried out and respondents can provide opinions on mitigation actions to deal with and reduce risks.

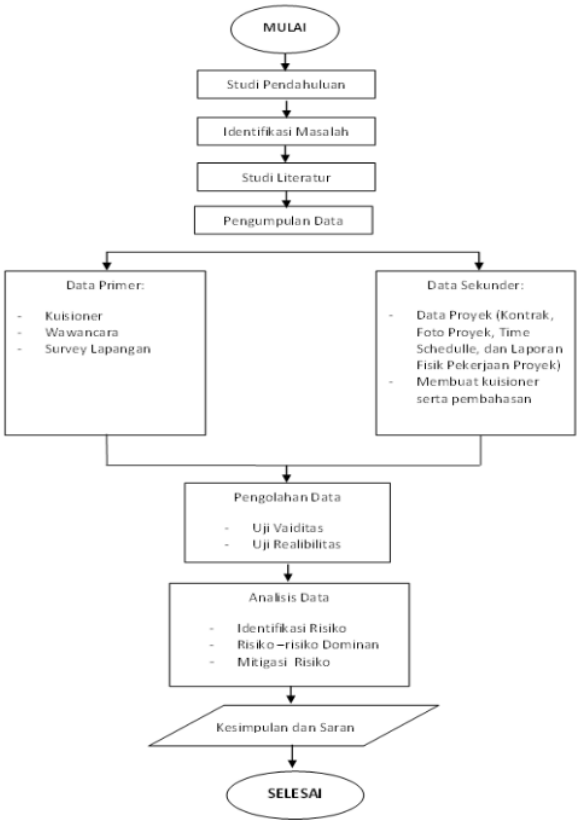
5. Measurement Scale

The measurement scale is used as a reference for the length of the interval in the questionnaire so that it can produce quantitative data. This study uses a Likert scale. Likert scale is used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena. The weighting of the answers to the questionnaire uses a five-point Likert scale. The questionnaire has provided alternative answers for each question item and respondents can choose one of the appropriate answers. Each item is worth 1 to 5 according to the alternatives chosen from each question.

6. Conclusions and Suggestions

Conclusions are drawn up based on data analysis and discussions that have been carried out previously. The conclusions obtained must be in accordance with the research objectives and not out of bounds of the problem. Then the input, recommendations, and others in the form of research suggestions are also described.

Research flow chart



IV. RESULTS AND DISCUSSION

1. Respondent Profile

After designing the questionnaire, the questionnaire was distributed to 30 respondents who were directly involved in this project to fill out the questionnaire (PT. Kusuma Bangun Mandiri and PT. Alkonusa Teknik Inti). Respondents who gave responses were 23 respondents, then data processing and the results of filling out questionnaires were analyzed to determine the level of risk (probability) of the occurrence of risks to project continuity where the results of the analysis will be entered into the matrix of the relationship between probability and impact to determine the level of risk so that it can be known which risks have only major or significant impact. The next step is interviews with 23 respondents about how they respond to the risks that have been obtained.

2. Data Description

The data supplied has been processed using descriptive statistical analysis approaches, which include entering processing data from the outcomes of respondents' questionnaire responses into the SPSS 25.0 for Windows application.

Percentage of Total Risk by Source of Risk

No	Risiko	Amount	Persentase (%)
1	*Man*	7	16,28
2	*Equipment*	6	13,95
3	*Material*	8	18,60
4	*Method*	4	9,30
5	*Time*	4	9,30
6	*Environment*	4	9,30
7	*External Factors*	6	13,96
8	*Change*	4	9,31
	Amount	43	100,00

Risk Variables, risk types, and Project risk mitigation:

1. Man

a. Lack of competent workforce

Risk Value 12 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Bringing in workers from outside for special jobs, participating in job training at the Construction Training Center.

- Perform routine monitoring/checklist for work that requires special accuracy.
- The division of the jobdesk so as not to be overloaded with responsibilities was replaced by a more competent person.

b. Low worker productivity.

Risk Value 9 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Make a tighter work schedule/method (man power) to increase productivity according to the scope of work and project implementation time.
- Doubling overtime work to anticipate work items that require a lot of manpower such as during foundry work in order to meet the planned progress.

c. Fatigue due to a lot of work done overtime.

Risk Value 12 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Implement a rotating work system so that workers can recover their strength.
- Provide vitamins to workers who work overtime so that their stamina is maintained.

d. Lack of quality of work due to weak field supervision.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Increase the frequency of visits by consultants in the field to carry out stricter supervision and repeat work that does not meet the specified quality.

e. Lack of quality of work due to not following and carrying out input and instructions from field supervisors.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Provide instructions to contractors to follow inputs and always coordinate with supervisory consultants.

f. Workers do not use safety equipment at work.
Risk Value 8 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Provide advice, warnings and sanctions to workers who do not use safety equipment at work.
- Give awards to workers who are disciplined in safety equipment so that they motivate other workers.

g. There are workers who are sick or have an accident.
Risk Value 8 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Added safety fences and signage to prevent accidents.
- Prepare a first aid kit to help with medicines needed by the workforce.
- Placing special security officers/K3 officers

2. Equipment
a. Lack of equipment
Risk Value 8 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Create work schedules and methods for the effective use of tools to prevent project delays.

b. Repeated use of the tool that affects the quality of the tool.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Transfer*
Risk Mitigation:
- Adding equipment to streamline and maintain the quality of work.
- Perform routine maintenance/service so that the quality of the equipment is maintained.

c. Tool delivery delay
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Transfer*
Risk Mitigation:
- Make a schedule of arrivals and use of tools to prevent project delays.
- Looking for alternative replacement tools as a backup in case of delays in delivery.

d. Lack of complete project security equipment that can cause accidents.
Risk Value 6 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Adding project security equipment/equipment to maintain worker safety.

e. The use of old heavy equipment, so that it often breaks down and slows down performance.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Carry out routine maintenance and seek to use the tool effectively so as not to interfere with the performance of the tool.
- Prepare/find alternative tools to replace damaged heavy equipment.

f. The use of equipment facilities (attachment) is not in accordance with the guidelines.

Risk Value 12 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Provide training / bring in technicians before using the equipment used to comply with usage procedures.

3. Material
a. Limited availability of materials.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Make a schedule for material arrivals so as not to hinder the project implementation process and look for backup materials

a. Delay in delivery of materials from suppliers.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Transfer*
Risk Mitigation:
- Looking for alternative material delivery so that the material arrives on time.
- Set the material delivery schedule so that the material arrives on time.
- Looking for alternative backup/replacement materials

b. Mismatch between the volume of work in BQ and field conditions.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Carry out recalculation of the volume of work together to ensure that work is added less.

c. An escalation or increase in the price of building materials during the construction period.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Transfer*
Risk Mitigation:
- Contractors place orders or material orders from the start to anticipate price escalation.

- Looking for alternative material suppliers who offer lower prices.

d. Frequent changes in material specifications by the owner.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Provide information to the owner for the impact of changes in material specs that can result in additional work.
- The contractor must be proactive to check the availability of material changes requested by the owner.

e. Procurement of materials that are not in accordance with technical specifications.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Instruct and give warning to the contractor to replace material that does not match the material as required in the technical specifications.

f. Damage or loss of materials.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Tighten access to the project, especially the warehouse area for storing tools and materials to anticipate the theft of materials and work tools and placing special security officers to prevent loss.

g. Placement of limited materials.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Make a mapping of material placement so that material transfer does not occur and does not interfere with the work implementation process.

- Set the schedule for the arrival of materials, especially materials in large quantities and require a large area, such as iron-concrete, scaffolding, and others.

4. Method

a. Lack of project management implementation.

Risk Value 9 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Make a detailed work plan so that each job can be monitored directly.
- Adjust the schedule that has been set together so that the work can be completed on time.

b. Sudden relocation of equipment or labor.

Risk Value 6 (*Undesirable*)

Risk Type: *Risk Avoidance*

Risk Mitigation:

- Make a detailed work plan so that each job can be monitored directly.
- Monitoring materials or conducting daily data observations by logistics.

c. Wrong implementation method.

Risk Value 12 (*Undesirable*)

Risk Type: *Risk Avoidance*

Risk Mitigation:

- Make improvements to work methods by prioritizing work.
- Holding joint coordination meetings to discuss implementation methods in order to obtain more effective and efficient work methods.

d. Errors in structural calculations and analysis.

Risk Value 8 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Coordinate with the planner to check the structural calculations and analysis so that solutions can be found.

5. Time

a. Time used to create working drawings is limited/inadequate.

Risk Value 9 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Adding drafters to pursue working drawings to pursue field activities.
- Make a list of priority work drawings in the field.

b. Loss of time due to wrong procedures/methods in implementation.

Risk Value 9 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Create a method of implementation procedures that are effective in terms of cost and time.
- Doubling overtime hours to meet planned progress

c. Very limited time constraints for the work process (workable days).

Risk Value 9 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Make a detailed work plan so that each job can be monitored directly.
- Make a list of priority work drawings in the field.
- Adding manpower and increasing overtime.

d. Project rescheduling.

Risk Value 9 (*Undesirable*)

Risk Type: *Risk Reduction*

Risk Mitigation:

- Make a schedule for the implementation of work that is effective in terms of cost and time.

- Making work methods more effective in terms of time and cost.

6. Environment

a. Physical conditions in a narrow field.

Risk Value 6 (*Undesirable*)

Risk Type: *Risk Reduction*
Risk Mitigation:
- Make a detailed material schedule so that the material placement can be monitored directly.

b. Difficult access for heavy equipment to be used during project implementation.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Transfer*
Risk Mitigation:
- Prepare alternative access to load heavy equipment and coordinate with related parties.
- Make a mapping of the implementation of work in the field so as not to interfere with project access roads.

c. Poor soil conditions.
Risk Value 6 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Doing more precise planning for the soil condition, given the reinforcement of the excavated soil.

d. Damage to surrounding buildings.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Make siring (can be made of galam specifically for the Banjarmasin area) for surrounding buildings to anticipate soil movements during the work process.
- Document the surrounding buildings before the work process begins.

7. External Factors
a. Incompatibility of drawings and technical specifications.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Coordinate with planners with RFI (Request For Information) to ensure the planning used.

b. High and erratic rainfall that hinders work.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Scheduling large work such as casting so as not to enter the rainy season from Climatology and Geophysics (BMKG) data regarding rainfall that is generally accepted around the project.

c. The occurrence of accidents due to the use of heavy equipment.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- The division of the jobdesk so as not to be overloaded with responsibilities is replaced by a more competent person so that the use of heavy equipment is in accordance with the procedures for using the equipment.

d. Coordination between contractors, planning consultants, supervisory consultants and owners is not going well.
Risk Value 9 (*Undesirable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Improve coordination between contractors, supervisory consultants, and the owner.
- Tighten supervision by supervisory consultants so that work is carried out as planned.

e. Unclear planning and specifications.
Risk Value 16 (*Unacceptable*)
Risk Type: *Risk Avoidance*
Risk Mitigation:
- Checking drawings and specifications prior to tender and execution of work.
- At the time of the tender, the contractor must evaluate the planning drawings and specifications that are not clear.

f. Restrictions on work due to covid.
Risk Value 12 (*Undesirable*)

Risk Type: *Risk Avoidance*
Risk Mitigation:
- Make a work plan and describe the division of work locations so that there is no accumulation of labor.

8. Change
a. There is a design change by the owner.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Carry out a re-calculation of the volume of work and propose work plus or minus to the owner.

b. There is a change in design due to adjustments to conditions in the field.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Coordinate between contractors, supervisory consultants and planning consultants with the owner's approval to then make changes to the design according to real conditions in the field.

c. Changes in planning and specifications.
Risk Value 12 (*Undesirable*)
Risk Type: *Risk Avoidance*

Risk Mitigation:
- Checking and correcting working drawings and specifications prior to tendering so as to minimize changes in project implementation.

d. Lots (often) additional work.
Risk Value 16 (*Unacceptable*)
Risk Type: *Risk Reduction*
Risk Mitigation:
- Checking drawings/image changes and specifications prior to tender by the owner so that there are not many changes to images/added work that occurs.
- At the time of tender, the contractor must evaluate the lack of drawings and planning specifications.
- Changes to the design drawings were made prior to the tender by the owner so that there were not many changes to the work.
- Coordinate between contractors, supervisory consultants, planning consultants with the owner's approval to then make changes to the design according to the field.

Based on the data, there are 43 risk factors with 2 risks accepted for Unacceptable, and 41 Undesirable risks. While the type of risk is avoiding risk (risk avoidance) as much as 16, reducing risk (risk reduction) as much as 22, and transferring risk (risk transfer) as much as 5, while the type of risk withholding/accepting risk (risk retention) does not exist because it does not include risks that require mitigation. Mitigation actions are carried out to reduce the negative impact of risks that are included in the dominant risk category (major risk).

From the strategy made in data which describes risk management or risk mitigation on the dominant factor. From this it can be concluded that the main strategies are grouped into:
1. Checking planner drawings and specifications prior to tender, and proper planning. This mitigation action will address risk factors such as:
a. Unclear planning and specifications
b. Lots (often) additional work
c. Poor soil conditions.
d. Damage to surrounding buildings.
e. There is a design change by the planner.
f. There are design changes due to adjustments to conditions in the field.
g. Changes in planning and specifications.
h. Inconsistency of drawings and technical specifications.
2. Make a stricter work schedule/method (man power) and division of job desks. This mitigation action will address risk factors such as:
a. Lack of availability of competent manpower
b. Low worker productivity
c. Fatigue due to a lot of work done overtime.
d. Lack of quality of work due to weak field supervision.
e. Lack of quality of work due to not following and carrying out input and instructions from field supervisors.

f. Work restrictions due to covid.
3. Placing Special Security Officers for OHS Officers. This mitigation action will address risk factors such as:
a. Workers do not use safety equipment at work.
b. There are workers who are sick or have an accident.
4. Make a schedule for equipment arrivals, schedule equipment maintenance, bring in equipment technicians, and look for alternative replacement tools. This mitigation action will address risk factors such as:
a. Lack of equipment.
b. Repeated use of the tool affects the quality of the tool.
c. Device delivery delay.
d. Lack of completeness of project use equipment that can cause accidents.
e. The use of old heavy equipment, so that it often breaks down and slows down performance.
f. The use of equipment facilities (attachment) is not in accordance with the guidelines.
g. Accidents occur due to the use of heavy equipment.
5. Mapping material placement in the field, calculating material stock requirements, material arrival schedules, and alternative material delivery. This mitigation action will address risk factors such as:
a. Limited availability of materials.
b. Delay in material delivery from suppliers.
c. Mismatch between the volume of work in the BQ and field conditions.
d. An escalation or increase in the price of building materials during the construction period.
e. Frequent changes in material specs by the owner
f. Procurement of materials that do not comply with technical specifications.
g. Damage or loss of material.
h. Limited placement of materials.
i. Physical conditions in a narrow field.
j. Difficult access for heavy equipment to be used during project implementation.
6. Making detailed work plans, monitoring materials, improving work methods, and holding project coordination meetings. This mitigation action will address risk factors such as:
a. Lack of project management implementation.
b. Sudden relocation of equipment or labor.
c. Incorrect implementation method.
d. Errors in structural calculations and analysis.
e. Heavy and erratic rainfall that hinders work.
f. Coordination between contractors, planning consultants, supervisory consultants, and owners is not going well.
g. Time used to create working drawings is limited/inadequate.
h. Loss of time due to wrong procedures/methods in implementation.
i. Very limited time constraints for workable days work process).
j. Project rescheduling.

V. CLOSING

1. Conclusion

1. From the risk identification, in the implementation of the 7-floor home office building project PT. Goautama Sinarbatuah in densely populated areas identified 43 risks based on activities at the project implementation stage. Identified risks consists of 8 risk categories, namely Human (Man), Equipment, Material, Method, Time, External Factors, and Change. From the results of 8 risk categories with 43 factors risk is the dominant risk in the implementation of the 7 floor home office PT. Goautama Sinarbatuah, a Banjarmasin veteran, is in a congested area resident.

3. In terms of acceptance, where the risks that have a risk value between 5-25. There are 2 unacceptable risks and categories unexpected (undesirable) as many as 41 risks with the most risk comes from material risk. Where are the risks included unacceptable and undesirable which are included in the dominant risk category (major risk) on the implementation of the 7-floor home office building project PT. Goautama Sinarbatuah Banjarmasin in a densely populated area. For the type of risk you get too can be grouped into types of risk avoiding risk (risk avoidance) as many as 16 risks, reducing the risk (risk reduction) as much as 22 risks, transfer risk as many as 7 risks, while the types of risk holding/accepting risk (risk retention) does not exist because it is not included risks that require mitigation.
The strategy that must be carried out and the most important in this researchaccording to the conditions or facts in the field are:

a. Checking planner drawings and specifications before bidding, and proper planning.
b. Making a tighter work schedule/method (man power) job desk division of work.
c. Placing Special Security Officers for K3 Officers.
d. Make a schedule for equipment arrivals, equipment maintenance schedules, bring in equipment technicians, and look for alternative replacement tools.
e. Make a mapping of the placement of materials in the field, carry out calculation of material stock requirements, material arrival schedule, as well as alternative material delivery.
f. Make detailed work plans, material monitoring, repairs working methods, as well as holding project coordination meetings.

2. Suggestion

Based on the results of research and analysis as well as interviews that have been carried out, the suggestions that can be submitted are as follows:

1. The level of risk that falls into the category of Unacceptable must be get more attention to reduce the negative impacts that generated, so that there is no swelling in terms of cost, quality, and time that will harm the contractor and the owner (private).
2. This research can be continued with quantitative risk analysis, so that the impact of measurable risk is clearer on the uncertainty associated with implementation of high-rise building construction projects in congested areas residents, as well as on private projects.
3. Based on the results of this study, it is expected to be a guide for identify risks, and take mitigation actions for research further, and can be input for related parties in the implementation of high-rise building construction projects in the area densely populated, as well as on private projects.

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