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RISK MANAGEMENT IN THE JABODEBEK LRT (LIGHT RAIL TRANSIT) DEVELOPMENT PROJECT, IN JAKARTA AND ITS NEIGHBOURING CITIES

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ABSTRACT

LRT (Light Rail Transit) is one solution for an environmentally friendly transportation system to overcome congestion problems that occur in Jakarta. This mass transportation is considered effective because there is less land in the capital for road construction. The project is a complex project that includes design, material procurement and construction. The development that is currently underway is cross-service 1 (Cawang-Cibubur), cross-service 2 (Cawang-Dukuh Atas) and cross-service 3 (Cawang-Bekasi East). This study aims to determine the risks that often arise and find out the right way to handle the risks that arise in the construction of the JABODEBEK LRT project. Data was collected using a questionnaire on 45 respondents who were involved in the construction of the JABODEBEK LRT project. The variables studied in this study are aspects of scheduling planning, aspects of scope and work documents (contracts), aspects of organizational systems, coordination and communication, aspects of resource readiness/preparation, aspects of inspection systems, work control and evaluation and other aspects (force majeure /beyond the ability of the owner and contractor). Data processing in this study used the SPSS version 25 program. This study discusses seven variables classified as high risk (H) in the project.

Keywords*: LRT (Light Rail Transit), Cross Services 1, 2 and 3, Comparative Analysis, SPSS v.25 Test.*

1. PRELIMINARY

The development of Jakarta as the capital city of Indonesia is growing rapidly and has become one of the busiest cities in the world. Even with the current conditions, Jakarta continues to improve in every way, especially in improving various facilities and infrastructure, especially public transportation, considering that public transportation is crucial for this city. Light Rail Transit JABODEBEK or abbreviated as LRT JABODEBEK is a Mass Transit system with light rail (LRT) which is currently under

construction in Jakarta and connects Jakarta with surrounding cities such as Bekasi and Bogor. There will be 6 LRTs in JABODEBEK, namely Cibubur-Cawang, Bekasi Timur-Cawang, Cawang-Dukuh Atas, Cibubur-Bogor, Dukuh Atas-Palmerah-Senayan and Palmerah-Grogol. Each stage of the project cannot be separated from various risks that affect both in terms of quality. This research was conducted to determine the risks that exist in the Light Rail Transit (LRT) project.

Key Issues

The key issues that are drawn from this analysis are:

1. What risks are expected to arise frequently in Light Rail Transit (LRT) construction projects?
2. What are the appropriate measures in dealing with risks arising in the work of the Light Rail Transit (LRT) construction project?

Objectives

The objectives of this research are as follows:

1. To find out the risks that often arise in the construction of the JABODEBEK LRT project.
2. To find out the right way to handle the risks that arise in the JABODEBEK LRT project.

2. THEORETICAL FRAMEWORK

Construction project

A construction project is a series of activities that are carried out only once and are generally short-term and have a clear start and end time. In this series of activities, there is a process that processes project resources into a result of activities in the form of buildings.

Definition of Risk

Risk can be defined as the opportunity for an adverse event to occur due to the uncertainty of what will be faced. Uncertainty is a potential change that will occur in the future as a consequence of the inability to know what will happen, if an activity is carried out at this time, Chapman et al (2003) emphasized that it is very important to place uncertainty as a starting point in risk management.

Risk identification

Risk identification is the initial stage in risk management which aims to be able to describe and detail the types of risks that may occur from the activities or activities that we will carry out. Risk identification is carried out based on the description of the planned activities to be carried out and is guided by changes/uncertainties from various existing risk sources. This risk identification stage is the most difficult and most decisive stage in risk management. This difficulty is caused by the inability to identify all the risks that will arise given the uncertainty of what will be faced.

Formatting risk map

By knowing the existing risk level, then the existing risks can be mapped into a risk map. This Risk Map shows the location of the risk based on its level. The risk map will be used in the next stage to evaluate the existing risks. The following is an image of the Probability and Impact Matrix.

Likelihood	Severity	Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
Rare (1)		Low (1x1)	Low (1x2)	Low (1x3)	Low (1x4)	Medium (1x5)
Unlikely (2)		Low (2x1)	Low (2x2)	Medium (2x3)	Medium (2x4)	High (2x5)
Possible (3)		Low (3x1)	Medium (3x2)	Medium (3x3)	High (3x4)	High (3x5)
Likely (4)		Low (4x1)	Medium (4x2)	High (4x3)	High (4x4)	Very High (4x5)
Almost Certain (5)		Medium (5x1)	High (5x2)	High (5x3)	Very High (5x4)	Very High (5x5)
Adapted from the AS/NZ 4360 Standard Risk Matrix and NHS QIS Risk Matrix						

Figure 1. Opportunity – Impact Matrix

3. METHODOLOGY

Research steps

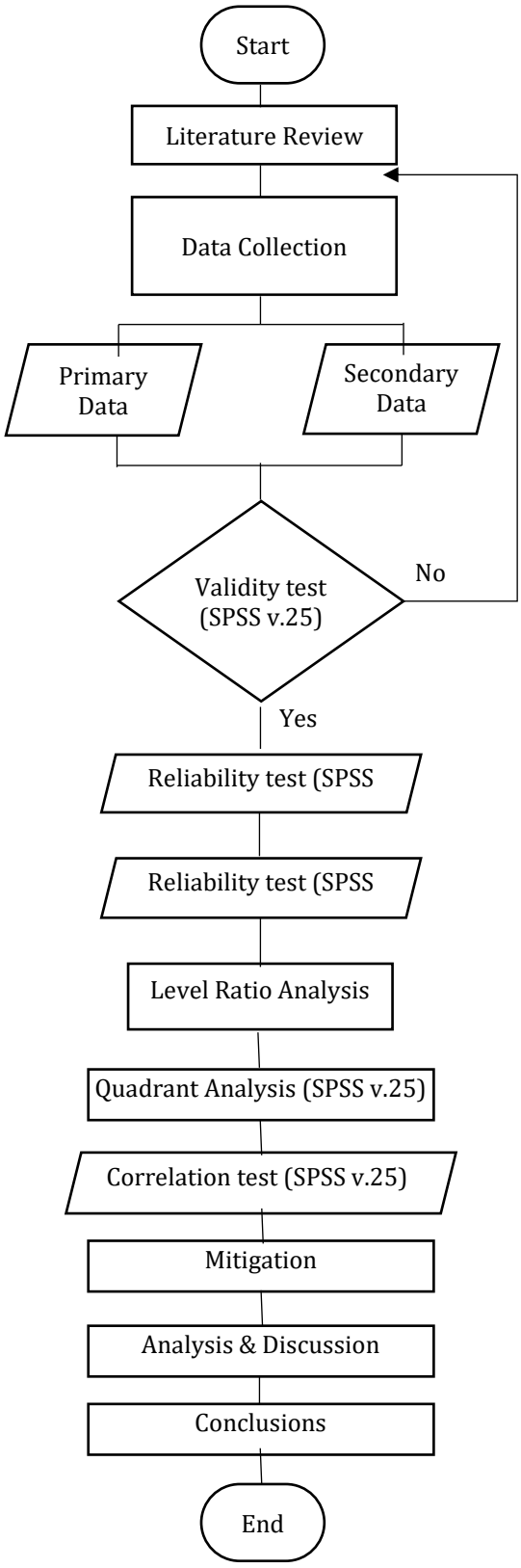

Figure 2. Research Flowchart

Research variables

Table 1. Research variables

Variable	Code	Sub Indicator
Aspects of Scheduling Planning	X1	Very strict project schedule determination by the owner
	X2	Incomplete identification of the type of work that must exist
	X3	The work order plan is not well organized/integrated
	X4	Inaccurate determination of working time duration
	X5	The owner's work plan changes frequently
	X6	Wrong or incorrect construction/work execution methods
Aspects of Scope and Documents of Work (contract)	X7	Incorrect/incomplete planning (drawings/specifications)
	X8	Changes in design/work details during execution
	X9	Changes in the scope of work at the time of implementation
	X10	The process of making working drawings by contractors
	X11	Process of requesting and approval of working drawings by owner
	X12	Disagreement of working drawing rules
	X13	There is a lot (often) additional work

	X14	There is a request for changes to the work that has been completed
Organizational Aspects, Coordination and Communication System	X15	Limited authority of owner personnel in decision making
	X16	Qualifications of personnel/owners who are not professional in their field
	X17	Bureaucratic way of inspection and control of work by the owner
	X18	Owner's failure to coordinate the work of many contractors/subcontractors
	X19	Owner's failure to coordinate land transfer/use
	X20	Delay in supply of tools/materials etc. provided by owner
	X21	Poor technical and managerial qualifications of personnel in contractor work organizations
	X22	Poor coordination and communication between sections in the contractor's work organization
	X23	Accident at work
Aspects of Alertness / Resource Preparation	X24	Slow Mobilization of Resources (materials, tools, labor)
	X25	Lack of expertise and skills and work motivation of workers directly in the field
	X26	Inadequate number of workers/according to existing work activities
	X27	Unavailability of materials with sufficient certainty/appropriateness as needed
	X28	Negligence / Delay by sub-contractor work
	X29	Funding of project activities that are not well planned (difficulty in funding in contractors)
	X30	The contractor is not paid properly according to his rights (difficulty in payment by the owner)
Aspects of Work Inspection, Control and Evaluation System	X31	Submission of samples of materials by contractors who are not scheduled
	X32	Process for requesting and approving material samples by the former owner
	X33	The process of testing and evaluating the material test from the owner is not relevant
	X34	Long-winded work permit approval process

	X35	Failure of the contractor to carry out the work
	X36	Many works have to be repaired/reworked because they are defective/incorrect
	X37	Processes and procedures for evaluating the progress of work that are long and past the agreed schedule
Miscellaneous Aspects (Force Major/beyond the ability of Owner and Contractor)	X38	Site conditions and environment did not match expectations
	X39	Transportation to difficult project sites
	X40	Unforeseen events such as fire, flood, storm/hurricane, earthquake, landslide, severe weather
	X41	Labor strike
	X42	Riot or war
	X43	The occurrence of damage/damage due to negligence or the actions of a third party
	X44	Changes in the government's political/economic situation or policy

4. DISCUSSION

Collecting data

Primary data collection is the collection of data taken directly from the field. This data collection was carried out by distributing questionnaires to contractors handling design-and-build contracts who are working on LRT (Light Rail Transit) construction projects. Respondents taken for this study were 45 respondents.

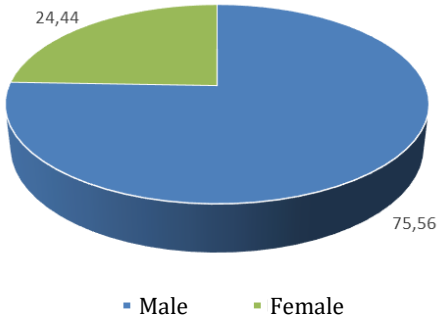

Figure 3. Respondents' sex

Based on Figure 3, respondents are male with a percentage of 75.56% and female with a percentage of 24.44%.

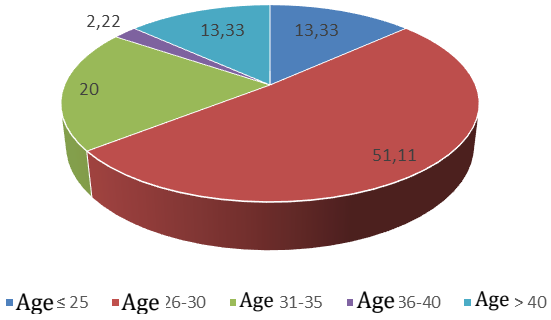

Figure 4. Respondents' age

Based on Figure 4, respondents aged 25 years are 13.33%, aged 26-30 years are dominant with a percentage of 51.11%, aged 31-35 years are 20%, aged 36-40 years are 2.22% and aged >40 years are 13.33%.

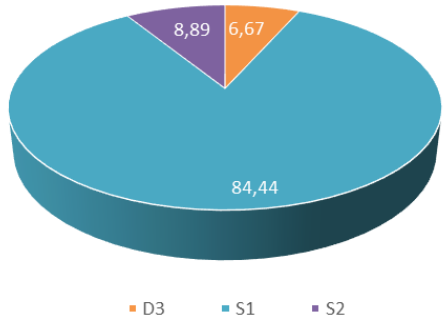

Figure 5. Respondents' education level

Based on Figure 5, respondents with the latest education D3 (diploma degree graduates) are 6.67%, S1 (Undergraduate degree graduates) are 84.44% and S2 (Post Graduate degree graduates) are 8.89%.

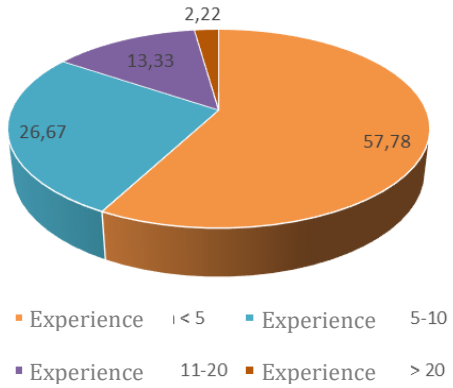

Figure 6. Respondents' work experience

Based on Figure 6, respondents with work experience <5 years are 57.78%, 5-10 years work experience is 26.67%, 11-20 years work experience is 13.33% and work experience >20 years is 2.22%.

Data analysis

a. Validity test

The results of testing the validity of the probability and impact questionnaire that have tabulated the data. The following are the results of data processing using the help of the SPSS program:

Tabel 2. Validity test data (Probability)

Variable	Item	r table	r count	Re-mark
Aspects of Scheduling Planning	X1	0.294	0.462	Valid
	X2		0.512	Valid
	X3		0.446	Valid
	X4		0.474	Valid
	X5		0.361	Valid
	X6		0.601	Valid
Aspects of Scope and Documents of Work (contract)	X7		0.534	Valid
	X8		0.389	Valid
	X9		0.523	Valid
	X10		0.788	Valid
	X11		0.706	Valid
	X12		0.407	Valid
	X13		0.419	Valid
	X14		0.484	Valid
Aspects of Organizational, Coordination and Communication System	X15		0.362	Valid
	X16		0.637	Valid
	X17		0.398	Valid
	X18		0.572	Valid
	X19		0.792	Valid
	X20		0.607	Valid
	X21		0.715	Valid
	X22		0.670	Valid
	X23		0.722	Valid
Aspects of Alertness / Resource Preparation	X24		0.741	Valid
	X25		0.778	Valid
	X26		0.618	Valid
	X27		0.806	Valid
	X28		0.619	Valid
	X29		0.429	Valid
	X30		0.584	Valid
Aspects of Work Inspection, Control and Evaluation System	X31		0.693	Valid
	X32		0.441	Valid
	X33		0.542	Valid
	X34		0.429	Valid
	X35		0.658	Valid
	X36		0.596	Valid
	X37		0.644	Valid
Miscellaneous Aspects (Force Major/beyond the ability of Owner and Contractor)	X38		0.653	Valid
	X39		0.680	Valid
	X40		0.519	Valid
	X41		0.438	Valid
	X42		0.634	Valid
	X43		0.773	Valid
	X44		0.562	Valid

Tabel 3. Validity Test Data (Impact)

Variable	Item	r table	r count	Remark
Aspects of Scheduling Planning	Y1	0.294	0.548	Valid
	Y2		0.438	Valid
	Y3		0.771	Valid
	Y4		0.385	Valid
	Y5		0.393	Valid
	Y6		0.461	Valid
Aspects of Scope and Documents of Work (contract)	Y7		0.520	Valid
	Y8		0.461	Valid
	Y9		0.507	Valid
	Y10		0.490	Valid
	Y11		0.526	Valid
	Y12		0.624	Valid
	Y13		0.411	Valid
	Y14		0.634	Valid
Aspects of Organizational, Coordination and Communication System	Y15		0.782	Valid
	Y16		0.673	Valid
	Y17		0.395	Valid
	Y18		0.756	Valid
	Y19		0.582	Valid
	Y20		0.533	Valid
	Y21		0.695	Valid
	Y22		0.530	Valid
	Y23		0.640	Valid
Aspects of Alertness / Resource Preparation	Y24		0.405	Valid
	Y25		0.438	Valid
	Y26		0.771	Valid
	Y27		0.385	Valid
	Y28		0.547	Valid
	Y29		0.449	Valid
	Y30		0.520	Valid
Aspects of Work Inspection, Control and Evaluation System	Y31		0.407	Valid
	Y32		0.507	Valid
	Y33		0.611	Valid
	Y34		0.568	Valid
	Y35		0.624	Valid
	Y36		0.308	Valid
	Y37		0.634	Valid
Miscellaneous Aspects (Force Majeure/beyond the ability of Owner and Contractor)	Y38		0.782	Valid
	Y39		0.663	Valid
	Y40		0.395	Valid
	Y41		0.739	Valid
	Y42		0.592	Valid
	Y43		0.530	Valid
	Y44		0.701	Valid

b. Reliability test

The results of the reliability test from the probability and impact questionnaire that have been tabulated by the data. The following are the results of data processing using the help of the SPSS program:

Table 4. Reliability (probability) test result

Reliability Statistics

Cronbach's Alpha	N of Items
,938	44

Table 5. Reliability (impact) test result

Reliability Statistics

Cronbach's Alpha	N of Items
,937	44

c. Normalization test

Normalization test is a sample testing method to determine the level of normality of an answer from respondents. The purpose is to assess data in a group of data or variables used in research, whether the data distribution is normal.

The results of the normalization test using the IBM SPSS V.25 program can be seen in the table below:

Table 6. Normality test result (Probability and impact)

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Probabilitas	,087	45	,200*	,959	45	,112
Dampak Risiko	,098	45	,200*	,968	45	,255

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

From the results in table 6 it can be seen that the Sig Shapiro-Wilk value on the probability and impact indicator shows a significance value > 0.05, which means that the sample is normally distributed.

d. Risk level analysis

The risk level analysis is carried out on the risk level index, where the risk level index is the product of probability and impact. The risk level index is divided into 3 (three) risk levels, namely low (L), medium (M) and high (H). Based on the level of risk, it is represented in green for low risk levels, yellow for medium risk levels and red for high risk levels. The division of the 3 levels is evaluated based on the dominant value of the frequency of opportunity x the dominant value of the frequency of impact.

Table 7. Probability – Impact Matrix

Likelihood / Severity	Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
Rare (1)	Low (1x1)	Low (1x2)	Low (1x3)	Low (1x4)	Medium (1x5)
Unlikely (2)	Low (2x1)	Low (2x2)	Medium (2x3)	Medium (2x4)	High (2x5)
Possible (3)	Low (3x1)	Medium (3x2)	Medium (3x3)	High (3x4)	High (3x5)
Likely (4)	Low (4x1)	Medium (4x2)	High (4x3)	High (4x4)	Very High (4x5)
Almost Certain (5)	Medium (5x1)	High (5x2)	High (5x3)	Very High (5x4)	Very High (5x5)

Adapted from the AS/NZ 4360 Standard Risk Matrix and NHS QIS Risk Matrix

Analysis of the level of risk in the Jabodebek LRT construction work can be seen based on the following table:

Table 8. Risk Level Analysis

No.	Variable	Sub Indicator	Prob. Domination Freq.	Impact Domination Freq.	Risk (prob. x Impact)	Risk Level
1	Aspects of Scheduling Planning					
	X1	Very strict project schedule determination by the owner	5	4	20	H
	X2	Incomplete identification of the type of work that must exist	2	4	8	M
	X3	The work order plan is not well organized/integrated	2	4	8	M
	X4	Inaccurate determination of working time duration	3	3	9	M
	X5	The owner's work plan changes frequently	5	4	20	H
	X6	Wrong or incorrect construction/work execution methods	3	3	9	M

2	Aspects of Scope and Documents of Work (contract)					
	X7	Incorrect/incomplete planning (drawings/specifications)	4	3	12	H
	X8	Changes in design/work details during execution	4	4	16	H
	X9	Changes in the scope of work at the time of implementation	2	4	8	M
	X10	The process of making working drawings by contractors	5	4	20	H
	X11	Process of requesting and approval of working drawings by owner	5	4	20	H
	X12	Disagreement of working drawing rules	3	3	9	M
	X13	There is a lot (often) additional work	4	3	12	H
	X14	There is a request for changes to the work that has been completed	3	3	9	M
3	Organizational Aspects, Coordination and Communication System					
	X15	Limited authority of owner personnel in decision making	2	4	8	M
	X16	Qualifications of personnel/owners who are not professional in their field	2	4	8	M
	X17	Bureaucratic way of inspection and control of work by the owner	3	3	9	M
	X18	Owner's failure to coordinate the work of many contractors/subcontractors	3	3	9	M
	X19	Owner's failure to coordinate land transfer/use	3	3	9	M
	X20	Delay in supply of tools/materials etc. provided by owner	3	3	9	M
	X21	Poor technical and managerial qualifications of personnel in contractor work organizations	3	3	9	M

	X22	Poor coordination and communication between sections in the contractor's work organization	3	3	9	M
	X23	Accident at work	1	4	4	L
4	Aspects of Alertness / Resource Preparation					
	X24	Slow Mobilization of Resources (materials, tools, labor)	2	4	8	M
	X25	Lack of expertise and skills and work motivation of workers directly in the field	3	3	9	M
	X26	Inadequate number of workers/according to existing work activities	3	3	9	M
	X27	Unavailability of materials with sufficient certainty/appropriateness as needed	3	3	9	M
	X28	Negligence / Delay by sub-contractor work	3	3	9	M
	X29	Funding of project activities that are not well planned (difficulty in funding in contractors)	3	3	9	M
	X30	The contractor is not paid properly according to his rights (difficulty in payment by the owner)	3	3	9	M
5	Aspects of Work Inspection, Control and Evaluation System					
	X31	Submission of samples of materials by contractors who are not scheduled	2	4	8	M
	X32	Process for requesting and approving material samples by the former owner	2	4	8	M
	X33	The process of testing and evaluating the material test from the owner is not relevant	3	3	9	M
	X34	Long-winded work permit approval process	3	3	9	M

	X35	Failure of the contractor to carry out the work	3	3	9	M
	X36	Many works have to be repaired/re-worked because they are defective/in-correct	3	3	9	M
	X37	Processes and procedures for evaluat-ing the progress of work that are long and past the agreed schedule	3	3	9	M
6	Miscellane-ous Aspects (Force Ma-jor/beyond the ability of Owner and Contractor)					
	X38	Site conditions and environment did not match expectations	3	3	9	M
	X39	Transportation to difficult project sites	1	4	4	L
	X40	Unforeseen events such as fire, flood, storm/hurricane, earthquake, land-slide, severe weather	3	3	9	M
	X41	Labor strike	2	3	6	M
	X42	Riot or war	2	3	6	M
	X43	The occurrence of damage/damage due to negligence or the actions of a third party	1	3	3	L
	X44	Changes in the government's politi-cal/economic situation or policy	3	3	9	M

Based on table 8 high risk (H) consists of 7 variables (15.91%), medium risk (M) is 34 variables (77.27%), and low risk (L) is 3 variables (6.82%). So it can be con-cluded that the Jabodebek LRT project work has a high risk.

The following are the results of the quad-rant analysis of the data processing using the SPSS program:

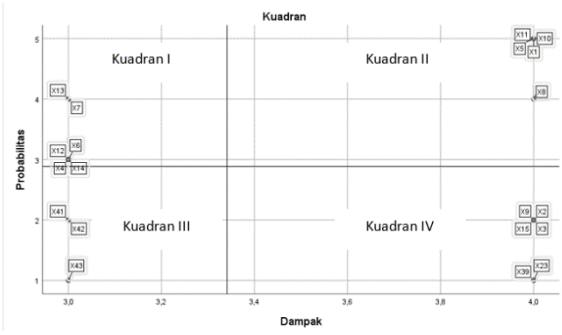

Figure 7. Quadrant Analysis Cartesian Diagram

The order of the most dominant risks in the Jabodebek LRT project work is as follows:

Table 9. Level Risk Sequence

		Sub Indicator	Risk
1	X1	Very strict project schedule determination by the owner	20
2	X5	The owner's work plan changes frequently	20
3	X10	The process of making working drawings by contractors	20
4	X11	Process of requesting and approval of working drawings by owner	20
5	X8	Changes in design/work details during execution	16
6	X7	Incorrect/incomplete planning (drawings/specifications)	12
7	X13	There is a lot (often) additional work	12

e. Correlation analysis
Correlation analysis is used to determine the relationship between variable X (probability) and variable Y (risk impact).
The results of the correlation analysis using the IBM SPSS V.25 program can be seen in table 10 below:

Table 10. Correlation Analysis

Correlations

		Probabilitas	Dampak Risiko
Probabilitas	Pearson Correlation	1	,416**
	Sig. (2-tailed)		,004
	N	45	45
Dampak Risiko	Pearson Correlation	,416**	1
	Sig. (2-tailed)	,004	
	N	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

Based on table 10 shows a significance value of 0.004 or a significance <0.05, then the correlation and the relationship between the two variables is a moderate correlation of 0.416.

High risk handling according to managerial peers

The next step is to conduct interviews with three managerial peers related to the work with the aim of obtaining information regarding the control of high risks that occur in the work of the Jabodebek LRT project. Qualifications of experts based on positions in the projects involved in this project are Project Manager, Deputy Project Manager and Project Engineering Manager. The dominant answer from the respondent is the best decision that is considered to reduce the level of risk that occurs. The results of the questionnaire obtained are as follows:

Table 11. High Risk Handling Questionnaire

	Code	Sub Indicator	Respondents' answers			Dominant Answer
			R1	R2	R3	
1	X1	Very strict project schedule determination by the owner	Risks that arise Delayed work **Handling**: speed up material procurement contracts and subcontract work	Risks that arise Delayed work Handling: speed up approval of drawings and materials to pursue a predetermined schedule	Risks that arise: Work pending Handling: Survey of overdue work and speeding up approval of drawings and materials	speeding up approval of drawings and materials
2	X5	The owner's work plan changes frequently	Risks that arise: design changes Handling: make an action plan that is coordinated with related parties regarding the change	Risks that arise: design changes Handling: Speeding up the design related to requests for plan changes from the owner if it has not been backed up by the planner by hiring a third-party planner	Risks that arise: design changes Handling: Observe changes of work plan from the owner and immediately making an action plan	immediately make an action plan regarding changes to the work plan carried out by the owner
3	X10	The process of making working drawings by contractors	Risks that arise: delayed drawing approval Handling: Increase the number of drafters if there are many drawings that have simultaneous urgency	Risks that arise: delayed drawing approval Handling: Control the progress of each drafter and make a target for completion of the drawing and if needed, add more drafters	Risks that arise: delayed drawing approval Handling: Request assistance from specialist subcon if needed regarding detailing specialist drawings such as sandwich panels, ceilings, curtain walls etc.	add more drafters and make a target for completion of the drawing
4	X11	Process of requesting and approval of working drawings by owner	Risks that arise: delayed drawing approval Handling: Monitoring the technical	Risks that arise: delayed drawing approval Handling: Inform the technical administration of the consultant if there are draw-	Risks that arise: delayed drawing approval Handling: Speeding up drawing assistance to expert consultants	Monitoring the technical administration of the consultant so that the drawing is immediately followed up if there is an approval problem

			administration of the consultant so that the drawing is immediately followed up if there is an approval problem	ings that need acceleration to be approved immediately		
5	X8	Changes in design/work details during execution	Risks that arise: Delayed drawing approval Handling: Speeding up the design process by involving specialist subcons such as sandwich panels, ceilings etc.	Risks that arise: Delayed drawing approval Handling: Speeding up drawing assistance from expert consultants	Risks that arise: Delayed drawing approval Handling: Coordinate design changes with the relevant team and if needed, assist from specialist subcons to be immediately coordinated	Speeding up drawing assistance from specialist sub con consultants
6	X7	Incorrect/incomplete planning (drawings/specifications)	Risks that arise: Work in the field goes wrong and there is a risk of material loss Handling: Immediately revise the drawing following the request from the expert consultant and the owner must be informed if there are additional specifications	Risks that arise: Work in the field goes wrong and there is a risk of material loss Handling: Coordinate the matter to the engineering team and immediately make changes to drawings/specifications to be immediately submitted for the approval process	Risks that arise: Work in the field goes wrong and there is a risk of material loss Handling: Complete drawings/specifications as soon as possible and immediately submit for approval	Equipped with drawings/specifications according to directions from expert consultants and immediately submitted for the approval process

7	X13	There is a lot (often) additional work	Risks that arise: Delayed drawing approval Handling: Immediately revise the drawing and submit it for the approval process both in terms of drawings and materials	Risks that arise: Delayed drawing approval Handling: Speed up the drawing revision process and distribute information about the added work both internally and externally	Risks that arise: Delayed drawing approval Handling: Revise drawings and inform additional material so that it can be processed for submitting approval to expert consultants	Handling: Revise the image for immediate submission of the approval process and notify the additional costs incurred for approval

5. CONCLUSIONS

From the results obtained through the stages of the research process regarding the JABODEBEK LRT (Light Rail Transit) development project, it can be concluded as follows:

1. The JABODEBEK LRT (Light Rail Transit) development project has a high level of risk based on the analysis in table 8, namely high risk (H) totaling 7 variables (15.91%), moderate risk (M) totaling 34 variables (77.27%), and low risk (L) amounted to 3 variables (6.82%). The highest level of risk is the variable:

a. X1: very strict project schedule setting by the owner
b. X5: owner's work plan that changes frequently
c. X10: the process of making working drawings by contractors
d. X11: process of requesting and approval of working drawings by the owner with a risk value of 20 each.

2. How to handle the high risks that arise in the JABODEBEK LRT (Light Rail Transit) construction project, namely:

a. X1: very strict project schedule setting by the owner
   - Accelerate approval of drawings and materials.
b. X5: owner's work plan that changes frequently
   - Immediately make an action plan regarding changes to the work plan carried out by the owner.
c. X10: the process of making working drawings by contractors
   - Increasing the number of drafters and giving the completion target of each drafter.
d. X11: process of requesting and approval of working drawings by the owner
   - Monitoring and informing the technical administration of the consultant if there are drawings that need acceleration for immediate approval.

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