



Analysis of Risk Management that Affects The Reconstruction Project of The West Java Provincial Road Section using The Severity Index (SI) Method

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ABSTRACT

Road damage on provincial roads in Cirebon Regency disrupts community mobility and has the potential to cause accidents. This problem requires reconstruction measures to improve transportation safety and efficiency. This study aims to identify the dominant risks affecting the implementation of provincial road reconstruction projects in West Java using the Severity Index (SI) method. The research approach used is quantitative. Data were collected through a questionnaire survey distributed to project owners, consultants, and contractors directly involved. Severity Index method was applied to assess and calculate risks based on probability impact matrix (PIM). From the analysis, 12 risk factors with 22 risk variables were found to have high severity and unacceptable. These risks include political, environmental, planning, financial, and technical aspects, which have a significant effect on project time, cost, and quality. Provincial road reconstruction in West Java faces various risks that must be effectively managed to achieve success. Proposed risk mitigation includes expert consultation, development of a coordination plan, and worker training to improve communication and safety awareness. These measures are expected to ensure the project goes according to plan and minimize any negative impacts that may occur.

Keywords: Risk Management, Quantitative, Severity Index.

INTRODUCTION

West Java Province is establishing a new area in Cirebon as part of metropolitan urban development (Atharinafi & Wijaya, 2021; Supriyadi Rustidja, 2018). According to the WJP-MDM in May 2013, the area was named Metropolitan Cirebon Raya, supported by the West Java Provincial RT/RW 2009-2029. Cirebon City and Cirebon Regency are designated as PKN with a strategic position bordering Central Java Province and having 200 agricultural areas (Lestari et al.,

2017). In the development of the Greater Cirebon Metropolitan urban area, the construction of inter-provincial border roads and reconstruction of road sections, many of which are damaged, which results in disrupted community mobility and can lead to accidents, therefore the Head of the UPTD of Road and Bridge Management Service Area VI of the West Java Provincial Bina Marga and Spatial Planning Office of Cirebon Regency is reconstructing provincial roads. Delay is the most common project problem, some things to consider when implementing a construction project are time, cost, and quality (Gaurang, 2020; Hoque et al., 2023). Ultimately, there are risks both expected and unexpected. Identifying and calculating potential project risks is a way to manage risks (Moi & Purnawirati, 2021).

Construction business is growing in the era of globalization, and in the process, projects sometimes face several challenges, such as time, cost, and quality (Abyad, 2017; Jackson, 2020). The goal of the project is to be on time, cost within budget, and quality according to standard specifications (Cerezo-Narváez et al., 2020). Therefore, construction project management is a way to manage construction project activities, one of which is managing the risks that arise during the construction process (Setyawan et al., 2022).

Although many studies have been conducted on risk analysis in construction projects, there is still a lack of systematic and comprehensive application of the method in Indonesia, especially in the context of provincial road reconstruction in Cirebon (Agustina, 2021; Isradi, 2023). Most of the previous studies only focused on risk identification without providing concrete solutions to mitigate the identified risks (Kondo et al., 2025; Rybnicek et al., 2020). In addition, there are still limitations in combining various interconnected risk factors. This gap is a challenge for researchers and practitioners in the field of project management. This research seeks to fill the gap by applying the Severity Index method to analyze risks in provincial road reconstruction projects. With this approach, it is expected to provide a clearer picture of the risk factors affecting the project and relevant mitigation solutions.

This research offers a new approach by integrating the Severity Index method in risk analysis on provincial road reconstruction projects. By systematically identifying and analyzing risks, this research aims to make a significant contribution to construction project risk management in Indonesia. This approach is expected to provide more effective guidance for decision makers in project planning and execution. By using the SI method, this research can provide a more in-depth analysis of the risks faced, as well as assist in the development of more effective mitigation strategies. In addition, this research will also provide data-driven recommendations to improve risk management on road reconstruction projects.

The purpose of this research is to identify the dominant risks affecting the implementation of the provincial road reconstruction project in Cirebon and provide recommendations for effective mitigation solutions. Thus, this research is expected to serve as a guide for stakeholders in managing construction project risks. In addition, this research also aims to increase understanding of the importance of risk management in the context of infrastructure development. The benefits of this research include an increased understanding of the risks faced in road reconstruction projects, as well as providing mitigation strategies that can be applied to improve project efficiency

and effectiveness. The results of this research are expected to be a reference for decision makers in the infrastructure sector, as well as contribute to further research in the field of construction risk management.

RESEARCH METHOD

The research was conducted on a provincial road reconstruction project, this research focuses on a quantitative approach. Sugiyono (2020: 16) states that quantitative research, rooted in positivism, is used to determine a specific population or sample. This method collects data with research instructions and then analyzes it quantitatively or statistically to validate the hypothesis. Respondents were selected based on owners, consultants, and contractors who were directly involved in the provincial road reconstruction project. Questionnaires were distributed to respondents to present quantitative research. The method used is the severity index. The severity index method is used to determine how high-risk variables are related to work. Each risk factor must be treated to minimize the impact of the risk (Jaelani, 2019).

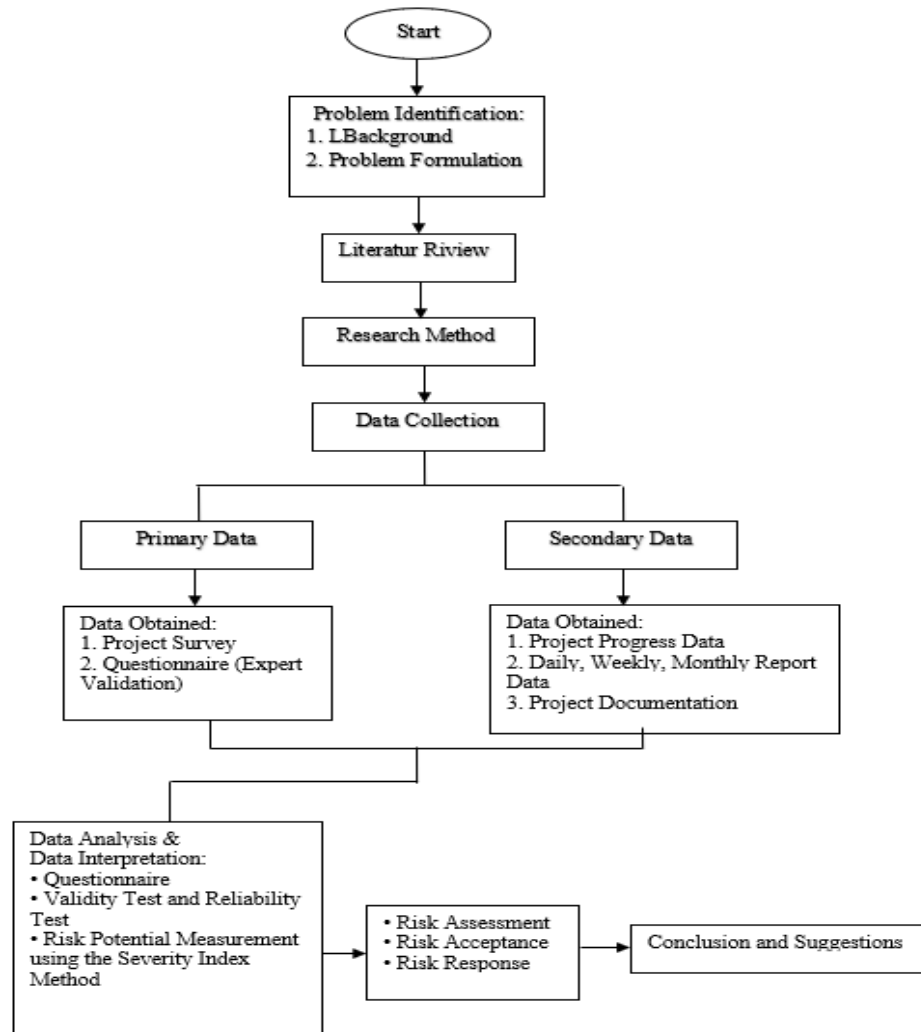


Figure 1. Research Flow

Research Object

This research was conducted on the reconstruction project of the West Java provincial road section. There are 6 project packages, namely Budur Road, Jatibarang Road, Waled Road, Jangga Road, Tegalgubug Road, and Kadipaten Road.

Data Collection

In data collection for research, data is needed:

1. Primary data obtained from field surveys, questionnaire data, and journal literature.
2. Secondary data obtained from project progress data and project documentation.

RESULTS AND DISCUSSION

This research will discuss the results of data analysis from a questionnaire survey distributed to selected respondents. The data is then processed using SPSS version 17 to produce research answers or outputs. In this research, 4 experts participated and gave their opinions on the implementation risks of the provincial road section reconstruction project. Their opinion is valid enough to be requested. After the questionnaire was validated by experts, 47 risk variables for frequency and impact were identified. This is a reduction from the previous 72 risk variables. This shows 47 variables, which are presented in the following table:

Table 1. Risk variable before validation by experts

Variable	Description
Political	
1	government policy
2	public Opinion
3	The input from other agencies has resulted in changes to the design and technical execution
4	Counterproductive mass media reporting
5	Lack of coordination among related agencies
6	The existence of changes in the structure/responsibilities of government agencies
7	The administrative system in government offices
Environment	
8	Pollution
9	Noise
10	Environmental impact
11	Community licensing
12	Environmental regulations/environmental impact requirements
13	The occurrence of road damage around the project
14	The level of traffic density around the project site
Planning	
15	Quality conformity with the specified specifications
16	topographic measurement, soil mechanics, and design
17	Licensing requirements
18	Land use planning
19	Social and economic impact
Marketing	
20	Demand for materials
21	Market competition
22	Customer satisfaction

Social Economy	
23	The occurrence of price escalation during the implementation of the project
24	Interest rates during the construction period
25	Exchange rate
26	Financial policy
27	Tax
28	Fuel price increase
29	Workers' demands for an inappropriate wage increase
30	The delay in payment of the installment by the owner to the contractor
Finance	
31	Bankruptcy
32	Insurance
33	Payment to subcontractors/suppliers is delayed
34	The contractor's cash flow is not smooth
35	The use of funds outside what is stated in the contract
36	High operational and overhead costs
37	Cost overruns
38	Construction Cost Estimate
Natural	
39	Weather
40	Earthquake
41	Flood at the location
42	Landslide
Project	
43	Quality planning and control
44	The demand for aggregate material is not being met due to the high demand for material at the quarry
45	Project management is still low
46	Delay in project material delivery
Technical	
47	Completeness of the design
48	Operational efficiency
49	Often reviewing designs
50	Inadequate work methods
51	Heavy equipment damage
52	Discrepancy between the work volume in the contract and the project conditions
Human	
53	Worker's mistake
54	Incompetent Worker
55	Worker's Negligence
56	Worker Culture
57	Workforce communication skills
58	Working in the dark/nighttime
59	The limitation in the number of workers
60	Labor strike
Criminal	
61	Destruction
62	Theft
63	Fraud

64	Corruption
65	Lack of security
Safety/OHS	
66	Lack of OHS application
67	The awareness of workers using OHS
68	Not using PPE
69	Hazardous substance
70	Explosion
71	Fire
72	Collapse

After expert validation, 28 risk variables were obtained for the provincial road reconstruction project in West Java that were not suitable. Besides that, the validator also added 3 risk variables. So that the variables totaling 72 questions become 47 questions that will be distributed to respondents. The following table has been validated by experts:

Table 2. Risk variables have been validated by expert

Variable	Description
Politician	
1	government policy
2	Counterproductive mass media reporting
3	Lack of coordination among related agencies
4	The existence of changes in the structure/responsibilities of government agencies
5	The administrative system in government offices
Environment	
6	Environmental regulations/environmental impact requirements
Planning	
7	Quality conformity with the specified specifications
8	Land use planning
9	Social and economic impact
Marketing	
10	Demand for materials
Social Economy	
11	The occurrence of price escalation during the implementation of the project
12	Interest rates during the construction period
13	Exchange rate
14	Financial policy
15	Social Conflict
Finance	
16	The contractor's cash flow is not smooth
17	The use of funds outside what is stated in the contract
18	High operational and overhead costs
19	Cost overruns
Natural	
20	Weather
21	Earthquake
22	Flood at the location

23	Landslide
24	Land subsidence
Project	
25	The demand for aggregate material is not being met due to the high demand for material at the quarry
26	Project management is still low
27	Delay in project material delivery
Technical	
28	Completeness of the design
29	Often reviewing designs
30	Inadequate work methods
31	Heavy equipment damage
Human	
32	Incompetent Worker
33	Worker Culture
34	Workforce communication skills
35	The limitation in the number of workers
36	Labor Strike
Criminal	
37	Destruction
38	Theft
39	Fraud
40	Corruption
41	Lack of security
Safety/OHS	
42	Lack of OHS application
43	Not using PPE
44	Hazardous substance
45	Explosion
46	Fire
47	Collapse

After the data collection and processing stage is complete, the results of this research will be presented. Before filling out the questionnaire, an explanation was provided about the purpose and objectives of this research. The number of research respondents is 35 people. The determination of the sample size was taken from a population of 53 with a 10% error tolerance rate and a 90% data accuracy level using the following formula:

$$n = N / (1 + N \cdot e^2)$$

Where :

n = Sample size

N = Population size

e = margin of error

Sample calculation

N = 53

e = 10%

$$n = 53 / (1 + 53 \times (0,1)^2)$$

= 34,64052

So from the sample calculation, using the Slovin formula, it resulted in 34,64052 rounded up to 35. Based on the results of the distributed questionnaire, the demographic data of the respondents can be detailed as follows, categorized by age, position, work experience, and education level. The obtained data will be explained in the form of the following table:

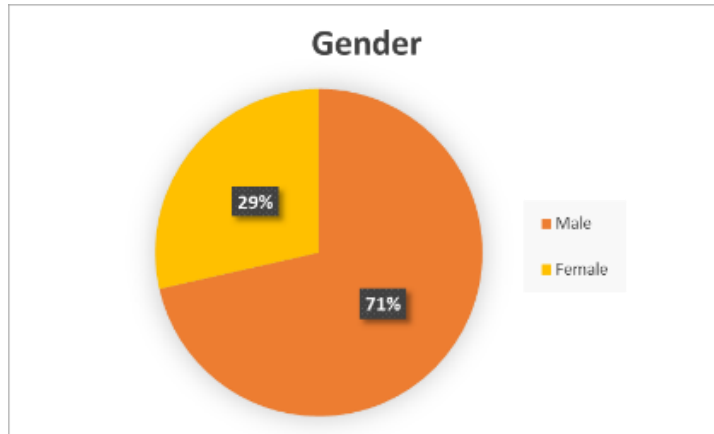


Figure 2. Gender classification

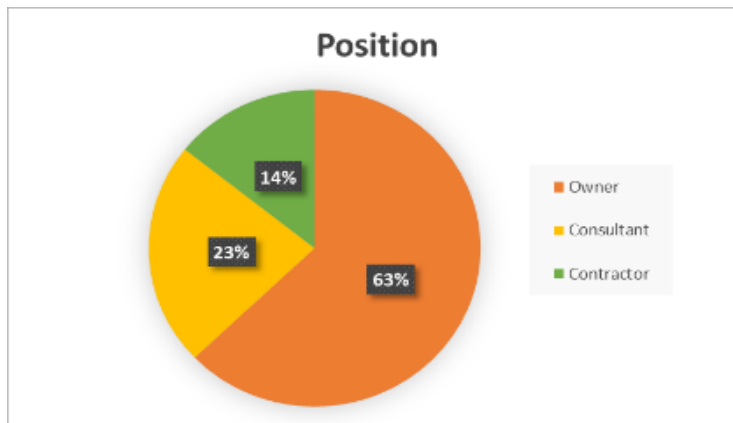


Figure 3. Position Classification

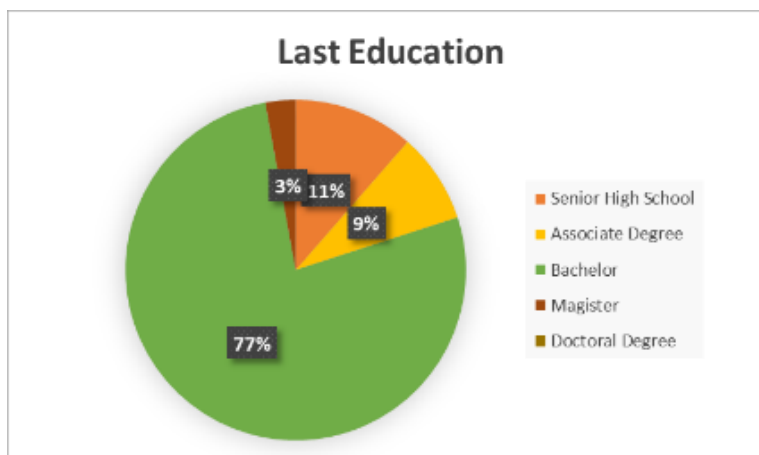


Figure 4. Last Education Classification



Figure 5. Work experience classification

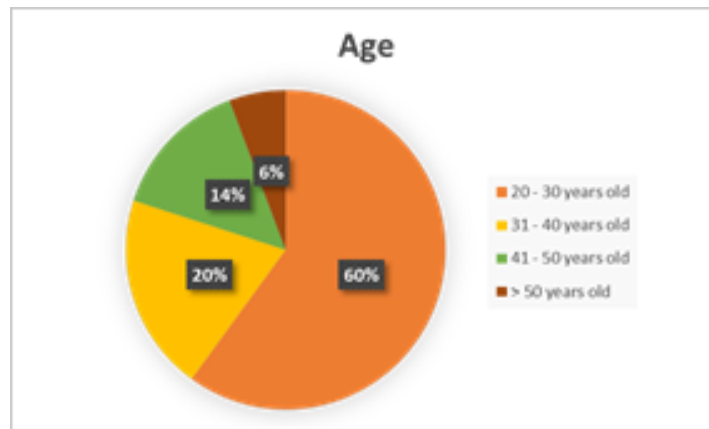


Figure 6. Age Classification

Validity Test

According to (Priyatno, 2019) in Hansen & Anondho (2019), the validity test shows how accurately an item measures what it is intended to measure in the research. Items with a significance level of 0.05 and a two-tailed test are considered valid if the scores for each variable correlate with the total score. This is done using the validity test method with Pearson correlation. Items can be declared valid if the positive value and the calculated r are greater than or less than the table r .

Table 3. Probability validity test

<i>Case Processing Summary</i>			
		N	%
<i>Cases</i>	<i>Valid</i>	35	100.0
	<i>Excluded^a</i>	0	0.0
	Total	35	100.0

Table 4. Impact validity test

<i>Case Processing Summary</i>			
		N	%
<i>Cases</i>	<i>Valid</i>	35	100.0
	<i>Excluded^a</i>	0	0.0
	Total	35	100.0

Reliability Test

Reliability testing is an advanced validity test, where the items being tested are considered valid. This is done using a threshold of 0.6 to evaluate the reliability of the items; items with a reliability below 0.6 are considered poor, while items with a reliability above 0.7 are considered good, and items with a reliability above 0.8 are considered very good. (Priyatno, 2019).

According to that opinion, the instrument is considered reliable if the Cronbach's alpha value is greater than 0.60. The results of the reliability test of the risk probability and impact questionnaire indicate that the instrument is highly reliable, with a Cronbach's alpha of $0.980 > 0.60$ for frequency and $0.938 > 0.60$ for impact. The formula for the reliability test on frequency is as follows:

$$r_{11} = \left(\frac{n}{n-1}\right) \left(1 - \frac{\sum \sigma_t^2}{\sigma_t^2}\right)$$

$$r_{11} = \left(\frac{47}{47-1}\right) \left(1 - \frac{45.5445}{1104.22}\right)$$

$$r_{11} = 0,980$$

Table 5. Cronbach's Alpha Results at Probability
Reliability Statistics

<i>Cronbach's Alpha</i>	<i>N of Items</i>
0.980	47

Reliability test formula on impact:

$$r_{11} = \left(\frac{n}{n-1}\right) \left(1 - \frac{\sum \sigma_t^2}{\sigma_t^2}\right)$$

$$r_{11} = \left(\frac{47}{47-1}\right) \left(1 - \frac{25,894}{316.339}\right)$$

$$r_{11} = 0,938$$

Table 6. Cronbach's Alpha Results at Impact
Reliability Statistics

<i>Cronbach's Alpha</i>	<i>N of Items</i>
0.938	47

Severity Index Calculation

Table 7 and table 8 is the result of calculations using the severity index method:

Table 7. Impact severity index calculation results

Risk Factors	1 STB	2 TB	3 N	4 B	5 SB	SI Value (%)	CC	Value
A. Political								
1	0	1	3	18	13	80.7	B	4
2	0	1	21	8	5	62.1	N	3
3	0	0	4	21	10	79.3	B	4
4	0	0	2	25	8	79.3	B	4

Risk Factors	1	2	3	4	5	SI Value (%)	CC	Value
	STB	TB	N	B	SB			
5	0	0	6	20	9	77.1	B	4
B. Environment								
6	0	0	10	16	9	74.3	B	4
C. Planning								
7	0	0	7	15	13	79.3	B	4
8	0	0	5	19	11	79.3	B	4
9	0	2	7	19	7	72.1	B	4
D. Marketing								
10	0	0	1	24	10	81.4	B	4
E. Social Economy								
11	0	1	4	19	11	78.6	B	4
12	0	1	10	18	6	70.7	B	4
13	0	3	16	12	4	62.1	N	3
14	0	1	4	20	10	77.9	B	4
15	1	3	4	19	8	71.4	B	4
F. Finance								
16	0	1	8	17	9	74.3	B	4
17	0	2	9	18	6	70.0	B	4
18	0	0	7	19	9	76.4	B	4
19	0	0	4	20	11	80.0	B	4
G. Natural								
20	0	0	3	11	21	87.9	SB	5
21	0	0	2	14	19	87.1	B	4
22	0	0	1	16	18	87.1	B	4
23	0	0	2	16	17	85.7	B	4
24	0	1	3	19	12	80.0	B	4
H. Project								
25	0	3	0	15	17	82.9	B	4
26	0	1	3	23	8	77.1	B	4
27	0	0	5	18	12	80.0	B	4
I. Technical								
28	0	0	7	22	6	74.3	B	4
29	0	0	8	21	6	73.6	B	4
30	0	0	4	17	14	82.1	B	4
31	0	0	2	25	8	79.3	B	4
J. Human								
32	0	1	2	20	12	80.7	B	4
33	0	0	12	22	1	67.1	B	4
34	0	1	5	16	13	79.3	B	4
35	0	0	7	20	8	75.7	B	4
36	0	0	1	20	14	84.3	B	4
K. Criminal								
37	0	0	6	21	8	76.4	B	4
38	0	0	17	17	1	63.6	B	4
39	0	1	5	17	12	78.6	B	4
40	0	0	1	14	20	88.6	SB	5
41	0	0	6	17	12	79.3	B	4

Risk Factors	1	2	3	4	5	SI Value (%)	CC	Value
	STB	TB	N	B	SB			
L. Safety/OHS								
42	0	0	9	16	10	75.7	B	4
43	0	0	11	13	11	75.0	B	4
44	0	0	5	18	12	80.0	B	4
45	0	0	2	18	15	84.3	B	4
46	0	0	8	18	9	75.7	B	4
47	0	1	10	13	11	74.3	B	4

Description:

STB = very no effect

TB = no effect

N = netral

B = influential

SB = very influential

Table 8. Results of probability severity index calculation

Risk Factors	1	2	3	4	5	SI Value (%)	CC	Value
	SJ	J	KK	S	SS			
A. Political								
1.	1	3	10	18	3	63.6	S	4
2.	3	2	3	11	4	40.7	KK	3
3.	0	3	16	13	5	67.1	S	4
4.	0	6	7	20	2	62.9	S	4
5.	0	5	9	18	3	63.6	S	4
B. Environment								
6.	1	4	8	18	4	64.3	S	4
C. Planning								
7.	0	3	10	18	4	66.4	S	4
8.	1	1	12	14	7	67.9	S	4
9.	0	2	12	17	4	66.4	S	4
D. Marketing								
10.	2	2	17	10	4	58.6	KK	3
E. Social Economy								
11.	1	9	6	16	3	57.9	KK	3
12.	3	4	13	5	10	60.7	KK	3
13.	3	5	8	15	4	58.6	KK	3
14.	2	3	8	19	3	62.9	S	4
15.	2	1	7	16	9	70.7	S	4
F. Finance								
16.	2	1	12	13	7	65.7	S	4
17.	0	5	15	12	3	59.3	KK	3
18.	0	3	18	11	3	60.0	KK	3
19.	2	3	8	17	5	64.3	S	4

Risk Factors	1 SJ	2 J	3 KK	4 S	5 SS	SI Value (%)	CC	Value
G. Natural								
20.	0	4	3	20	8	72.9	S	4
21.	3	5	8	10	9	62.1	KK	3
22.	0	6	7	12	10	68.6	S	4
23.	3	2	9	15	6	63.6	S	4
24.	1	3	8	17	6	67.1	S	4
H. Project								
25.	1	5	6	15	8	67.1	S	4
26.	0	3	13	18	1	62.1	KK	3
27.	1	1	17	13	3	61.4	KK	3
I. Technical								
28.	0	6	10	16	3	61.4	KK	3
29.	2	4	8	20	1	60.0	KK	3
30.	1	6	17	8	3	54.3	KK	3
31.	1	3	6	19	6	68.6	S	4
J. Human								
32.	0	4	12	15	4	63.6	S	4
33.	0	4	11	19	1	62.1	KK	3
34.	1	1	12	17	4	65.7	S	4
35.	0	7	13	12	3	57.9	KK	3
36.	3	4	8	14	6	61.4	KK	3
K. Criminal								
37.	4	4	9	12	6	58.6	KK	3
38.	0	5	12	14	4	62.1	KK	3
39.	2	7	8	15	3	57.1	KK	3
40.	3	2	9	14	7	64.3	S	4
41.	1	3	13	11	7	64.3	S	4
L. Safety/OHS								
42.	1	1	17	14	2	60.7	KK	3
43.	0	5	15	12	3	59.3	KK	3
44.	3	7	7	11	7	58.6	KK	3
45.	5	5	7	14	4	55.0	KK	3
46.	2	6	9	15	3	57.9	KK	3
47.	2	6	11	12	4	57.1	KK	3

Description:

SJ = very rare

J = rarely

KK = sometimes

S = often

SS = very often

Risk Assessment

At the risk assessment stage, the calculation of answer data from each risk variable from the questionnaire results, which have been compiled into an Excel format using the Severity Index calculation. (SI). After obtaining the values of frequency (probability) and impact (impact), a risk analysis is conducted to determine the risk variable levels from the lowest to the highest. This is done by multiplying probability by impact (PxI) and using the Probability Impact Matrix (PIM). The risk levels for each variable can be seen in Table 9.

Probability \ Impact	1 (Sangat Tidak Berpengaruh)	2 (Tidak Berpengaruh)	3 (Netral)	4 (Berpengaruh)	5 (Sangat Berpengaruh)
5 (Sangat Sering)	5	10	15	20	25
4 (Sering)	4	8	12	16	20
3 (Cukup)	3	6	9	12	15
2 (Jarang)	2	4	6	8	10
1 (Sangat Jarang)	1	2	3	4	5
Keterangan :					
Low (Rendah)	1-4				
Medium (Sedang)	5-12				
High (Tinggi)	15-25				

Figure 7. Probability Impact Matrix (PIM)

Table 9. Risk Assessment Calculation Results

No	Risk Factor	Probability (P)	Impact (I)	P x I	Risk category
1	A. Political	4	4	16	high
2		3	3	9	medium
3		4	4	16	high
4		4	4	16	high
5		4	4	16	high
6	B. Environment	4	4	16	high
7		4	4	16	high
8	C. Planning	4	4	16	high
9		4	4	16	high
10	D. Marketing	3	4	12	medium
11		3	4	12	medium
12	E. Social Economy	3	4	12	medium
13		3	3	9	medium
14		4	4	16	high

No	Risk Factor	Probability (P)	Impact (I)	P x I	Risk category
15		4	4	16	high
16		4	4	16	high
17	F. Finance	3	4	12	medium
18		3	4	12	medium
19		4	4	16	high
20		4	5	20	high
21		3	4	12	medium
22	G. Natural	4	4	16	high
23		4	4	16	high
24		4	4	16	high
25		4	4	16	high
26	H. Project	3	4	12	medium
27		3	4	12	medium
28		3	4	12	medium
29		3	4	12	medium
30	I. Technical	3	4	12	medium
31		4	4	16	high
32		4	4	16	high
33		3	4	12	medium
34	J. Human	4	4	16	high
35		3	4	12	medium
36		3	4	12	medium
37		3	4	12	medium
38		3	4	12	medium
39	K. Criminal	3	4	12	medium
40		4	5	20	high
41		4	4	16	high
42		3	4	12	medium
43		3	4	12	medium
44	L. Safety/OHS	3	4	12	medium
45		3	4	12	medium
46		3	4	12	medium
47		3	4	12	medium

The results of the probability and impact (PxI) multiplication calculation show that 22 variables have a high level and 25 variables have a medium level.

Risk Acceptance

Multiplying probability by impact results in the risk acceptance level. This is done using the following risk acceptance scale:

Table 10. Risk Acceptance of Probability and Impact

No	Risk Factor	P	I	P x I	Risk Category
1		4	4	16	<i>unacceptable</i>
2		3	3	9	<i>undesirable</i>
3	A. Political	4	4	16	<i>unacceptable</i>
4		4	4	16	<i>unacceptable</i>
5		4	4	16	<i>unacceptable</i>
6	B. Environment	4	4	16	<i>unacceptable</i>
7		4	4	16	<i>unacceptable</i>
8	C. Planning	4	4	16	<i>unacceptable</i>
9		4	4	16	<i>unacceptable</i>
10	D. Marketing	3	4	12	<i>undesirable</i>
11		3	4	12	<i>undesirable</i>
12		3	4	12	<i>undesirable</i>
13	E. Social Economy	3	3	9	<i>undesirable</i>
14		4	4	16	<i>unacceptable</i>
15		4	4	16	<i>unacceptable</i>
16		4	4	16	<i>unacceptable</i>
17		3	4	12	<i>undesirable</i>
18	F. Finance	3	4	12	<i>undesirable</i>
19		4	4	16	<i>unacceptable</i>
20		4	5	20	<i>unacceptable</i>
21		3	4	12	<i>undesirable</i>
22	G. Natural	4	4	16	<i>unacceptable</i>
23		4	4	16	<i>unacceptable</i>
24		4	4	16	<i>unacceptable</i>
25		4	4	16	<i>unacceptable</i>
26	H. Project	3	4	12	<i>undesirable</i>
27		3	4	12	<i>undesirable</i>
28		3	4	12	<i>undesirable</i>
29		3	4	12	<i>undesirable</i>
30	I. Technical	3	4	12	<i>undesirable</i>
31		4	4	16	<i>unacceptable</i>
32		4	4	16	<i>unacceptable</i>
33		3	4	12	<i>undesirable</i>
34	J. Human	4	4	16	<i>unacceptable</i>
35		3	4	12	<i>undesirable</i>
36		3	4	12	<i>undesirable</i>
37		3	4	12	<i>undesirable</i>
38		3	4	12	<i>undesirable</i>
39	K. Criminal	3	4	12	<i>undesirable</i>
40		4	5	20	<i>unacceptable</i>
41		4	4	16	<i>unacceptable</i>

No	Risk Factor	P	I	P x I	Risk Category
42	L. Safety/OHS	3	4	12	<i>undesirable</i>
43		3	4	12	<i>undesirable</i>
44		3	4	12	<i>undesirable</i>
45		3	4	12	<i>undesirable</i>
46		3	4	12	<i>undesirable</i>
47		3	4	12	<i>undesirable</i>

By using a risk acceptance scale to measure frequency and impact (PxI), the number of unacceptable risk variables amounts to 22 variables. The results of this multiplication can be seen in Table 10.

Risk Response

After the risk acceptance analysis is complete, there are 22 most significant risks during the implementation of the road reconstruction project in West Java province. To minimize the next stage of these 22 risks, risk responses will be used. This will be done so that the project's objectives can be achieved effectively. However, in terms of risk allocation or risk transfer, risks categorized as dominant, also known as the largest risks, are assigned to the contractors involved in the provincial road reconstruction project.

In the research on the reconstruction of provincial road sections, the contractor bears the greatest risk ownership, so it is expected that they can protect the construction project to proceed according to plan. Through interviews, field observations, and expert validation, the response and risk ownership towards 22 risk variables occurring in the project aim to minimize the impact of risks.

CONCLUSION

Based on the results of research and evaluation on the West Java provincial road construction project, it can be concluded that in the process of reconstructing the provincial road, 12 risk variables were identified based on a review of previous journal literature, field conditions, and expert opinions with experience in construction projects. From the risk acceptance analysis, 22 dominant risk factors were found, covering various aspects, including political factors (government policy, lack of coordination between related agencies, changes in the structure or responsibilities of government agencies, and administrative systems in government offices), environmental factors (environmental regulations and environmental impact requirements), planning factors (quality conformity with specified specifications, land use, and socio-economic impact), social and economic factors (financial policy and social conflict), financial factors (contractor's cash flow issues and cost inflation), natural factors (weather, flooding, land movement, and land subsidence), project factors (unmet needs for aggregate materials), technical factors (heavy equipment damage), human factors (incompetent workers and poor communication skills), and criminal factors (corruption and lack of security). To respond to these risks, various mitigation measures were implemented, such as consultations with policy and environmental experts, development of effective coordination plans, enhanced quality and budget supervision,

geological risk mapping, provision of flood protection infrastructure, regular equipment maintenance, worker training, implementation of standardized communication procedures (SOPs), and strict monitoring of financial transactions and access control to the project area. These approaches aim to minimize negative impacts and ensure the continuity of the construction project in the region.

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