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Risk Management Analysis in the Implementation of Building Construction Projects

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Abstract. *This research aims to identify risks and determine responses to risks that can affect the implementation of the Bojonegoro Regency Oncology Specialised Hospital Construction Project Phase 2. The research was conducted using literature study and field study methods. Primary data was obtained through documentation, field surveys, and interviews, while secondary data included the Cost Budget Plan (RAB), project schedule, and weekly project reports. Sampling was conducted using the Slovin technique to obtain a representative number of respondents. The results showed that there were 31 relevant risk variables, grouped into 8 categories, namely force majeure, material, equipment, labour, contractual, construction, design and technology, and management risks. Significant risks were identified using the Severity Index method, which measures probability and time impact. The results of the risk analysis using the severity index method showed that there were 24 risks included in the low risk level, 3 risks included in the medium risk level, and 2 risks included in the high risk level.*

Keywords: *Construction Project, Risk Management, Risk Probability, Risk Impact.*

1. INTRODUCTION

Today, construction projects in Indonesia are growing in size and complexity, both in terms of engineering and cost. Significant development is seen especially in the infrastructure sector, such as roads, buildings, and bridges (Dewi et al., 2023). Construction itself includes a series of interrelated activities to support the development of infrastructure that is crucial to our daily lives (Johari & Fazriani, 2021). In the process of building a construction project, there are several aspects that must be considered for the smooth implementation of the project. One of the important things that must be considered is risk management, because the risks that arise in the field can have a major impact on activities during the development process (Sopiyah, 2020).

The construction of the Oncology Hospital Phase 2 has now reached 50 per cent. The hospital, which occupies the former The Residence office building on the Bojonegoro - Cepu National Road in Talok Village, Kalitidu District, Bojonegoro Regency, East Java, is targeted for completion in 2025. The secretary of the Bojonegoro Housing, Settlement and Human Settlement Office (PKPCK) said that the construction of the cancer speciality hospital is still continuing. In the Bojonegoro electronic procurement service (LPSE) page, the construction

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of the Oncology Hospital in phase two is budgeted in the 2024 APBD with a ceiling of Rp 19 billion from a contract value of Rp 18.8 billion. Meanwhile, in the first phase, according to LPSE, the construction of the Oncology Hospital cost Rp 240 million from a contract value of Rp 239 million in the 2023 regional revenue and expenditure budget (APBD). The Head of the Building Planning Division of the Bojonegoro Housing, Settlement Areas and Cipta Karya (PKPCK) Office said that currently the construction process is around 40 to 50 per cent for phase two this year.

In reality, when the structural work was in progress, there were several changes that occurred in the field, including the addition of structures from the planner, changes in drawings, permit constraints for MEP work and changes in the volume of work from the plan (Diputera et al., 2024). These things caused a significant delay in this project so that it was necessary to reschedule or re-schedulling the reference schedule that had been planned at the beginning of the project (Rodrigues-da-Silva & Crispim, 2014).

Rescheduling or re-schedulling of the initial schedule carried out on this project has an impact on increasing the duration of work, causing the project completion target to be delayed from the time it should be (Cahyono et al., 2022). The current condition of the Talok Hospital Construction progress is in week 14 or month 3 with a cumulative progress of 48.68% while the planned cumulative progress or stated on the S curve is 56.19%. From these figures there is a considerable difference of 7.51%. This resulted in the project experiencing a considerable delay from the plan.

In the construction of the hospital building, of course, there are various significant risk factors in this work. These factors can affect the construction process and potentially have a negative impact on productivity, performance, quality, and project cost constraints. Risk can be defined as a possibility that can arise unexpectedly (Nurudin & Huda, 2020). Even if an activity is very well planned, there is still a degree of uncertainty as to whether everything will go according to plan. In construction, risk cannot be completely eliminated, but it can be minimised or transferred from one party to another (Rahardi & Johari, 2021).

Risk analysis is now more urgent than ever (Rahman & Tjendani, 2022). Many cases show that failure to manage risk properly can result in significant losses, both for companies and individuals (Ahmed, 2017). We often witness how companies suffer losses due to fraud committed by employees or management, as well as failure to anticipate overhead costs and other issues. Similarly, individuals are often adversely affected due to negligence in complying with applicable regulations. The potential for loss due to risk will increase further if company

members do not have the necessary prudence. However, many of these situations can be avoided if we are able to understand and manage risks effectively (Afiq, 2021).

The purpose of this research is to identify the risks and to determine the response of the risks that may occur in the Bojonegoro Regency Oncology Specialised Hospital Construction Phase 2 project.

2. METHODS

Type of Research

In this research methodology, there are 2 types of research carried out, namely:

1. Literature Study

In this research, references related to the process and implementation of time management in effective construction projects have been collected from various sources, including literature, books, and journals. The purpose of this study is to identify the theoretical basis that supports the research. In addition, this literature review was also used as a foundation in formulating a list of questions for the interviews.

2. Field Study

This informal field observation was conducted through a case study on a project. The method used was direct interviews with staff and experts who were directly involved in the various stages of the project, from scheduling, implementation, and control, to updating the project schedule.

Data Collection Procedure

Some data collection methods to analyse Risk Management in the Bojonegoro Regency Oncology Specialty Hospital Construction Project Phase 2 include:

1. Primary data

Primary data obtained directly from the original source or first party which is done by means of documentation and field surveys. The explanation of each primary data is as follows:

a. Project Location

The research location in this study is the Construction of the Bojonegoro Regency Oncology Special Hospital Phase 2 located in Talok Village, Bojonegoro Regency.

The Bojonegoro Regency Oncology Special Hospital Phase 2 Construction Project will run for 160 calendar days starting on 22 July 2024 and is planned to be completed on 28 December 2024. The project location is in a residential area.

b. Documentation and Field Survey

Field surveys are carried out to find out how far the progress of the implementation of the office construction project is and to obtain documentation of work progress. This activity also aims to conduct non-formal interviews to find out problems and factors that can hinder project performance.

2. Secondary data

Secondary data obtained directly from the Oncology Special Hospital contractor company include:

a. Cost Budget Plan

This is a breakdown of the costs allocated to each item of work. The Cost Budget Plan (RAB) is an integral part of the contract between the project owner and the implementing contractor.

b. Time Schedule

In this study there are 2 time schedule data, namely:

1) Time Schedule project plan

The Time Schedule contains job descriptions, work volumes and S curves.

2) Time Schedule actual project

In the actual project time schedule, there is a similarity in content with the planned project time schedule. However, there are additions in the form of work progress items that have been carried out, accompanied by weights for work that has and has not been carried out.

c. Weekly Progress Report

This contains a report on the progress of the project that has been achieved in one week. This weekly report includes the volume and percentage weight (%) of the progress achieved.

Population and Sample

The population in this study were all construction workers and a team of MK experts who worked on the Hospital Development project totalling 55 employees. In addition, there are also 20 people from the Cipta Karya Office involved and a team of experts who have knowledge in the field of Risk Management. In this study, the authors narrowed the population, namely the total number of people involved in the project of 75 people by calculating the sample size using the Slovin technique according to Sugiyono (2011: 87).

In this study, the total population studied was 75 people. Therefore, the percentage of leeway used is set at 20%, and the calculation results can be rounded to ensure suitability. Given the time and cost constraints, this error rate has been chosen. From the minimum number

of samples required, which is 20 respondents, the following minimum proportion of respondents was determined:

Table 1. Minimum Research Sample Participation of Respondents

Institution	Amount
Construction Worker and MK	15
Human Settlements Office	3
Expert Team	2
Total	20

Source: Analysis Results, 2024

Data Analysis

The first stage before conducting data analysis is risk identification. This process is critical, as it establishes the various risks and their characteristics that could affect the project. Failure at this stage can have a major impact on subsequent risk management and reduce project reliability, given the number of vulnerabilities that may arise in the future. Various techniques can be used to identify risks, such as questionnaires, field investigations and project data collection.

After performing risk identification, the next step is risk analysis. The purpose of this analysis is to reduce the risks that may occur by implementing corrective actions on various aspects of the project, such as scheduling, budget, and quality. Risk reduction requires careful analysis to understand its effect on the project. The effect of risk can be calculated by the formula: risk likelihood multiplied by risk effect. From the data analysis, we can identify the impact of risks that have a high category on each aspect of execution and time. These highly categorised risks are considered significant to the project execution and schedule.

3. RESULTS

Risk Identification

This risk identification was previously obtained through a literature review. In this questionnaire, respondents were asked to assess whether the risk variables generated from the literature review had any relevance to the Oncology Hospital construction project they had handled. In addition, respondents were also asked to provide input on other risk variables that might appear in the Oncology Hospital project that had not been listed in the questionnaire list.

However, the results of Questionnaire 1 cannot be used as definitive research variables, because verification is needed to ensure the suitability of these variables with the object of this research. Some respondents provided reductions to some of the proposed risk variables. Respondents in Questionnaire 1 included contractors, Construction Manager (MK), Public Works and Spatial Planning Office (PKP), and MK Expert Team, as listed in Table 1.

The results of questionnaire 1 obtained 100% of respondents chose yes for the flood variable because this variable, if it occurs, has an influence on the implementation of the Oncology Hospital Building Construction. Furthermore, 100% of respondents chose yes for the unfavourable weather variable because this variable also affects the implementation of the project. The risk variables that have been determined by the questionnaire can be seen in table 1 below.

Table 2. Risk Variables

SUB VARIABEL		KODE	INDIKATOR	YA	TIDAK
1	Force Majeure	A . 1	Gempa Bumi	10	0
		A . 2	Banjir	10	0
		A . 3	Cuaca Tidak Mendukung	10	0
2	Material	B . 1	Keterlambatan Pengiriman Material	10	0
		B . 2	Material kurang memenuhi syarat	10	0
		B . 3	Kerusakan atau kehilangan (pencurian) material	10	0
		B . 4	Pengadaan material khusus sehingga membutuhkan waktu pemesanan	10	0
3	Peralatan	C . 1	Lambatnya proses mobilisasi peralatan	10	0
		C . 2	Peralatan yang digunakan sering rusak	10	0
		C . 3	Operator kurang disiplin sehingga produktivitas kurang makasimal	10	0
4	Tenaga Kerja	D . 1	Kurang disiplinnya pekerja menggunakan APD	10	0
		D . 2	Tenaga kerja yang tidak terampil	10	0
		D . 3	Kurang tersedianya jumlah tenaga kerja di lapangan	10	0
		D . 4	Produktivitas tenaga kerja yang rendah	10	0
		D . 5	Jam kerja kurang efektif	10	0
5	Kontraktual	E . 1	Lamanya proses admintrasi terkait kontrak kerja	10	0
		E . 2	Pembedaan Intersepsi spesifikasi antara owner dan kontraktor	10	0
		E . 3	Perselisihan antara owner dan kontraktor	10	0
6	Konstruksi	F . 1	Kesesuain dimensi yang dikerjakan (panjang, lebar, tinggi)	10	0
		F . 2	Kesalahan Pembesian (dimensi besi, jarak besi, dan mutu)	10	0
		F . 3	Mutu beton tidak sesuai spesifikasi teknis	10	0
		F . 4	Proses perijinan terkait pekerjaan Kelistrikan	10	0
		F . 5	Proses pekerjaan plumbing yang tidak sesuai atau terjadi kebocoran	10	0
7	Desain dan Teknologi	G . 1	Adanya perubahan desain	10	0
		G . 2	Metode pelaksanaan yang salah	10	0
		G . 3	Data desain tidak lengkap	10	0
8	Manajemen	H. 1	Kesalahan estimasi biaya	10	0
		H. 2	Kesalahan estimasi waktu	10	0
		H. 3	Adanya staf yang kurang berpengalaman	10	0
		H. 4	Kinerja kontraktor yang buruk	10	0
		H. 5	Tingkat disiplin manajemen kontraktor yang rendah	10	0

Source: Researcher's Processed Results, 2024

Based on the results of the recapitulation of questionnaire 1 (One), 10 answers were obtained from each respondent. Of the 31 questions that constitute risk indicators, all indicators are agreed by respondents. Hence, the researcher recapitulates from 8 selected variables as many as 31 indicators that have relevance to the Oncology Speciality Hospital construction project. From the results of questionnaire 1, risk analysis can then be carried out by determining the probability and impact values.

Risk Analysis

After identifying the risks, the next step is to conduct risk analysis and assessment. The purpose of this step is to determine the size or weight associated with the type of risk, the impact caused, and the likelihood of the risk occurring. Based on the data obtained from the second questionnaire, the analysis of the assessment of the probability and impact of risks affecting the cost aspect is calculated using the Severity Index (SI) method in the following way:

$$SI = \frac{\sum_{i=0}^{4} a_i x_i}{4\sum_{i=0}^{4} x_i} (100\ \%)$$

Where,

ai = constant assessment

xi = frequency of respondents

i = 0, 1, 2, 3, 4,..., n

with,

x_0, x_1, x_2, x_3, x_4 are the frequency of respondents

$a_0 = 0$, $a_1 = 1$, $a_2 = 2$, $a_3 = 3$ $a_4 = 4$

$x_0 = 1$ ‘very rare/very small’

$x_1 = 2$ ‘rare/small’

$x_2 = 3$ ‘moderate/medium’

$x_3 = 4$ ‘frequent/large’

$x_4 = 5$ ‘very often/very large’

Furthermore, the Severity Index value is converted to the probability and impact assessment scale to determine the risk category based on the SI value (%), categorising it into:

Very Rare/Low = $0.00 \leq SI \leq 12.5$

Rare/Low = $12.5 \leq SI \leq 37.5$

Moderate/Medium = $37.5 \leq SI \leq 62.5$

Frequent/High = $62.5 \leq SI \leq 87.5$

Very Often/High = $87.5 \leq SI \leq 100$

The following is an example of calculation using Severity Index (SI) to assess the probability and impact of risks. This risk probability calculation is based on data obtained from the second questionnaire (2).

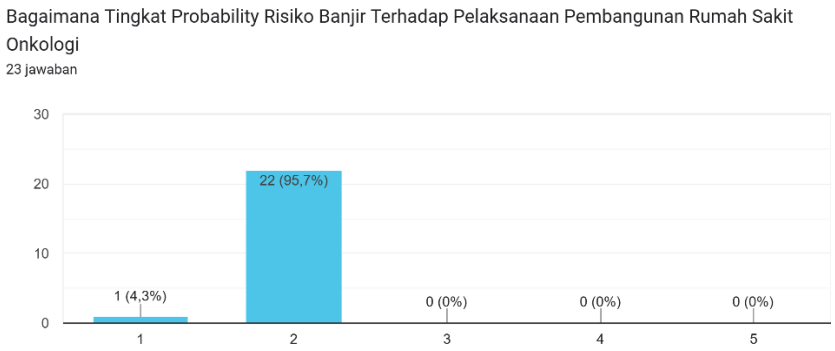

Figure 1. example of calculation using SI to assess the probability and impact of risks

Based on the answers from respondents for the level of probability of flood risk, the following data was obtained, namely 1 respondent stated that it was Very Rare (VR) (*Sangat Jarang* (SJ)), and 22 respondents stated that the occurrence was Rare (R) (*Jarang* (J)), then the following calculation was obtained:

$$SI = \frac{\sum_{i=0}^{4} a_i x_i}{4\sum_{i=0}^{4} x_i}(100\ \%)$$

$$SI = \frac{((0X1)+(1X22)+(2X0)+(3X0)+(4X0))}{4X23} \text{ X } 100$$

$$SI = \frac{22}{92} \text{ X } 100$$

SI = 23,91% (Kategori Jarang/Rendah)

Table 3. Probability calculation results

KODE		INDIKATOR	PENILAIAN PROBABILITY RISIKO					JUMLAH	NILAI SI (%)	KATEGORI
			1	2	3	4	5			
A .	1	Banjir	1	22	0	0	0	23	23,91	J
A .	2	Cuaca Tidak Mendukung	0	0	9	14	0	23	65,22	S

If the percentage of the SI value is in the range of $12.5 \leq SI \leq 37.5$, then the risk probability of 'Flood or *Banjir*' is included in the risk category whose probability of occurrence is '*J* or Rare/Low'.

Probability Calculation Results

The risk analysis phase began with the implementation of Questionnaire 2 to obtain the probability and impact values of each relevant variable. As in Questionnaire 1, the survey also asked respondents to provide an assessment of Risk Probability. Respondents were asked to give a score from '1 = Very Rare' to '5 = Very Often'.

After data collection from Questionnaire 2, analyses were conducted using the Severity Index (SI) to obtain a combination of risk probability and impact ratings. Furthermore, this Severity Index value scale was converted based on the probability assessment as follows:

Very rare (VR) = $0.00 \leq SI \leq 12.5$

Rare (R) = $12.5 \leq SI \leq 37.5$

Fair (F) = $37.5 \leq SI \leq 62.5$

Often (O) = $62.5 \leq SI \leq 87.5$

Very often (VO) = $87.5 \leq SI \leq 100$

The following are the results of the analysis of the probability assessment using the severity index in table below:

Table 4. Probability calculation results

KODE		INDIKATOR	PENILAIAN PROBABILITY RISIKO					JUMLAH	NILAI SI (%)	KATEGORI
			1	2	3	4	5			
A.	1	Banjir	1	22	0	0	0	23	23,91	R
A.	2	Cuaca Tidak Mendukung	0	0	9	14	0	23	65,22	S
B.	1	Keterlambatan Pengiriman Material	0	16	7	0	0	23	32,61	R
B.	2	Material kurang memenuhi syarat	0	16	7	0	0	23	32,61	R
B.	3	Kerusakan atau kehilangan (pencurian) material	1	18	4	0	0	23	28,26	R
B.	4	Pengadaan material khusus sehingga membutuhkan waktu pemesanan	0	14	9	0	0	23	34,78	R
C.	1	Lambatnya proses mobilisasi peralatan	1	17	5	0	0	23	29,35	R
C.	2	Peralatan yang digunakan sering rusak	2	17	4	0	0	23	27,17	R
C.	3	Operator kurang disiplin sehingga produktivitas kurang makasimal	1	18	4	0	0	23	28,26	R
D.	1	Kurang disiplinnya pekerja menggunakan APD	0	8	15	0	0	23	41,30	C
D.	2	Tenaga kerja yang tidak terampil	0	17	6	0	0	23	31,52	R
D.	3	Kurang tersedianya jumlah tenaga kerja di lapangan	0	2	7	14	0	23	63,04	S
D.	4	Produktivitas tenaga kerja yang rendah	0	18	4	1	0	23	31,52	R
D.	5	Jam kerja kurang efektif	0	19	4	0	0	23	29,35	R
E.	1	Lamanya proses admintrasi terkait kontrak kerja	0	19	4	0	0	23	29,35	R
E.	2	Pembedaan Intersepsi spesifikasi antara owner dan kontraktor	0	19	4	0	0	23	29,35	R
F.	1	Kesesuain dimensi yang dikerjakan (panjang, lebar, tinggi)	0	17	6	0	0	23	31,52	R
F.	2	Kesalahan Pembesian (dimensi besi, jarak besi, dan mutu)	0	17	6	0	0	23	31,52	R
F.	3	Mutu beton tidak sesuai spesifikasi teknis	0	15	8	0	0	23	33,70	R
F.	4	Proses perijinan terkait pekerjaan Kelistrikan	0	15	8	1	0	24	35,42	R
F.	5	Proses pekerjaan plumbing yang tidak sesuai atau terjadi kebocoran	0	17	6	0	0	23	31,52	R
G.	1	Adanya perubahan desain	0	3	20	0	0	23	46,74	C
G.	2	Metode pelaksanaan yang salah	0	18	5	0	0	23	30,43	R
G.	3	Data desain tidak lengkap	0	20	3	0	0	23	28,26	R
H.	1	Kesalahan estimasi biaya	0	19	4	0	0	23	29,35	R
H.	2	Kesalahan estimasi waktu	0	17	6	0	0	23	31,52	R
H.	3	Adanya staf yang kurang berpengalaman	0	22	1	0	0	23	26,09	R
H.	4	Kinerja kontraktor yang buruk	0	21	2	0	0	23	27,17	R
H.	5	Tingkat disiplin manajemen kontraktor yang rendah	0	21	2	0	0	23	27,17	R

Source: Researcher's Processed Results, 2024

From Table 4 above, there are 25 risk variables that have a probability of occurrence of ‘Rare’, which means that this risk occurs occasionally, with an intensity of occurrence between 20% and 40%. One example is the risk of flooding, which has a probability of occurrence of 23.91%, so it falls into the Rare/Low category. This indicates that the risk of flooding occurs unexpectedly and is difficult to predict.

Furthermore, there are 2 risks categorised with a probability of occurrence of 'Fair'. This risk is said to be sufficient if it can occur under certain conditions, with the intensity of occurrence in the range of 40% to 60%. For example, the risk of design changes in the oncology hospital construction project. This risk arises only in some work items, such as in the strous work which should have been planned with a depth of 5 metres, but due to rocky soil conditions, the strous depth reached 3 metres during its implementation. Therefore, it is necessary to calculate the addition or reduction of work.

In addition, based on Table 4 above, there are 2 risks that have a probability of occurrence of 'Often'. This means that the risk occurs frequently, with the intensity of the probability of occurrence between 60% and 80%.

Calculation Results of Risk Impact on Time

The following is an example of calculating the impact of risk on time using the severity index, based on the data in Figure obtained through the 'Flood' risk occurrence questionnaire, the following calculation is obtained:

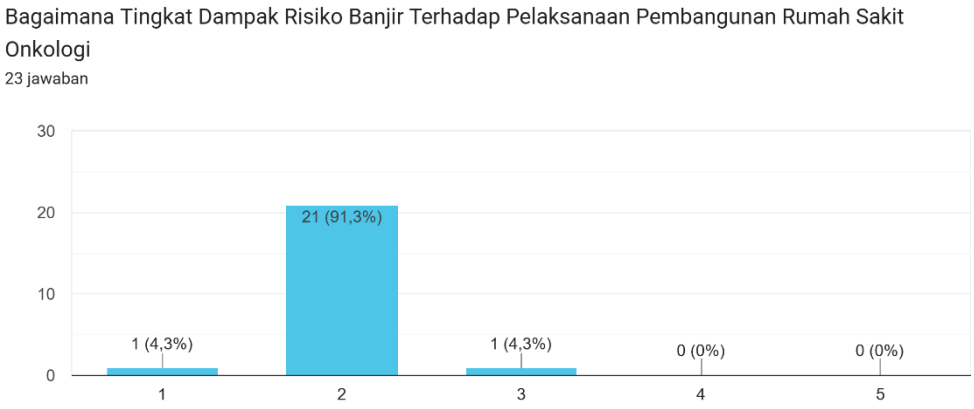

Figure 2. Questionnaire Data 2 (Two)

$$SI = \frac{((0X1)+(1X21)+(2X1)+(3X0)+(4X0))}{4X23} \text{ X } 100$$

$$SI = \frac{23}{80} \text{ X } 100\%$$

$$SI = 28{,}75\%$$

Table 4. Calculation of Risk Impact

KODE	INDIKATOR	PENILAIAN DAMPAK RISIKO					JUMLAH	NILAI SI (%)	KATEGORI
		1	2	3	4	5			
A . 1	Banjir	1	21	1	0	0	23	28,75	R

From the results of the above calculations, it means that the impact of flood (*banjir*) risk on time is included in the Low (R) category. The results of the risk impact assessment on time using the severity index can be seen in table 5 below:

Table 5. Calculation Results of Impact on Time

KODE		INDIKATOR	PENILAIAN *Impact*					JUMLAH	NILAI SI (%)	KATEGORI
			1	2	3	4	5			
A.	1	Banjir	1	21	1	0	0	23	28,75	R
A.	2	Cuaca Tidak Mendukung	0	6	14	3	0	23	53,75	S
B.	1	Keterlambatan Pengiriman Material	0	18	5	0	0	23	35,00	R
B.	2	Material kurang memenuhi syarat	0	17	6	0	0	23	36,25	R
B.	3	Kerusakan atau kehilangan (pencurian) material	4	15	4	0	0	23	28,75	R
B.	4	Pengadaan material khusus sehingga membutuhkan waktu pemesanan	1	15	6	1	0	23	37,50	R
C.	1	Lambatnya proses mobilisasi peralatan	2	17	4	0	0	23	31,25	R
C.	2	Peralatan yang digunakan sering rusak	4	15	4	0	0	23	28,75	R
C.	3	Operator kurang disiplin sehingga produktivitas kurang makasimal	3	16	4	0	0	23	30,00	R
D.	1	Kurang disiplinnya pekerja menggunakan APD	1	14	8	0	0	23	37,50	R
D.	2	Tenaga kerja yang tidak terampil	2	15	6	0	0	23	33,75	R
D.	3	Kurang tersedianya jumlah tenaga kerja di lapangan	0	7	12	4	0	23	53,75	S
D.	4	Produktivitas tenaga kerja yang rendah	0	2	17	4	0	23	60,00	S
D.	5	Jam kerja kurang efektif	3	17	3	0	0	23	28,75	R
E.	1	Lamanya proses admintrasi terkait kontrak kerja	4	16	3	0	0	23	27,50	R
E.	2	Pembedaan Intersepsi spesifikasi antara owner dan kontraktor	3	17	3	0	0	23	28,75	R
F.	1	Kesesuain dimensi yang dikerjakan (panjang, lebar, tinggi)	1	18	4	0	0	23	32,50	R
F.	2	Kesalahan Pembesian (dimensi besi, jarak besi, dan mutu)	1	18	4	0	0	23	32,50	R
F.	3	Mutu beton tidak sesuai spesifikasi teknis	1	17	5	0	0	23	33,75	R
F.	4	Proses perijinan terkait pekerjaan Kelistrikan	2	13	7	1	0	23	37,50	R
F.	5	Proses pekerjaan plumbing yang tidak sesuai atau terjadi kebocoran	1	18	4	0	0	23	32,50	R
G.	1	Adanya perubahan desain	3	18	2	0	0	23	27,50	R
G.	2	Metode pelaksanaan yang salah	3	17	3	0	0	23	28,75	R
G.	3	Data desain tidak lengkap	3	19	1	0	0	23	26,25	R
H.	1	Kesalahan estimasi biaya	2	18	3	0	0	23	30,00	R
H.	2	Kesalahan estimasi waktu	2	17	4	0	0	23	31,25	R
H.	3	Adanya staf yang kurang berpengalaman	3	19	1	0	0	23	26,25	R
H.	4	Kinerja kontraktor yang buruk	1	21	1	0	0	23	28,75	R
H.	5	Tingkat disiplin manajemen kontraktor yang rendah	2	19	2	0	0	23	28,75	R

Source: Researcher's Processed Results, 2024

In table 5, it is known that there are 26 risks that have a category of impact on time, which is classified as Low (R), meaning that the risk if it occurs has a delayed impact on the Project Schedule of 1-3 days of project duration. Meanwhile, 3 risks are known to have an impact category on the implementation time which is included in the Medium (S) category based on the respondents' answers, meaning that the risk, if it occurs, will have a delayed impact on the Project Schedule by 3-7 days of project duration.

4. CONCLUSION

Based on the results of the research and analysis that has been carried out, there are risks that occur in the work that affect the implementation of the Bojonegoro Regency Oncology Special Hospital Construction Project Phase 2 based on risk identification that has been carried out including 31 risk variables obtained from questionnaire 1. Risk variables are divided into 8 groups namely Force Majeure, material risk, equipment risk, labour risk, contractual risk, construction risk, design and technology risk, management risk fibre.

REFERENCES

Afiq, M. (2021). Manajemen risiko pada proyek pembangunan gedung asrama mahasiswa UIN Walisongo tahun 2021. *Akselerasi: Jurnal Ilmiah Teknik Sipil, 3*(1).

Ahmed, R. (2017). Risk mitigation strategies in innovative projects. In *Key Issues for Management of Innovative Projects*. IntechOpen.

Cahyono, B., Witjaksana, B., & Tjendani, H. T. (2022). Analisis manajemen risiko pelaksanaan proyek pembangunan jalan tol Manado-Bitung seksi 2 STA 14+067–39+700. *Senakama: Prosiding Seminar Nasional Karya Ilmiah Mahasiswa, 1*(1), 57–66.

Dewi, A. A. D. P., Sudarsana, I. D. K., & Jayantika, P. Y. (2023). Manajemen risiko pada pembangunan pengembangan Rumah Sakit Umum Tabanan yang sedang beroperasi (Studi kasus pada pembangunan gedung NICU–PONEK BRSU Tabanan Bali). *Jurnal Teknik Sipil Terapan, 5*(1), 41–53.

Diputera, I. G. A., Lestari, I. G. A. A. I., & Utama, I. P. R. A. (2024). Analisis dan mitigasi risiko pembangunan gedung Mall Pelayanan Publik Kabupaten Gianyar. *Jurnal Teknik Gradien, 16*(1), 9–17.

Johari, G. J., & Fazriani, R. R. (2021). Analisis manajemen risiko pelaksanaan proyek konstruksi bangunan gedung di Kabupaten Garut. *Jurnal Konstruksi, 19*(2), 430–439.

Nurudin, M., & Huda, M. (2020). Identifikasi risiko pelaksanaan pembangunan gedung bertingkat milik Pemerintah Kota Surabaya. *Axial: Jurnal Rekayasa dan Manajemen Konstruksi, 8*(2), 102–112.

Rahardi, R., & Johari, G. J. (2021). Manajemen risiko pada proyek bangunan gedung di Kabupaten Tasikmalaya. *Jurnal Konstruksi, 19*(2), 511–519.

Rahman, M. H. A., & Tjendani, H. T. (2022). Identifikasi risiko pelaksanaan pembangunan proyek gedung highrise building di Hotel Grand Dafam Signature Yogyakarta. *PADURAKSA: Jurnal Teknik Sipil Universitas Warmadewa, 11*(2), 177–185.

Rodrigues-da-Silva, L. H., & Crispim, J. A. (2014). The project risk management process: A preliminary study. *Procedia Technology, 16*, 943–949.

Sopiyah, Y. (2020). Analisis dan respon risiko pada proyek konstruksi gedung. *Construction and Material Journal, 2*(1), 46–58.