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Identification of Risks of Delays in the Construction of Jalan Animal Hospital

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Abstract

Timely completion of hospital construction projects is crucial to support public health services, but delays are a common problem that has an impact on increased costs and delayed social benefits. This study aims to identify the risk factors for causing delays and analyze the level of significance in the case study of the construction of the Jalan Kehewanan Hospital in Tenggarong. This study uses a qualitative approach with primary data collected through semi-structured interviews with the implementing contractor. Data analysis is carried out by mapping identified risks into risk matrices based on *likelihood* and impact. The results of the study identified four main risk factors, namely (1) Design Changes, (2) High Rainfall, (3) Restrictions on Working Hours by Residents, and (4) Equipment Damage. The risk assessment showed that Design Change (value 15) and High Rainfall (value 12) were the two factors with the most significant High risk level, while the other two factors were at Medium levels. These findings imply that project management should prioritize mitigation strategies on aspects of internal design management and anticipation of external weather factors to ensure the smooth running of the project.

Keywords: Risk Management, Project Delays, Hospital Construction, Qualitative Analysis, Risk Matrix.

INTRODUCTION

The development of health infrastructure, especially hospitals, is one of the important priorities in supporting the improvement of the quality of public health services (Le-Hoai, Lee, & Lee, 2008). Hospitals not only function as medical service facilities, but also as social welfare support whose existence is urgently needed (World Health Organization, 2010). Therefore, the success of the hospital construction project is highly dependent on the achievement of three main targets, namely completion on time, within budget, and meeting the quality standards that have been set (PMI, 2021).

However, in practice, construction projects often face various challenges that can trigger delays. Delays are one of the most common and chronic problems in the construction industry worldwide (Assaf & Al-Hejji, 2006). Project delays not only have an impact on increasing implementation costs or cost overruns (Doloi, Sawhney, & Iyer, 2012), but also delay the social and economic benefits that should be felt immediately by the community. In the context of the construction of the Animal Road Hospital, the risk of delay is an important issue to be identified and managed systematically (Zou, Zhang, & Wang, 2007).

Delays in construction projects can be caused by a variety of factors, which many researchers group into several categories such as owner, contractor, consultant, material, labor, and external factors (Sambasivan & Soon, 2007). These factors include unpredictable field conditions, technical constraints, lack of coordination between related parties, limited resources, and external factors such as weather or regulatory changes (Abd El-Razek, Bassioni, & Mobarak, 2008). Identification of the risk of delay from the beginning is very necessary so that project management can develop an effective mitigation strategy (Baloi & Price, 2003). Thus, potential obstacles can be minimized and project completion can run more optimally.

Based on this background, this research was formulated to answer two main problems, namely what factors have the potential to cause delays in the construction of the Jalan Kehewanan Hospital and how the level of significance of each of these factors is to the delay in the project. In line with the formulation of the problem, the purpose of this study is to identify risk factors that have the potential to cause delays and analyze the level of significance of each risk found (Fugar & Agyakwah-Baah, 2010), so as to provide input for related parties in anticipating potential obstacles during the development process.

With this research, it is hoped that it can make a practical contribution to construction project management, especially in terms of planning, control, and decision-making so that project delays can be minimized.

LITERATURE REVIEW

Based on the research of Devedo et al. (2025) regarding the risk analysis of delays in road reconstruction projects, it was found that risk identification and assessment is a crucial step for the success of the project. In his case study on the road project at the Palaran Stadium Complex, he used the risk matrix analysis method to systematically map potential obstacles. The results of the study showed that the highest risk was found in pavement work (Division 5) caused by waterlogging, followed by asphalt pavement work (Division 6) which was hampered by heavy equipment traffic, and moderate risk in structural work (Division 7) related to soil layer conditions. Furthermore, the study recommends several proactive mitigation measures such as the creation of drainage channels and the regulation of machine traffic to minimize potential delays.

Then, based on research conducted by Devedo et al. (2025) focused on identifying the risk of delays in housing development projects, by taking a case study on the Verdi Summarecon Cluster. Through an approach that combines field observations, interviews, and risk matrix assessments based on the likelihood × consequence formula, the study successfully mapped the work that is most vulnerable to delay. Key findings from the study showed that roofing work had the highest level of delay risk with an average score of 6.75. In addition, this study also classifies that of the total risks identified, low category risk was the most dominant (96 cases), followed by moderate category risk (56 cases). These results provide a specific overview of the critical points and distribution of risk levels in residential construction projects.

Furthermore, according to Ismael's (2023) research, the success of a construction project is highly dependent on the ability of management to analyze and provide corrective actions against various risk factors. He said that delays often stem from various aspects such as poor management, inadequate resources, improper work methods, and unfavorable financial conditions and project environment. Therefore, his research presents an approach to systematically examine the causes of delays using statistical analysis. This approach aims to identify the risk factors with the highest value, which are then prioritized for treatment, so that potential delays can be effectively minimized.

Although all three studies focused on the risk of delays in construction projects, they had different approaches and scopes. The similarities lie in the overarching goal of minimizing delays through proactive risk identification and the principle of prioritizing the highest risk handling.

METHODS

This study uses a qualitative approach to gain an in-depth and holistic understanding of the risk factors that cause project delays. This approach was chosen because it is able to explore the complexity, dynamics, and specific context of problems that cannot be fully measured by numbers

alone. For data collection, this study relies on primary data obtained through semi-structured interview techniques. The main source of data is the contractor involved in the implementation of the Jalan Kehewanan Hospital construction project. The selection of contractors as key informants is based on their central role in the field, which provides them with hands-on experience and a practical understanding of the obstacles, challenges, and various operational constraints that occur on a daily basis. The interviews are designed to delve deeply into their perceptions and experiences regarding the various potential risks that can trigger delays, from the planning stage to final execution. Once the interview data is collected, the next step is data analysis.

Interview transcript data is first analyzed to identify, categorize, and map all potential risks mentioned by the informant. Then, to give weight and priority to each identified risk, this study applied an assessment technique using a risk matrix.

Each risk factor is assessed based on two main dimensions: the likelihood and the impact it has on the project schedule. The following is a flow chart of this research.

RESULTS AND DISCUSSION

Contents of Results and Discussion

Based on the results of in-depth interviews conducted with the project contractor, four main risk factors that have the potential to be significant in the construction project of Jalan Kehewanan Hospital have been identified. These factors include technical, natural, social, and operational aspects. The four risk factors are as follows:

1. **Design Changes:** Changes in the design of the plan drawings during the construction realization process in the field.

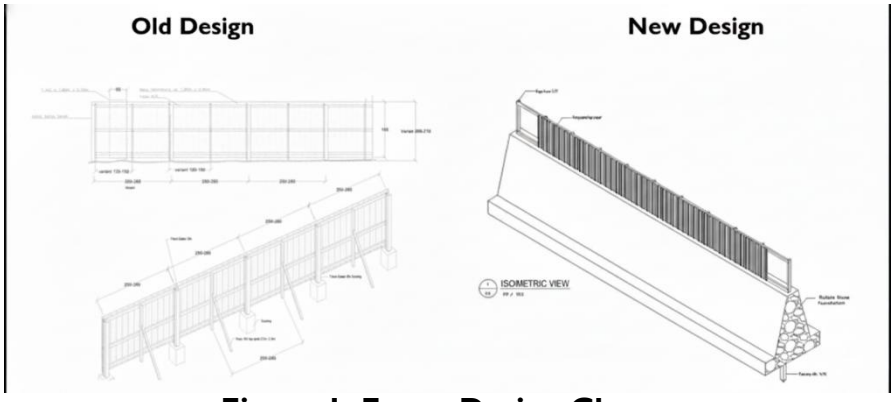

Figure 1. Fence Design Changes

2. **Extreme Weather Conditions:** High rainfall at the project site resulting in a temporary halt of work, especially on outdoor activities.

Figure 2. Rain Halts Work

3. **Social Environmental Barriers:** There are restrictions on working hours by local residents that require special permits for activities outside normal hours.
4. **Equipment Failure:** Damage to heavy and light work tools caused by internal factors or the age of use of the tool.

Risk Matrix Assessment

To determine the level of significance of each identified risk factor, an assessment was carried out using a risk matrix. This assessment is based on two dimensions: Likelihood and Impact on the project schedule. The risk assessment can be seen in this matrix image.

Likelihood	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
Scale		1	2	3	4	5
		Impact				

Figure 3. Risk Matrix

Rating Scale:

- **Likelihood Level:**
  - 1 (Very Rare): Almost never happens.
  - 2 (Rare): Unlikely to occur.
  - 3 (Occasionally): May occur occasionally.
  - 4 (Often): Most likely to occur.
  - 5 (Very Frequent): Almost certainly happens.
- **Impact Level:**
  - 1 (Very Low): Delay < 1 week.
  - 2 (Low): 1-2 weeks delay.
  - 3 (Medium): 2-4 weeks delay.
  - 4 (High): 1-2 months delay.
  - 5 (Very High): Delays > 2 months, threatening critical schedules.

Risk Assessment Results:

Table 1. Identify Delay Risk

No	Risk factor	Probability (L)	Impact (I)	Risk Assessment (L x I)	Risk Level	Assessment Description
1	Plan design changes	3 (Sometimes)	5 (Very High)	15	**Height**	Design changes, while not always happening, can lead to major rework and disrupt entire critical workflows.
2	High rainfall	4 (Often)	3 (Medium)	12	**Height**	Given the location in East Kalimantan, high rainfall is frequent and can stop excavation, foundry, and roofing work for several days.
3	Restrictions on citizens' working hours	3 (Sometimes)	3 (Medium)	9	**Medium**	This risk may occur if overtime work is required to pursue the target. The impact is significant because it reduces daily productivity.
4	Appliance malfunction	2 (Rare)	4 (High)	8	**Medium**	Even if the contractor performs maintenance, damage to heavy equipment (e.g. *crane*) is rare, but if it does, the impact is very high because it can stop the main work.

Based on the risk matrix analysis above, Design Change and High Rainfall are identified as high level risks. These two factors should be top priorities for project management to monitor and mitigate. Meanwhile, Restriction of Working Hours and Equipment Damage is at a Medium risk level, which still requires a careful contingency plan.

CONCLUSION

Based on the analysis and discussion that has been carried out on the risk of delays in the construction project of Jalan Kehewanan Hospital, several conclusions can be drawn as follows:

1. This study successfully identified four main risk factors that have the potential to cause project delays based on the perception and experience of contractors. These factors are Plan Design Changes, High Rainfall, Restrictions on Working Hours by Citizens, and Equipment Damage.
2. Through analysis using a risk matrix, it is known that not all risks have the same level of significance. Design Change (risk value 15) and High Rainfall (risk value 12) are classified as risks with a high level. Meanwhile, Working Hours Restriction (risk value 9) and Equipment Damage (risk value 8) are classified as Medium level risks.

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