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Risk Management Analysis on the Development Project for the Expansion of the Main Clinic Setara Handil Bakti Phase I, Alalak District, Barito Kuala Regency

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ABSTRACT. In the implementation of construction project development, often experiencing various obstacles arising from the risks that occur where it results in the failure to achieve maximum performance, quality and achievement of work results as expected. The purpose of this study is to analyze the dominant risk factors that occur during the implementation of work in the field and to analyze risk management strategies in construction projects. In this study, risk identification, risk factor analysis and risk management strategies were carried out on the Setara Main Clinic Expansion Construction Work located in Handil Bakti, Barito Kuala Regency. The research method used was by means of a survey distributing indicator and risk factor questionnaires to construction supervisor/management consultants, contractors and related agencies. The ranking assessment of the risk indicator and risk factor questionnaires used the AS/NZS 4360 analysis. The results of the study showed 5 (five) dominant risks that occurred from sources of material, construction, environment effect and financial risks. The strategy in dealing with these dominant risks is by monitoring and managing the stages of workers and coordinating with the vendors involved and the related owners.

Keywords: *AS/NZS 4360, Risk Management, Construction*

INTRODUCTION

A construction project is a series of activities related to efforts to build a building that must be completed within a certain period of time to achieve a goal. However, every construction project certainly has risks related to the probability of bad or detrimental consequences, such as the probability of injury, fire and so on [1]. Risks in construction projects can be mitigated or transferred from one partner to another rather than eliminated altogether. If the risk is realized, it will have an impact on how well the project performs overall, which can result in loss of money, time and quality of work [2]. For this reason, in construction projects, risk management is needed that can minimize and anticipate possible risks.

The implementation of risk management has a positive impact on the project, where in Hwang's research [3] showed a positive correlation between the implementation of risk management and the improvement of project quality, time and cost performance. However, in the study, risk identification is also needed because there are obstacles to the implementation of risk management in small-scale construction projects, namely lack of time, lack of budget, low profit and uneconomical. In the planning and design period, risk identification can help in project assessment and selection of project alternatives. Risk identification will also help in determining the project organization, procurement procedures and type of construction contract used. With risk identification, contractors can learn what risks are allocated to them in a contract and make bids based on the risk allocation.

Along with the increase in population, especially in the Alalak District, Barito Kuala Regency and the development of human activities, it encourages physical development of the city as an impact that arises to meet basic human needs for housing, in the form of development of residential areas, offices and their infrastructure. The population growth rate of the Alalak District area as a direct supporting area for Banjarmasin City is a factor that influences population density in Barito Kuala Regency. In order to support population growth and facilitate the comfort, safety and health of its residents, related agencies in this case the Public Works and Spatial Planning Agency of Barito Kuala Regency continue to carry out their roles in the construction of public buildings. One of them is through the construction of health facilities, namely the Construction of the Expansion of the Setara Handil Bakti Clinic Phase I in Barito Kuala Regency, South Kalimantan Province. These health facilities will be the object of study in the application of risk management in building construction.

The purpose of this study is to analyze the dominant risk factors that influence the implementation of the construction of the expansion of the Setara Handil Bakti Main Clinic Phase I and how the risk management strategy is in the implementation stage of the work.

RESEARCH METHODOLOGY

Method : This research work is based on methods developed Qualitative Risk Analysis using the Australian Standard/New Zealand Standard (AS/NZS) measurement standard [4}. This method facilitates descriptive surveys using questionnaires as measurement instruments, as well as factor analysis and principal component analysis of questionnaire data and interviews with related parties. The research location is at the Expansion Work for the Construction of the Setara Handil Bakti Clinic Phase I, Barito Kuala Regency, located on Jalan Trans Kalimantan Km 8, Alalak District, Barito Kuala Regency, South Kalimantan Province.

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Figure 1. Location of Construction of Expansion of Setara Handil Bakti Main Clinic Phase I

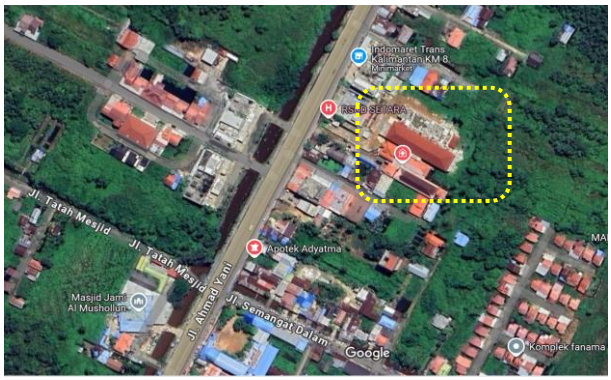

Figure 2. Location of Clinic Expansion Construction via Satellite Imagery

The data used in this study are primary data obtained directly from the original source (without intermediaries) which can be in the form of observation results of a review object (physical), events or activities and test results and personal opinions. The way to obtain primary data used in this study is by distributing questionnaires and interviews with several respondents, while for secondary data, namely in the form of notes or reports that have been compiled in published archives and those that are not published to the public relating to project administration.

RESULT AND DISCUSSION

1. Research Instrument Test
   Validity test results
   Validity testing in this study uses the Pearson Product Moment formula and the assistance of the SPSS program where each variable will be known to be valid or not based on the p-value.
   Table 1. Validity Test Results for the Probability and Impact Questionnaire

Variabel	*p-value* (sig.)	Information	*p-value* (sig.)	Information	Variabel	*p-value* (sig.)	Information	*p-value* (sig.)	Information
P1	0,039	Valid	0,018	Valid	P21	0,000	Valid	0,016	Valid
P2	0,049	Valid	0,023	Valid	P22	0,000	Valid	0,021	Valid
P3	0,040	Valid	0,036	Valid	P23	0,004	Valid	0,000	Valid
P4	0,055	Tidak Valid	0,086	Tidak Valid	P24	0,065	Tidak Valid	0,000	Valid
P5	0,060	Tidak Valid	0,002	Valid	P25	0,007	Valid	0,011	Valid
P6	0,012	Valid	0,005	Valid	P26	0,019	Valid	0,000	Valid
P7	0,044	Valid	0,024	Valid	P27	0,006	Valid	0,003	Valid
P8	0,030	Valid	0,072	Tidak Valid	P28	0,078	Tidak Valid	0,069	Tidak Valid
P9	0,001	Valid	0,042	Valid	P29	0,038	Valid	0,014	Valid

Variabel	*p-value* (sig.)	Information	*p-value* (sig.)	Information	Variabel	*p-value* (sig.)	Information	*p-value* (sig.)	Information
P10	0,001	Valid	0,076	Tidak Valid	P30	0,054	Tidak Valid	0,027	Valid
P11	0,006	Valid	0,078	Tidak Valid	P31	0,012	Valid	0,008	Valid
P12	0,005	Valid	0,076	Tidak Valid	P32	0,017	Valid	0,055	Tidak Valid
P13	0,001	Valid	0,092	Tidak Valid	P33	0,006	Valid	0,000	Valid
P14	0,008	Valid	0,001	Valid	P34	0,005	Valid	0,000	Valid
P15	0,004	Valid	0,041	Valid	P35	0,011	Valid	0,026	Valid
P16	0,001	Valid	0,067	Tidak Valid	P36	0,017	Valid	0,031	Valid
P17	0,085	Tidak Valid	0,066	Tidak Valid	P37	0,039	Valid	0,082	Tidak Valid
P18	0,048	Valid	0,006	Valid	P38	0,001	Valid	0,102	Tidak Valid
P19	0,006	Valid	0,008	Valid	P39	0,002	Valid	0,004	Valid
P20	0.000	Valid	0,004	Valid	P40	0,093	Tidak Valid	0,048	Valid

The results of the Probability Validity test obtained 7 invalid variables (p-value (sig.) > 0.05. While the results of the Impact Validity test obtained 12 invalid variables (p-value (sig.) > 0.05). Furthermore, valid data (p-value (sig.) < 0.05 in the validity test again, the invalid ones were removed because they were considered to represent the indicators so that the number of probability items used was 33 variables (Table 2) and the number of impact items was 28 variables as shown in Table 3.

Table 2. Validity Test Results for Probability Questionnaire

No.	Variabel	*p-value* (sig.)	Information	No.	Variabel	*p-value* (sig.)	Information
1.	P2	0,022	Valid	15.	P23	0,015	Valid
2.	P9	0,001	Valid	16.	P25	0,010	Valid
3.	P10	0,000	Valid	17.	P26	0,030	Valid
4.	P11	0,001	Valid	18.	P27	0,009	Valid
5.	P12	0,002	Valid	19.	P29	0,021	Valid
6.	P13	0,001	Valid	20.	P31	0,016	Valid
7.	P14	0,003	Valid	21.	P32	0,007	Valid
8.	P15	0,003	Valid	22.	P33	0,003	Valid
9.	P16	0,001	Valid	23.	P34	0,007	Valid
10.	P18	0,016	Valid	24.	P35	0,004	Valid
11.	P19	0,001	Valid	25.	P36	0,024	Valid
12.	P20	0,000	Valid	26.	P37	0,017	Valid
13.	P21	0,000	Valid	27.	P38	0,002	Valid
14.	P22	0,000	Valid	28.	P39	0,001	Valid

Table 3. Validity Test Results for Impact Questionnaire

No	Variabel	*p-value* (sig.)	Information	No	Variabel	*p-value* (sig.)	Information
1.	P1	0,042	Valid	13.	P25	0,003	Valid
2.	P2	0,025	Valid	14.	P26	0,000	Valid
3.	P5	0,006	Valid	15.	P27	0,001	Valid
4.	P6	0,006	Valid	16.	P29	0,020	Valid
5.	P14	0,001	Valid	17.	P30	0,002	Valid
6.	P18	0,001	Valid	18.	P31	0,008	Valid
7.	P19	0,000	Valid	19.	P33	0,000	Valid
8.	P20	0,000	Valid	20.	P34	0,001	Valid
9.	P21	0,002	Valid	21.	P35	0,031	Valid
10.	P22	0,003	Valid	22.	P36	0,038	Valid
11.	P23	0,000	Valid	23.	P39	0,001	Valid
12.	P24	0,000	Valid	24.	P40	0,023	Valid

Based on Table 2 above, the results of the validity test show that the probability obtained 28 valid variables (p-value (sig.) < 0.05) and ased on Table 3, the data from the impact factor validity test results obtained 24 valid variables (p-value (sig.) < 0.05. Furthermore, the valid data can be continued with reliability testing.

a. Reliability test results

The results of the probability and impact reliability tests show that the questionnaire or survey is declared reliable or consistent (where the Cronbach's Alpha value is > 0.60).

Table 4. Results of Research Instrument Reliability Test

	Nilai *Cronbach's Alpha*	Keterangan
Probabilitas (P)	0,818	Reliabel
Dampak (I)	0,778	Reliabel

2. Risk Analysis

The results of calculating the risk value for the probability of risk occurring (P) and the impact of occurring (I) can be seen in Table 2 and 3. Where the results of the risk assessment are entered into the risk assessment analysis matrix table, the information obtained is as shown in the Table 6.

Table 5. Risk Assessment

Code	Indicator	Average Probability (P)	Average Impact Occurs (I)	Risk Value (P×I)	Category Risk
P2	Delay in delivery of materials from suppliers	3	3	9	High
P14	Unclear clauses in the contract	2	1	2	Low
P18	Limited site location conditions	2	2	4	Medium

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Code	Indicator	Average Probability (P)	Average Impact Occurs (I)	Risk Value (P×I)	Category Risk
P19	Work carried out simultaneously with work carried out by vendors/subcontractors	3	3	9	High
P20	The initial design did not match the reality on the ground	2	2	4	Medium
P21	There are design changes after joint measurements	2	2	4	Medium
P22	Incomplete design data	2	2	4	Medium
P23	Cost estimation error	2	2	4	Medium
P25	Poor contractor performance	2	2	4	Medium
P26	Coordination between the contractor, MK consultant and owner is not going well	2	2	4	Medium
P27	Low level of contractor management discipline	1	1	1	low
P29	Cramped work site conditions	4	3	12	High
P31	Damage to road infrastructure and public facilities	2	2	4	Medium
P33	Not paying attention to unexpected costs	2	2	4	Medium
P34	Cash flow bottlenecks	3	3	9	High
P35	Uncertainty in cost estimates	3	3	9	High
P36	Natural disasters	2	2	4	Medium
P39	Land dispute	1	1	1	low

Table 6. Risk Assessment Analysis Matrix

			IMPACT (I)				
			1	2	3	4	5
			Insignificant	*Minor*	*Moderate*	*Major*	*Catastrophic*
PROBABILITY (P)	5	*Almost Certain*	M	H	H	E	E
	4	*Likely*	M	M	H (P29)	H	E
	3	*Possible*	L	M	H (P2, P19, P34, P35)	H	H
	2	*Unlike*	L (P14)	L (P18, P20, P21, P22, P23, P25, P26, P31, P33, P36)	M	M	H
	1	*Rare*	L (P27, P39)	L	M	M	H

Information:
E : very risk (extreme risk) immediate action is needed.
H : high risk, required from management.
M : medium risk, management responsibilities must be specific.
L : low risk, handle with routine procedures.

The dominant risk factor as the most influential factor in the delay of the project implementation time, must receive special treatment in its handling so as not to cause a significant impact on the delay of the project implementation time.

Based on Table 6 in the risk assessment on the Construction of the Expansion of the Main Clinic Setara Handil Bakti Phase I, the dominant risks that occur can be seen as shown in Table 7.

Table 7. Dominant Risk Factors

No	Source Risk	Variables	Risk (P×L)	Category
1	Material	Delay in delivery of materials from suppliers (P2)	9	High
2	Construction	Work carried out simultaneously with work carried out by vendors/subcontractors (P19)	9	High
3	Environmental Impact	Cramped work site conditions (P29)	12	High
4	Financial	Cash flow bottlenecks (P34)	9	High
5	Financial	Uncertainty in cost estimates (P35)	9	High

3. Work Execution Risk Management Strategy

Based on the research results, it was found that the dominant risk in this project is the responsibility of the contractor, with five main risks that they have. The biggest risk is under the control of the contractor because the identified risk sources related to the implementation of the construction of the Setara Clinic Phase I are the responsibility of the contractor in carrying out the work. If the contractor does not handle these risks properly, this can have a negative impact on the cost, quality, and time of the project.

Table 8. Risk Management Strategy

Source Risk	Variables	Risk Management Strategy	
		Karyani, ST	Muhammad Ihsan, ST
Material	Delay in delivery of materials from suppliers (P2)	Create a priority list and combine several material supplies.	Speed up delivery and provide suitable storage space.
Construction	Work carried out simultaneously with work carried out by vendors/subcontractors (P19)	Conduct joint meetings and provide education for work completion.	Improve coordination between vendors, mutual coordination and monitoring of work progress.
Environmental Impact	Cramped work site conditions (P29)	Conduct a meeting together with the arrangement of the	It is necessary to consider increasing the area and

Source Risk	Variables	Risk Management Strategy	
		Karyani, ST	Muhammad Ihsan, ST
		work area and propose to the owner to consider adding area by clearing land behind the shophouse and land behind the hospital.	renting shophouses and land near the work location for storage and worker base camps.
Financial	Cash flow bottlenecks (P34)	Company finances must be prepared according to the progress stages so that cash flow can run smoothly.	Make payment agreements with suppliers or distributors according to terms.
Financial	Uncertainty in cost estimates (P35)	Have the latest price list.	Request price updates from suppliers or distributors.

CONCLUSIONS

Based on the analysis that has been done, the following conclusions can be drawn:

1. There are 5 (five) things that are the dominant risk factors that occur in the implementation of the Setara Handil Bakti Main Clinic Expansion Project Phase I, namely:
   a. Material factors, on the variable of late delivery of materials from suppliers.
   b. Construction factors, on the variable of work carried out simultaneously with work carried out by vendors/subcontractors.
   c. Environmental impact factors, on the variable of limited and narrow site location conditions.
   d. Financial factors, on the variable of cash flow congestion.
   e. Financial factors, on the variable of uncertainty in cost estimates.
2. Risk management strategies for the implementation of the Setara Handil Bakti Main Clinic Expansion Project Phase I by carrying out:
   a. Materials: compiling a priority list and combining several material supplies as well as accelerating delivery and providing a suitable place for storage.
   b. Construction: holding joint meetings and providing education for work completion, improving coordination between vendors, coordinating with each other and monitoring work progress.
   c. Environmental impact: Conducting joint meetings to maximize the arrangement of the work area and it is necessary to consider adding area by renting a shophouse near the work location for storage.
   d. Financial: The company's finances must be prepared according to the progress stages so that cash flow can run smoothly, have the latest price list and request price updates from suppliers or distributors.

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