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Project risk management in Yogyakarta

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ABSTRACT: The development of the construction industry is one of the important factors that can boost up the economic sector in Indonesia. However, the construction industry is highly potential for the risk of failure. The probability of risk in the construction industry is high because of the process from the designing, investment, bidding, until the construction project done is very complex. It is a common thing that the failures result in project delay, cost overruns, and the change scope of work. Risk management can reduce or even avoid the damages that resulting failures in many projects. The aim of this research is to identify and evaluate current risks and uncertainties in the construction project in Yogyakarta. It is essential for the contractors and consultant companies to understand deeply about the risk management so that both of the contractors and consultants can get more potential benefits to minimize and avoid the risks in construction project activities.

Keywords: *risk management, project management, risk identification, risk analysis, construction*

1 Introduction

The role of the construction industry is extremely important for a country. The construction industry usually links with the economic growth of a country. The development of the construction industry is one of the important factors that can boost up the economic sector in Indonesia. In 2014, the construction industry in Indonesia contributed 9.88% against the Gross Domestic Bruto (GDB), and it was ranked the 4th from 9 main sectors to the economic growth [1]. However, the construction industry is highly potential for the risk of failure.

Risk occurs through many unpredictable and uncontrollable factors. These factors can be internal factors and external factors. Flanagan and Norman said that the construction industry is subject to more risk and uncertainty than many other industries. The process of taking a project from initial investment appraisal to completion and into use is very complex, generally bespoke, and entails time-consuming design and production processes [2]. It requires a multitude of people with different skills and interests and the co-ordination of a wide range of disparate, yet interrelated, activities. The construction industry is affected not only by internal factors, but also by external factors that is uncontrollable. The aim of this research is to identify existing factors that influence risks in the construction project in Yogyakarta. This research was conducted in several ongoing construction projects in Yogyakarta and focused on the large construction project.

2 Concepts of Risk

Risk is usually defined as a positive or negative deviation of a variable from its expected value [3]. Mazouni says that the risk is an intrinsic property of any decision, it is measured by a combination of several factors like severity, occurrence, exposure to, etc. Although it is generally limited to two factors: severity and frequency of occurrence of a potentially damaging accidents that incorporate some exposure factors [4].

The risk of failure in construction industry is various. To explain, the risk in construction industry is full of uncertainty. Risk and

uncertainty can potentially have damaging consequences for the construction projects. Specifically said, the risk in construction industry can cause damages that can affect the cost, time, and also quality of the projects. Malek, Pathan, and Mal argued that the risk can be described as a systematic methodology and continuous process in which events that may significantly affect the final product can identify, quantify, model, manage and monitor [5].

The risks in construction industry related to many aspects. It can be related to the management system, technical system, and also the natural disasters. Risk definition can be different from one person to another. It is depend on their own point of view. Good risk management system in the construction industry can avoid many problems through many proactive actions that can make the project under control.

In the risk management, the risk analysis is followed by the risk response. The risk response is used to control the risks that happen in the construction project. There are five categories of classic risk response strategies: accepting, avoiding, monitoring, transferring and mitigating the risk [6].

3 Risk Identification and Analysis

The current risk management procedure includes the following main steps: risk identification, analysis, evaluation, and control. Yet these steps can be further divided to include risk response and monitoring which in turns will result in obtaining a controlled risk environment [7].

3.1 Risk Identification Method

This research used likert scale (rating scale) type questionnaire to identify the existing factors that influence risks in the construction project in Yogyakarta. A rating scale provides more than two options. Respondents were offered a choice of five responses toward the intensity of an accident. The questionnaires are distributed either to contractor or consultant in the construction projects in

Yogyakarta. Secondary data obtained from the literature study with variety of library books, articles, and journals to know the basic theories and support this research data analysis.

In order to know the existing factors that influence risks in the construction project in Yogyakarta, several methods, such as percentage method, mean method, and also standard deviation method, were used. The data already obtained from the questionnaires were analyzed by using Microsoft Excel 2013. The results were analyzed descriptively. The result data were presented in the form of table to be easy to understand.

3.2 Questionnaire Composition

The questions in the questionnaire are referring to the journal of Risk management in construction industry by Mehmod et al. (2010). The questionnaire is divided into four different parts.

1. First Part: It contains the respondents' information that was presented into several characteristics, such as company type of the respondents, respondents' position in the company, latest education status, and also age of the company.
2. Second part: This part contains the factors that influence risks in the construction project based on the type of risks namely, technical risks, logistical risks, management related risks, environmental risks, financial risks, and socio-political risks.
3. Third part: Common source of risks that happened in the construction project.
4. Fourth part: Response to risks. There are five categories of classic risk response strategies: accepting, avoiding, monitoring, transferring and mitigating the risk.

5 Result and Discussion

5.1 Technical Risks

Table 1 Technical Risk Factors

No	Technical Risk	Mean	SD	Rank
1	Risks occur because of inadequate site investigation	3.44	0.98	3
2	Risks in the construction project occur because of the incomplete design of the project	3.44	0.80	4
3	Inappropriateness of specifications in the construction project can make the risks occur	3.69	0.93	1
4	Risks in the construction project occur because of the uncertainty over the source and availability of materials	3.38	1.00	5
5	Similar nature of previous project with the current project will enhance the success of the current project	2.78	0.75	6
6	Lack of staff expertise and experience will lead to time delays, estimated cost upsets, and poor quality	3.66	0.87	2

This result confirmed that the inappropriateness of specifications in the construction project was usually the most common factor of technical risk that can affect the project. Inappropriateness of specifications in the construction project might affect the building quality and safety.

5.2 Logistical Risks

Table 2 Logistical Risk Factors

No	Logistical Risk	Mean	SD	Rank
1	The availability of sufficient transportation facilities can influence the construction project activities	3.47	0.76	1
2	The availability of resources (construction equipment, spare parts, fuel, and labor) can influence the construction project activities	3.41	0.76	2
3	Abundance of resources does not guarantee against risks	3.13	0.71	3

This result showed that the availability of transportation facilities could affect the logistical distribution to the construction project. This factor usually led to time delays and also the estimated cost upsets.

5.3 Management Related Risks

Table 3 Management Related Risk Factors

No	Management Related Risk	Mean	SD	Rank
1	Uncertainty of the productivity of resources can make the risks occur	3.28	0.68	3
2	Risks occur because of the industrial relations problems	2.97	0.74	5
3	Stability of the project team (team shares the same vision and direction) will lead successful achievement of goals	3.41	0.80	2
4	The probability of problem occurrence increases due to the team size	3	0.88	4
5	Risks occur because of the difficulty of communication between the project team	3.44	0.98	1

This particular matter showed that based on the respondent experience, the risks related to management related risks usually occurred because of the difficulty of communication among the project team. The difficulty of communication in the project team could lead into the project unsuccessfulness.

5.4 Environmental Risks

Table 4 Environmental Risk Factors

No	Environmental Risks	Mean	SD	Rank
1	Weather and seasonal implications affecting the risks in the project	3.84	0.92	1
2	Risks occur because of the natural disaster	3.34	0.97	2

This result showed that weather and seasonal implication became the main factor affecting the progress of the construction activities. The natural disaster could also affect the construction activities but it rarely happened.

5.5 Financial Risks

Table 5 Financial Risk Factors

No	Financial Risks	Mean	SD	Rank
1	Financial risks happen because of the availability and fluctuation in foreign exchange	2.75	0.95	2
2	The delays in payment causing the financial risks in the construction project	3.28	0.92	1
3	Financial risks usually occur because of the inflation	2.53	0.95	4
4	Local taxes causing the financial risks in the construction project	2.69	0.90	3
5	Repatriation of funds can cause the financial risks	2.41	0.76	5

This result explained that the delays in payment would cause the financial risks in the construction project. The delay of payment in the construction project might influence the supply chain of payment in whole construction process that would lead to project delay.

5.6 Socio-political Risks

Table 6 Socio-political Risk Factors

No	Socio-political Risks	Mean	SD	Rank
1	Risks happen because the constraints on the availability and employment of expatriate staff	1.91	0.78	4
2	The risks affected by the customs and import restrictions and procedures	2.31	0.74	3
3	Difficulties in disposing of plant and equipment causing the socio-political risks in the construction project	2.44	0.72	1
4	Risks occur because of the insistence on use of local firms and agents	2.38	0.75	2

This result showed that the disposing of plant and equipment would cause the socio-political issues if it was placed illegally in the wrong place. Disposing of plant and equipment illegally would attract fine issues as penalty infringement notices.

5.7 Common Sources of Risks

Table 7 Common Sources of Risks

No	Common sources of risks	Mean	SD	Rank
1	Changes in project scope and requirements	3.22	0.83	4
2	Design errors and omissions	3.38	0.79	3
3	Inadequately defined roles and responsibilities	3.19	0.69	5
4	Insufficiently skilled staff	3.41	0.80	1
5	Subcontractors	2.78	0.66	7
6	Inadequate contractor experience	2.66	1.00	8
7	Uncertainty about the fundamental relationships between project participants	2.41	0.76	9
8	New technology	2.31	0.74	10
9	Unfamiliarity with local conditions	2.94	0.76	6
10	Force majeure	3.38	1.04	2

This result showed that insufficiently skilled staff was commonly the main cause of risks in the construction project. The new technology did not really cause risks. In fact, it usually made the work in the construction projects easier.

5.8 Response to Risks

Table 8 Response to Risks

No	Response to Risk	Mean	SD	Rank
1	Accepting the risks, not doing anything about it	2.09	1.03	5
2	Avoided the risks by not doing part of the project which contain risks	2.25	0.80	4
3	Monitor the risks and prepare contingency plans	3.5	0.76	1
4	Transfer the risks by purchasing insurance for risks ranging from theft to fire.	3.13	1.13	2
5	Mitigate the risks. Mitigation is process of response to the risks after it has affected the project	3.13	0.83	3

This result showed that most of respondents prefer to monitor the risks and prepare contingency plans to solve the risks. Regarding to the respondents' answers, it could be concluded that it was better to prepare contingency plans so that the construction team had already

had alternative courses of action prepared before the risk event occurred.

6. Conclusion and Recommendation

The results of this research study enlightened that factors influencing the current risk and uncertainties in the construction project in Yogyakarta were:

- a. Inappropriateness of specifications in the construction project
- b. Availability of sufficient transportation facilities
- c. Difficulty of communication between the project team
- d. Weather and seasonal implications
- e. The delays of payment
- f. Difficulties in disposing of plant and equipment

Most of the respondents preferred to monitor the risks and then prepare the contingency plans as the alternative courses of action before the risk event occurs. The perception of respondents in this research study was mostly based on respondents' knowledge and experiences in the construction industry.

It is essential for the contractors and consultant companies to understand deeply about the risk management so that both of the contractors and consultants can get more potential benefits to minimize and avoid the risks in construction project activities. Further research study in different city in Indonesia is essential to conduct in order to help contractors and consultants in deciding actions to avoid, handle, and control risks under different circumstances.

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