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The Influence of Risk Management on Construction Project Performance: A Case Study

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Abstract

Risk Management is recognized as an important exercise that creates value to a project and improves project performance. Time, cost and quality are the primary measures of a project performance in this industry. The success or failure in any construction project can be monitored through the attainment of these primary measures. Notably, Malaysian construction industry is considered as one of the important industries that positively contribute to the increase of Gross Domestic Product and subsequently the growth of the country's economic development. Unfortunately, this industry suffers poor performance in which it leads to failure in accomplishing effective time, cost and quality performance. Most construction projects face a schedule delay, cost overrun and are poor in product quality. Thus, the aim of this study is to determine the influence of risk management on construction project performance of Malaysian companies based on these three primary measures. The degree of diffusion of risk management practice in the chosen construction project in Malaysia is also examined. The methodological approach exploited in this study is a case study approach involving analysis of documented data and face-to-face interviews with key players that hold different roles and responsibilities. They include a director, project managers, finance managers, contract managers and quantity surveyor managers. The results demonstrate that adopting effective risk management practices positively impacts project performance thus leading to project success. Nevertheless, the lack of knowledge and poor communication of risk management practices in construction projects contribute to the weak implementation of an effective and systematic risk management practices in Malaysia.

Keywords: Risk management; Construction project; Project performance.

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1. Introduction

The contribution of the construction industry in the increase of Gross Domestic Product and to the growth of the economy of one country has been unprecedented over the past decades. Hence, construction industry in Malaysia is acknowledged as a major productive sector and plays a crucial role in the development of a country (Ofori, 2015). However, the construction industry is surrounded with negative comments namely, being unable to cope with risks thus facing problems reflecting poor performance in cost, time and quality management. These problems could result in major project failures. Such challenges increase as the industry is a highly dynamic industry with risks and uncertainties inherent more than any other industries. Risk is an essential element and exist in all projects regardless of size or complexity (Ali *et al.*, 2014b; Khan *et al.*, 2014). Risks in a project management should be properly managed, otherwise the project is likely to fail. Thus, as project managers, they should do a proper and effective analysis and strategies to deal with those risks. Many literatures have outlined risk management procedures or steps to be followed in order to manage any types of risks. The steps include risk identification, risk analysis, risk response and risk monitoring. These broad and systematic way of risk management practice aim to achieve the project objectives and to deal with risks and uncertainties which may stem in any project proactively.

Nevertheless, in Malaysia, there is lack of investigation on the influence of risk management practices on project performance whereby many studies are curbed to the implementation or practice of risk management in the country under study. Previous literature also provides little evidence on the results or outcomes from the implementation of risk management, and less attention given to the indicators that determine project performance. Besides, there is lack of data collection in which previous studies carried out. Most of the studies were limited to only one participant. The absence of existing literature on this subject is unfortunate, thus post a hitches to improve the performance of any construction project as there is no point of reference for betterment. This shortcoming provides a gap that motivated the researchers to investigate on the extent of risk management practices influencing construction project performance.

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This paper is presented as follows. Next section provides literature review which consists of the explanation on the risk management in construction industry, project performance and contingency theory. This section is followed by methodology section that provides the research method used to conduct this study. After that, a section of discussion of results is presented. Last section concludes this study.

2. Literature Review

2.1. Risk in the Construction Industry

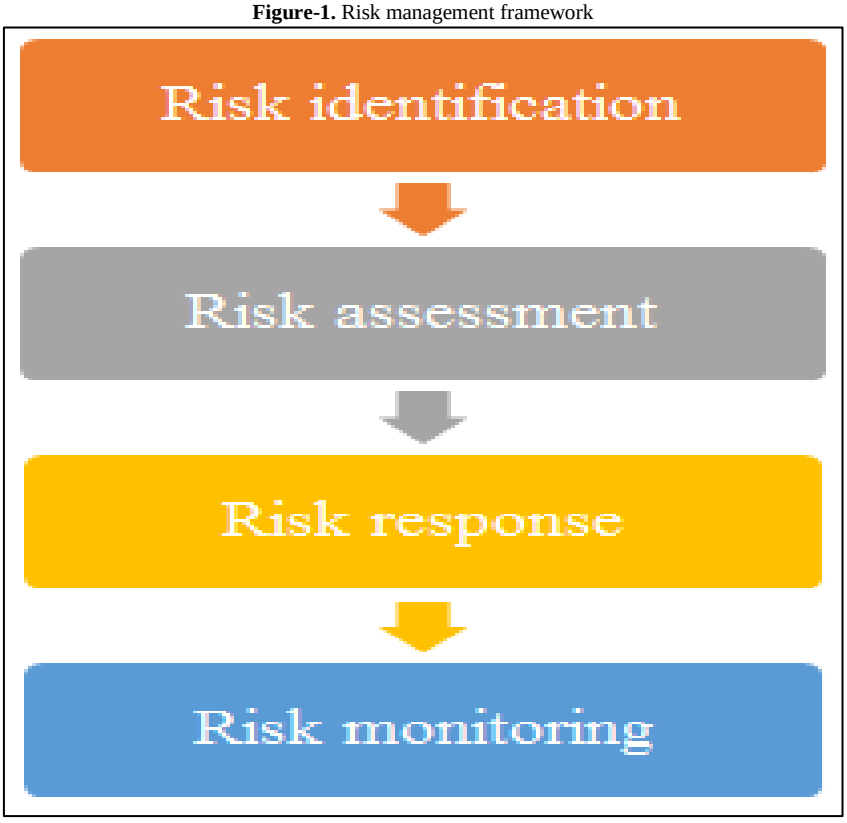
The construction industry is a highly dynamic industry (Ofori, 2015). It makes risks and uncertainties inherent more than any other industries. This is because risk is a vital component of any project and in existence, irrespective of the size or complexity of the project (Ali *et al.*, 2014b). There is no project that is totally free from risks. Any build-in risk and uncertainties which are left unaddressed could have a detrimental effect on the whole performance of a construction project in respect of cost, time, and quality (Ehsan *et al.*, 2010; Kululanga and Kuotcha, 2010). These risks are several times more severe and visibly apparent in construction projects than other industries (Gajewska and Ropel, 2011) with the exposure of risks and uncertainties stemming from the start to the completion of any project (Hamzah *et al.*, 2015). The setbacks or risks become greater towards the completion of the construction project as the risks often tend to be interrelated in each phases of the construction project (Goh and Hamzah, 2013). As such the construction industry is widely known as one of the riskiest and challenging industry as it is often overloaded by different levels and combinations of risks regardless of its size (Ali *et al.*, 2014b; Salihudin *et al.*, 2009).

2.2. Risk Management

In general, (Gajewska and Ropel, 2011) define risk management as a systematic application of management policies, processes and procedures of identifying, analysing, assessing, treating, monitoring and communicating risks. Other researchers such as Liu and Low (2009), Siang and Ali (2012), Mahendra *et al.* (2013) and Hamzah *et al.* (2015) define risk management as a process of identifying, assessing, evaluating and managing risks. They also defined risk management as a set of techniques developed to control the influences brought on by risks and uncertainties and assists in facilitating the decision making process. The aim of risk management is to identify sources of risk and uncertainty, determining their impact, and developing appropriate management responses. The fundamental to truly have a successful risk management is the core challenge for companies (Ali *et al.*, 2018).

In respect of risk management process, previous studies such as Gajewska and Ropel (2011) and Aven (2016) have described that risk identification, risk assessment and risk response as well as risk monitoring as the main stage of risk management process. To accomplish this process, the key players of any projects should have the skill to identify, assess and be able to manage risks and ensure that risk information is effectively been disseminated (Ali and Taylor, 2014a). Figure 1 below illustrates the general risk management framework.

Figure-1. Risk management framework



Previous studies such as Zou *et al.* (2006), Liu and Low (2009), Mahendra *et al.* (2013) and Hamzah *et al.* (2015) also described that the risk management technique contains a series of steps, namely, risk identification, risk

analysis and prioritization, risk response and risk control and risk monitoring. The practices or implementation of risk management in managing a construction project is widely recognized as an effective way in dealing with risk associated with construction projects. Risk management is perceived as a means to look into risks in a systematic way. On top of that, risk management is observed to identify sources of risks and uncertainties, to determine the impact, to develop appropriate response and deliberately determine how each risk should be treated (Ehsan *et al.*, 2010). It is also perceived to be a process that creates values to a project and improves project performance in term of cost, time and quality (Kang *et al.*, 2015; Kululanga and Kuotcha, 2010; Siang and Ali, 2012). Hence, it is not arguable that risk management is the most vigorous procedure to cope with project risk and uncertainties in a construction project (Kang *et al.*, 2015). Thus, the risk management process is an essential element in the decision-making process in construction projects and is a vital procedure in the field of project management and should be proactively carried out throughout the life cycle of any construction endeavors (Siang and Ali, 2012).

2.3. Project Performance

The construction industry in the region and the world including Malaysia experience a high risk of poor performance (Aftab *et al.*, 2012; Goh and Hamzah, 2013; Siang and Ali, 2012). Poor performance in a construction project is not an uncommon situation (Enshassi *et al.*, 2009; Ibironke *et al.*, 2013). It is viewed as a critical issue and should be dealt with concern. In the traditional point of view, the project performance in a construction industry can be gauged by the three legs of triple criteria, namely, the completion of a project on time with it signifying quality and cost effectiveness (Salihudin *et al.*, 2009). Hence, the success or failure of a project is determined when the project is completed within a budget on time and is performed according to the required designed in terms of specification and quality (Atkinson, 1999; Bannerman, 2008).

2.4. Contingency Theory

The construction industry is renowned for its unique and dynamic sector (Ofori, 2015). This makes the industry operate under an uncertain and changing environment depending on the size and complexity of each project. Hence, such condition shows that there is no one best way to manage the risks and uncertainties in a construction project (Ghahramanzadeh, 2013). Thus, the contingency theory is perceived to be an appropriate theoretical framework for such circumstances as the main concept of this theory is in line with the objectives of this study through two conditions as described by Ghahramanzadeh (2013) in which i) the existence of universal principles for management and organizations, and ii) the uniqueness of each organization thus requiring analyzing each situation. In other words, the contingency theory is perceived as adapting a new way for specific activities based on the current requirement or condition where the all-purpose theories or one size fit all is no longer suitable in such a situation (Ritchie and Marshall, 1993). The aim of the contingency theory is to improve construction performance by effectively responding to uncertainties where a contingency is created to remove or reduce the negative outcomes of unforeseen events by a) determining the probability of relationship between activities and environment, and b) identifying the responses to these elements. In conclusion, the theory recognizes that there is a range of risks and each risk has its own impact on the construction project with the suitable theory incorporating the contingency theory is applied to cover these influencing factors depending on the situation and in this context of the Malaysian company under observation here.

3. Methodology

In an effort to understand how the practice of risk management in a project influences project performance in construction companies in Malaysia, a qualitative study is conducted and few criteria have been established to ensure the study is current and relevant. A construction company in Malaysia is selected based on the criteria, namely, establishment, type and grade of contractor, scope of work, project value, award or recognition. Based on these criteria, company ABC Sdn Bhd in Malaysia was selected as the company has been incorporated since 1991 and has experienced over the decades in construction industry. ABC Sdn Bhd managed to develop and enhanced the company capabilities across the spectrum of construction industry to include buildings, road and bridges, water supply infrastructure and other civil engineering works. ABC Sdn Bhd is currently registered as a Class A contractor with *Pusat Khidmat Kontraktor* (PKK) and graded as Grade 7 with the Construction Industry Development Board (CIDB) of Malaysia in which enables the ABC Sdn Bhd to handle project value greater than RM10,000,000,000 or in other words, the graded has enables the company to participate in tenders of private and/or public projects of unlimited contract amount, as well as other negotiated projects, including those offered under design-and build specification and other similar scopes. Besides, ABC Sdn Bhd also has demonstrated and proven its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements by receiving certification of an ISO company by SIRIM QAS International Sdn Bhd.

After a discussion with the management of ABC Sdn Bhd, a case study is conducted to a randomly selected construction project of the company. Using this method, it is possible to gauge the practice of risk management in ABC Sdn Bhd. By using a triangulation of data which include face-to-face interviews and analyzing documented information, the aim is to enhance the reliability and validity of the study. The underlying principles of risk management execution in the construction project and its effects on project performance is explored. A set of semi structured interview questions was created based on previous studies to guide the researchers in this study to gain information on the impact of risk management on project performance. Face-to-face interviews were carried out on key players holding different roles and responsibilities in the project. They include a director, project managers,

finance managers, contract managers and quantity surveyor managers. The interviews were recorded via a voice recorder and were saved in a separate file. This study was also supported by the analysis of documented data with the aim to support the findings and increase validity towards the results obtained. Hence, all the necessary information or documents with regards to the project under study were gathered and extensively reviewed. They include the risk register, master work program, critical path method, S-Curve, letter extension of time, project cost analysis, technical specification approval and monthly manpower report. Content analysis was used to analyse the influence of risk management practices on project performance.

4. Results and Discussion

The project observed in this case study was related to a construction of a hospital. The hospital project is targeted to be the first comprehensive, dedicated, specialist referral rehabilitation hospital operated in Malaysia and in South East Asia. The project was initiated by the Ministry of Health with the assistance of the Malaysian Public Works Department or *Jabatan Kerja Raya Malaysia* (JKRM) with a mission to help rebuild lost functional abilities after illness or injury. The project was also known as *"Cadangan Merekabentuk, Membina, Menyiapkan, Mengujiterima, Mentauliah, dan Menyelenggara Hospital Rehabilitasi"* for a contract with the total of RM 341.90 million. The construction period of the contract is 144 weeks. The date for possession of site is 15 February 2008 and the date for completion is 18 November 2010. The project comprises a 2-storey main block in which Class D (30 units), Class F (100 units) and Class G (120 units) are located at the upper level while Nurses' Hostels (42 units) and Meditel (20 rooms) are located at the lower level. The hospital is supplied with ample reciprocity facilities and parking facilities.

The construction of the project was made on the piece of land that was previously used to construct a hospital in the early 1950s. However, due to some unforeseen circumstances in 1950s the hospital project were abandoned and part of the building developed were used as a health clinic. The abandoned hospital covers one-third of the entire site and two third of this land is filled with sekunder plants. This is a redevelopment project to transform the abandoned hospital project into a rehabilitation hospital to be used by November 2010. The construction work for this project can only be started after the completion of the demolition of the abandoned building. Among the construction works include in this project are works such as site clearing and earthwork, piling works, building works, demolition and restoration works, mechanical works, electrical works, information technology works, medical and non-medical equipment, furniture and vehicles, external works, testing and commissioning.

The life cycle of this project consists of six phases which include the following: (i) pre-project phase; (ii) planning and design; (iii) contractor selection; (iv) project mobilization; (v) operations and (vi) close-out and termination phase. Risk or uncertainties is inherent in the construction industry throughout the project's life cycle. Hence, it is crucial to identify and understand the risks and uncertainties in managing a construction project.

It was found that, risk management was part of the process conducted by the management in constructing rehabilitation hospital project. However, not all four steps of risk management process as described in the risk management framework is being carried out whereby the practice has missed the last step which is risk monitoring. Note that, risks and risk management process was perceived by key players within the studied project in various ways. Despite the various ways of defining risk, what makes it more interesting is that everyone unanimously perceived risk as something negative which should be avoided. For risk management, it was not described as the structured form of identification, analysis, response and monitor by respondents, but rather as a process of managing risk in which everyone is in fact using risk management but they are not aware and do not realize that they are actually putting to practice risk management process.

Lack of knowledge in the risk management could be one of the reasons for not practicing risk management in a systematic way as described in the risk management framework. Still, the respondents do acknowledge that it is crucial to identify risks or uncertainties at an earlier stage, and continuously. Most of the respondents perceive that continuous monitoring risk also essential as an effective way to identify issues and deal with problems before it is too late.

Brainstorming and discussion with experience people were recognized as an efficient method used to identify risk and was considered as the most cost and time saving way. The respondents were employing a variety of methods to prioritize identified risks when assessing and evaluating the probability of the occurrence of the risk as well as its impact on time, cost and quality where the most common way is by setting a ranking from the most critical risk with the greatest negative impact on project performance to the least critical with a low influence on the project.

The appropriate action should be taken in identifying risks based on its impact and likelihood. Hence, the respondents acknowledge that there is no one best way to manage risk and there is no specific approach in dealing with risks in which decision to respond to risk would depend on the situation that surrounds one's project. There are four ways to respond to risk which include risk avoidance, risk reduction, risk transfer and risk retention or acceptance. The appropriate strategies will be taken by taking into consideration information such as finance, costing, timeframe and man-hour that fall under desired budget and which can save time and promote or enhance the quality of the project which ultimately improves project performance.

Finally, risk monitoring which is among one of the vital steps in the risk management process requires a continuous supervision over the risk management process in order to discover new risks, to keep track the identified risks and eliminate past risks from the assessment and made of projects (Project Management Institute (PMI), 2013). Consequently, the performance of the project is dependent on the efficiency in the project management processes in every phase of the project where the most important factors to determine the project performance are time, cost and quality which are commonly referred to as the triple constraints. It is used as a benchmark to measure the success or

failure of one's project. Therefore, applying principles of risk management will support quality improvement and cost estimation by identifying and mitigating potential risks before a project begins. These principles will allow the management to receive organised and adequate risk information early enough to apply corrective actions that will allow realistic schedule and correct cost estimates thus reducing sudden surprises, assuring successful completion of the project and enhancing profit margin. Thus, there is a strong link between the amount of risk management undertaken in a project and the level of success of the project where the more project uses risk management, the more successful the projects are likely to be. This is because, a significant risk that is not identified and mitigated will become a real problem at some point during the project life cycle.

The project under study, had a very high incidence of occurrence of identified risks in risk identification and its impact on the identified risks on project to mitigate the risks. The impact of these risks was quite high and resulted in cost variation and delayed schedule to the chosen project under study. However, the impact was minimized due to the practice of risk management at an early stage. Therefore, the performance of the project under study was evaluated in the same parameter of other studies. As a result, the project was found to have deviated from its scheduled completion in 15 months, budgeted cost increasing by 21% and quality of work carried out to increase by 39%. However, at the same time, the project managed to be profitable though at a slightly reduced in profit margin by 15%. It was also identified that the major cause for the project not meeting completion date was the ineffective implementation of risk management process. Lack of knowledge and poor communication compounded the problem. Without effective risk management, the people involved in the project especially the project manager would react to the risks as they occur. Thus, to ensure the project is succeed, the continuous effective risk management has to be applied in managing a construction project in which it will help to identify the key risks, assess them and plan a mitigation or contingency effort to keep track of risk elements, to gauge what is being done about them and to identify new risks.

5. Conclusion

The construction project in Malaysia and generally in the region and the world is confronted often with major project failures due to ineffective management. Many projects run a high risk of being well over budget, are completed significantly late and display poor work quality as well as having a detrimental effect on the overall performance of construction project. Hence, risk management with the adoption of a contingency theory is deemed necessary to minimize the negative impact and thus improve project performance. Therefore, the objective of the study was to investigate the extent of risk management practices in the chosen construction project in Malaysia. This study is also conducted to examine the influence of these practices on project performance by deploying the contingency theory.

It was found that, the qualified members of the project deployed risk management in constructing the rehabilitation hospitals to ensure they are be able to gauge any issue arise. However, the management do not incorporated all four stages of risk management process as described in the risk management framework. Risk monitoring is not in present in this study.

It can be concluded that, the risk management process was not continuously performed throughout the project life cycle. Furthermore, the practice was limited to certain individuals in which other key peoples of the project did not take part in the development of risk management. Other key peoples also did not provide output from the development of risk management prior to commencement of construction work. This is due to the practice or development was not properly communicated. Subsequently, this study indicates that though most respondents have not studied risk management but it is widely being practiced in an informal or ineffective manner. However, the decision-making process throughout the project life cycle was done without referring to risk management as stated in the risk register and the process of risk management was not carried out throughout the project life cycle.

Even though risk management process was practiced in the project and was done at an early stage of construction project with the idea of contingency theory in the development of risk register and decision-making process, the project still confronted with a schedule delay. This is because the study identified an ineffective level of risk management practice at the chosen construction project in Malaysia where such circumstances happened because risk management process was done without the involvement of all key players in the construction project. Therefore, their opinions were deemed in the development of risk register to identify potential risks, their impacts and likelihood and mitigation plans.

Additionally, poor communication of risk management process or the output from the development of risk register and risk management process was not carried out throughout the project life cycle. These contributed to the ineffective level of risk management practice. This is because not all main players involved in the risk management process and the development of risk register. Risk register is important to identify the risks, their impacts and the mitigation plans. Hence, the impacts of identified but unmitigated risks were found to be high.

Various key players had different ways of mitigating various risks but the formal practice of risk management could have provided the project a chance in managing risks in the most efficient way. However, combined effort of the whole team would have been the best way in mitigating the risks. Thus, the project experienced a delay. However, the delay is not perceived to be significant in which the budget had not overrun, and the project was accepted by the client with the profit margin for the project having reduced. In conclusion, this study indicates that risk management practices in construction project with the idea of the contingency theory has a large influence on project performance. Nevertheless, the lack of knowledge and poor communication of risk management practices in construction projects are barriers to an effective and systematic implementation of risk management practices in Malaysia.

This study was conducted with the aim to provide a significant and influential contribution to the knowledge of risk management practices and the contingency theory by modifying the theory from a conceptual one to a more tangible and meaningful theory in the Malaysian construction industry – with greater emphasis on the risk management practices and its effects on project performances. This study has identified ineffective risk management practices as the cause of poor project performance. It is strongly recommended that an effective and structured risk management practice at the early stage of the construction project and throughout the project life cycle and with the involvement of all key players in the construction project come to play. This study also proposes continuous development on risk management seminars for all professionals in Malaysia. Finally, the findings of this study will contribute to an extensive literature on the efficacy of risk management practices in mediating project performance/success and to provide a basis for future studies.

This study is without its limitation. Firstly, this study was conducted in the construction industry in Malaysia. Hence, the findings may not be generalised to other countries. Secondly, the data was collected from a single case study. Therefore, the results (while valid for the chosen case) cannot be generalized across the board. Future research may look into a comparative method and multiple case studies such as a comparative study between public and private companies, a comparative study between Malaysia and other countries and an in-depth analysis of the issue.

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