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Risk management in small construction projects in Singapore: Status, barriers and impact

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Abstract

Risk management (RM) should be implemented in construction projects to assure the achievement of project objectives, regardless of project size. This study aims to investigate RM in small projects in Singapore in terms of status, barriers and impact of RM on project performance. To achieve the objectives, a questionnaire survey was conducted and data were collected from 668 projects submitted by 34 companies. The analysis results indicated a relatively low level of RM implementation in small projects, and that "lack of time", "lack of budget", "low profit margin", and "not economical" were prominent barriers. Also, the results reported the positive correlation between RM implementation and improvement in quality, cost and schedule performance of small projects, respectively. The findings of this study can provide an in-depth understanding of RM in small projects in Singapore and make benefits of RM convincing to the participants of small projects.

Keywords: Risk management; Small projects; Implementation; Barriers; Impact; Project performance

1. Introduction

The construction industry has become one of the sectors that significantly contribute to Singapore's economy. According to the Building and Construction Authority (BCA, 2012), Singapore's construction demand, measured by total value of construction contracts awarded, increased by 16% year-on-year from S$27.6 billion (US$1.00 ≈ S$1.25) in 2010 to S$32 billion in 2011. It is worth noting that more than half of construction tenders in 2011 were for smaller projects with value up to £6.5 million (≈ S$12.85 million) (UKTI, 2011). Thus, it is important to ensure the successful deliveries of small construction projects in Singapore.

At any stage of a life cycle, a project is plagued with various risks due to the complex and dynamic nature (Zhao et al., 2010). Thus, risk management (RM) should be emphasized and implemented in construction projects, regardless of the project size, to assure the achievement of project objectives. According to the Project Management Institute (PMI, 2008), project risk is an uncertain event that, if it occurs, impacts at least one project objective (e.g. quality, cost, time, etc.), and project RM intends to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project. Thus, project RM implementation would improve project performance through assuring the achievement of project objectives and pursuing opportunities to increase the positive impacts on these objectives. The project RM process consists of RM planning, risk identification, qualitative and quantitative risk analysis, risk response planning, and risk monitoring and control. In addition, project RM has been considered as one of the nine project management knowledge areas (PMI, 2008) and enables stakeholders to understand risk impacts on project performance (Chapman and Ward, 2003).

Like other management approaches, RM implementation needs the investment of various resources. However, previous studies (Griffith and Headley, 1998) indicated that, in small projects, the time spent on management would be disproportionate

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to the project costs. In addition, small and medium contractors (SMCs) may not be capable of effectively managing risks in their small projects due to the lack of internal knowledge (WSHC, 2011). Nonetheless, RM implementation in small projects should be emphasized and improved. Thus, to make the benefits of RM convincing to the participants of small projects, the impact of RM on project performance should be investigated.

The objectives of this study are: (1) to investigate the status quo of RM implementation in small projects in Singapore; (2) to identify the barriers to RM implementation; (3) to capture the perceived importance of RM in improving project performance; and (4) to explore the perceived impact of RM on project performance. Thus, the findings of this study provide practitioners, especially the participants of small projects, with a clear understanding of the status quo of RM implementation in these projects and confirm the benefits of RM in terms of the positive impact on project performance. Also, as few studies have focused on RM in small construction projects, this study contributes to the body of knowledge relating to the management of small projects.

Following the introduction to this study, the second section provides the background information relating to the characteristics of small projects and RM in this type of projects. In the third section, research methodology and a profile of the respondents are presented. Then, data concerning the RM status quo, barriers to RM implementation and impact of RM on project performance are analyzed, and the results are discussed in the fourth section. Finally, the fifth section draws conclusions of this study and recommends further research.

2. Background

2.1. Small projects

Despite no consensus on the definition of small projects, previous studies have provided some characteristics of these projects. The Construction Industry Institute (CII) indicated that judging whether a project was small mainly depended on intuition that reflected the firm size, type of work, current work volume and management approach (CII, 1991). Also, the CII (2001) revealed that small projects would have less staff and formal controls, higher project contingency, and more standardized process and use of checklists. In addition, Griffith and Headley (1998) believed that small projects were likely to have short duration, higher uncertainty and limited formal documentation, and considered the disproportion between the management investment and the project costs as the main problem in small projects. Moreover, Dunston and Reed (2000) recognized that small projects were those with the following characteristics: repetitive or routine work; simple or uncomplicated construction process; maintenance projects; renovations, remodeling or upgrades; and total project costs less than US$1 million. Furthermore, based on the previous studies, Liang (2005) believed small projects should have at least one of the following characteristics: project costs between US$0.1 million and US $5 million; project duration of 14 months or less; project site work-hours up to 100,000; and projects do not need full-time project management resources or a significant percentage of firm resources. With the reference to Liang (2005), the scope of this study is limited to the projects worth from US$0.1 million to US$5 million or those lasting less than 14 months.

2.2. Risk management in small projects

Small projects are prone to more risks as they face more challenges than large projects due to their innate characteristics such as resource constraints, tight project schedule, competition and low profit margin (Smith and Bohn, 1999). Hence, small projects should be managed diligently to prevent schedule and cost overruns. However, RM is often overlooked because RM is a tedious and costly strategy involving intensive information gathering and analysis (Mubarak, 2010). In Hong Kong, Mok et al. (1997) found that only 35% of project players emphasized RM in projects costing less than HK$10 million while more than 90% recognized the importance of RM in projects worth more than HK$100 million.

Previous studies indicated that the SMCs mainly contracting small projects did not attach adequate importance to RM in small projects because these contractors lacked sufficient internal knowledge on RM (Ho and Pike, 1992; Smith and Bohn, 1999), especially on the application of risk analysis techniques (Frey and Patil, 2002). Also, due to the disproportion between the resources required to conduct RM and the low profit margin of small projects, many SMCs were discouraged from investing in RM (Griffith and Headley, 1998). Moreover, intense competition forces SMCs to price their bids so low that they cannot have excess budget for contingency (Smith and Bohn, 1999).

Various studies revealed that the benefits of RM were tremendous in construction projects. For example, RM could improve the quality of cost estimate and decision-making (Mills, 2001; Mok et al., 1997), help projects completed on time and within budget (Ali, 2000), lower transaction costs and facilitate better risk allocation (Klemetti, 2006). However, few studies have indicated the benefits of RM in small projects and the impact of RM on project performance, such as project quality, costs and schedule. Given the innate characteristics, the benefits and impact of RM in small projects may be different from those in larger projects and are worth investigation.

As only a limited number of studies have focused on RM in small construction projects, this study expands the existing literature by investigating the implementation status and impact of RM on project performance in small construction projects in Singapore. It merits attention that this study focuses on formalized and standardized RM rather than implicit RM. This is because a formalized and standardized risk management process has been widely seen as a critical attribute to measure the risk management capability or maturity in previous studies (e.g. Hillson, 1997; Hopkinson, 2011; Ren and Yeo, 2004; Zou et al., 2010). Also, a formalized and standardized risk management process facilitates the cultivation of strong risk awareness and the flow of risk management information throughout the entire project life cycle.