

Understanding the key risks in construction projects in China

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Abstract

The aim of this paper is to understand the key risks in construction projects in China and to develop strategies to manage them. Risks were prioritized according to their significance of influences on typical project objectives in terms of cost, time, quality, safety and environmental sustainability, and then scrutinized from a joint perspective of project stakeholders and life cycle. Postal questionnaire surveys were used to collect data, based on which a total of 25 key risks were ascertained. These risks were compared with the findings of a parallel survey in the Australian construction industry context to highlight the unique risks associated with construction projects in China. Strategies to manage the risks were sought from the perspectives of project stakeholders and life cycle and in light of the Chinese construction culture. It is concluded that clients, designers and government bodies should take the responsibility to manage their relevant risks and work cooperatively from the feasibility phase onwards to address potential risks in time; contractors and subcontractors with robust construction and management knowledge should be employed to minimize construction risks and carry out safe, efficient and quality construction activities.

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1. Introduction

Construction projects are one-off endeavours with many unique features such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures [1,2] and such organizational and technological complexity generates enormous risks. The diverse interests of project stakeholders on a construction project further exacerbate the changeability and complexity of the risks [3]. While risks cannot be eliminated, successful projects are those where risks are effectively managed, of which early and effective identification and assessment of risks is essential [2]. Starting with a focus on what is to

be achieved in a construction project (i.e., project objectives), risk management process builds to an understanding of what might put goals in jeopardy and what should be done to ensure success.

The rapid growth of the Chinese economy calls for massive development of infrastructures and assets [4–6]. While this brings opportunities to project stakeholders, employing effective risk management techniques to cope with risks associated with variable construction activities is of importance to implement the projects aligning with project objectives including time, cost, quality, safety and environmental sustainability. This paper firstly presents a critical literature review of risks associated with construction projects and then identifies the key risks influencing the achievement of project objectives in the Chinese construction industry with the aid of questionnaire surveys. The paper further moves on to discuss these risks from project life cycle and stakeholders perspectives and present the identified risks using a two dimensional graphical presentation.

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Finally, the paper develops a range of strategies adopted by project stakeholders and in different project phases. The research findings will contribute to both the practice and research in risk management for the Chinese construction industry and also provide valuable information for those international companies who intend to provide construction project management service to China.

2. Related previous research

2.1. Fundamentals of risk management

Risk is perceived as ‘the potential for unwanted or negative consequences of an event or activity’ [7], a combination of hazard and exposure [8]. Recent research tends to emphasize the two-edged nature of risks, such as ‘a threat and a challenge’ [1], ‘the chance of something happening that will have an impact on objectives; may have a positive or negative impact’ [9], ‘combination of the probability or frequency of occurrence of a defined threat or opportunity and the magnitude of the consequences of the occurrence’ [10]. This paper examines mainly the negative impacts of risks inherent in construction projects through a combined consideration of the likelihood of occurrence and the magnitude of consequence.

Risk management is ‘a system which aims to identify and quantify all risks to which the business or project is exposed so that a conscious decision can be taken on how to manage the risks’ [1]. PMBOK [11] included risk management as one of the nine focuses in project management and described it as ‘the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project’. Recently, AS/NZS 4360 [9] defined risk management as ‘the culture, processes and structures that are directed towards realizing potential opportunities whilst managing adverse effects’ [9]. In line with these definitions, risk management in the construction project management context is a systematic way of identifying, analysing and dealing with risks associated with a project in an aim to achieve the project objectives. Owing to its increasing importance, risk management has been recognized as a necessity in today’s construction industry, and a set of techniques and strategies have been developed to control the influences brought by potential risks [2,12,13]. A systematic process of risk management are normally divided into (1) risk identification and classification, (2) risk analysis, and (3) risk response, where risk response has been further divided into four actions, i.e. retention, reduction, transfer and avoidance [1,9,14].

Risk identification is the first step of risk management process, in which potential risks associated with a construction project are identified. As an integrative part of risk identification, risk classification attempts to structure the diverse risks affecting a construction project. Many approaches have been suggested in the literature for classifying risks. Perry and Hayes [15] presented a list of factors

extracted from several sources which were divided in terms of risks retainable by contractors, consultants and clients. Combining the holistic approach of general systems theory with the discipline of a work breakdown structure as a framework, Flanagan and Norman [1] suggested three ways of classifying risk: by identifying the consequence, type and impact of risk. Chapman [16] grouped risks into four subsets: environment, industry, client and project. Of the 58 identified risks associated with Sino-Foreign construction joint ventures, Shen et al. [17] categorized them into six groups in accordance with the nature of the risks, i.e. financial, legal, management, market, policy and political, as well as technical risks. In a word, many ways can be used to classify the risks associated with construction projects and the rationale for choosing a method must serve the purpose of the research. In this paper, risks were grouped with reference to Perry and Hayes’ method in order to study risks from the project stakeholder perspective.

As an intermediate process between risk identification and risk response, risk analysis incorporates uncertainty in a qualitative and quantitative manner to evaluate the potential impact of risks [18]. Once the risks of a project have been identified and analysed, appropriate risk response strategies must be adopted to cope with the risks in the project implementation. The treatment measures on each risk are based on the nature and impact of the risk. The main aim is to remove as much as possible the potential negative impact and to increase the level of control of the risks. However, the process of risk management does not aim to eliminate all risks but to identify appropriate strategies to assist project stakeholders to manage them [15].

Extensive research has been undertaken in the field of risk management for construction projects. Major outcomes of these attempts are the identification of the project objectives related risks and the project phase related risks. While these recognized risks are pertaining to different construction projects in the context of different countries, they are all of great importance in guiding the risk management research and practice for the Chinese construction industry.

2.2. Risk versus project objectives

A direct relationship between effective risk management and project success is acknowledged since risks are assessed by their potential impact on the project objectives [19]. Hence, employing effective risk management techniques to manage risks associated with variable construction activities has never been more important for the successful delivery of a project. Previous research has mainly focused on examining the impacts of risks on one or two aspects of project strategies with respect to cost [20,21], time [22,23], quality [24,25], safety [26–29] and environmental sustainability [30,31]. Zou et al. [3] conducted a comprehensive review of the current literature as summarised below:

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