

Chapter 15

A Comprehensive Literature Review on Construction Project Risk Analysis

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ABSTRACT

The purpose of this paper is to present the chronological development of risk assessment techniques and models undertaken in construction project for the past two decades. This research used a systematic review and meta-analysis on risk assessment of construction project literatures. This includes browsing relevant researches and publications, screening articles based on the year of publication, identifying the domains and attributes. Accordingly, findings of major results achieved have been presented systematically based on the chronology of the research and research gaps are identified. From the review, it is found out that the dominant risk assessment tools used for the past twenty years is statistical analysis and fuzzy expert system.

INTRODUCTION

Various authors have defined project risk in different way. Project risk has positive and negative effects on project objectives (Adedokun, Ogunsemi, Aje, Awodele, & Dairo, 2013; Wang, Dulaimi, & Aguria, 2004). It is the measure of the probability, severity and the exposure to all hazards of an activity (Sarkar & Panchal, 2015). Risk is closely connected to uncertainty and is a commonly used term in all kinds of contexts, but is often related to the negative outcome of a certain event. Moreover, risks have stochastic nature (Hamzaoui, Taillandier, Mehdizadeh, Breysse, & Allal, 2015).

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There are different causes of risks in construction such as size, organizational and technical complexities, speed of construction, location of the project, technology being used and familiarity with the work (Dey & Ogunlana, 2004). In addition to the organizational and technical complexities, project managers have to consider a growing number of parameters (e.g. environmental, social, safety and security) and stakeholders, both inside and outside the project. The complexity of a project leads to the existence of a network of interdependent risks (Fang & Marle, 2012), where complex phenomena may occur, hard to anticipate and hard to keep under control (Fang & Marle, 2013).

Construction projects are initiated in complex and dynamic environments resulting in circumstances of high uncertainty and risk (Adedokun et al., 2013; Hamzaoui et al., 2015; Zhen-Yu & Lin-Ling, 2008). Risk and uncertainty are inherent in all construction work no matter what the size of the project (Carr & Tah, 2001; Jha & Devaya, 2008). Unexpected risk involves the threat of uncontrollable, unpredictable and unanticipated events, which are especially considered by the management of large-scale projects, since these unexpected risk events (Hamzaoui et al., 2015; Huang, Huang, & Hsieh, 2013). These risks have a direct influence on project success. Many projects tend to exhibit cost overruns and schedule delays (Koushki, Al-Rashid, & Kartam, 2005; Mahamid, 2011; Sarkar, 2012). Enormous researches conducted in different part of the world revealed that risks have resulted significant cost and time overrun of the projects (Arditi, Akan, & Gurdamar, 1985; D. W. M. Chan & Kumaraswamy, 1997; Floricel & Miller, 2001)

The literature on risk and risk assessment in projects is vast because project risk factor research has been (and continues to be) of interest to both academics and practitioners (MEZHER & TAWIL, 1998). The area of risk management has received significant recognition in the field of project management in recent years while the financial and economic crisis is evident globally.

It is very important to understand the actual practice of risk analysis and review the development of construction risk modelling and assessment in an attempt to research viable alternatives that may contribute to closing the gap.

However, few researches are there to summarize and capture the essential contribution and gaps of the previous researches.

This paper reviews the existing literature on construction project risk managements particularly on risk analysis. The aim of this literature review is to discover the development trends of risk management, techniques and methods of risk analysis, identify the limitations of the existing risk analysis techniques and recognize the future research directions on construction project risks.

RESEARCH METHODOLOGY

This research revealed the results of extensive review of the literature review of construction project risk modelling and assessment. The study focuses on construction project risks such as highway, road and building constructions. The target literature sources are limited to peer reviewed academic journals, published in English. Papers published on construction risk assessment for the past two decades have been reviewed. Relevant research papers are identified and gathered first, using keyword searching on several online databases, including Emerald Database, Science Direct, Taylor and Francis, Springer Link, Google Scholar, ProQuest, ABI/Inform, IEEE, IgentaConnect and Web of Science. For this purpose,

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