

A Comprehensive Literature Review on Construction Project Risk Analysis

Ermias Tesfaye, Addis Ababa Institute of Technology; Addis Ababa University, Addis Ababa, Ethiopia

Eshetie Berhan, Addis Ababa Institute of Technology; Addis Ababa University, Addis Ababa Ethiopia

Daniel Kitaw, Addis Ababa Institute of Technology; Addis Ababa University, Addis Ababa, Ethiopia

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.

KEYWORDS

Construction Project Risk, Risk Analysis, Risk Assessment, Risk Factor, Risk Modelling

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).

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, keywords used include “Risks in construction projects”, Risk quantification in construction projects” Risk analysis in construction projects”, “Risk quantification and analysis in construction” and “modelling project risks”. However, different combinations of them were used to validate the extensiveness of the search results.

The search targeted the past two decades of available articles in the databases in order to review the development of risk modelling and assessment.

As a result of the search, more than 208 journal articles have been found. However, through systematic refinement, only 93 papers were found to be more relevant. Consequently, these articles were reviewed and essential information was captured. This information includes authors’ name, year of publication, paper title, journal title, country of origin, research method, data analysis method, sector, purpose and research goals etc.

CHRONOLOGICAL DEVELOPMENT OF RISK ANALYSIS SINCE 1995

The presence of risks and uncertainties inherent in project development and implementation plays significant role in such a failure intrinsic in all stages of project (Nasirzadeh, Afshar, & Khanzadi, 2008). Because of complexity and dynamic nature of construction projects, they are exposed to effects of plentiful factors leading to uncertainty in the timing and sequence of project activities (A. P. Chan, Scott, & Chan, 2004). Project delays and cost overrun in the construction industry are common and taken as a global phenomenon (Mahamid, 2014; Sambasivan & Soon, 2007). As a result, construction is a risk-prone industry with delays in project completion, cost overrun and failing to meet quality standards.

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/a-comprehensive-literature-review-on-construction-project-risk-analysis/165969

Related Content

Interviews with Young People using Online Chat

Elza Dunkelsand AnnBritt Enochsson (2007). *Encyclopedia of Information Ethics and Security* (pp. 403-410).

www.irma-international.org/chapter/interviews-young-people-using-online/13503

Security and Privacy for Electronic Healthcare Records Using AI in Blockchain

Ramani Selvanambi, Samarth Bhutaniand Komal Veauli (2023). *Research Anthology on Convergence of Blockchain, Internet of Things, and Security* (pp. 768-777).

www.irma-international.org/chapter/security-and-privacy-for-electronic-healthcare-records-using-ai-in-blockchain/310479

A Privacy-Aware Data Aggregation Scheme for Smart Grid Based on Elliptic Curve Cryptography With Provable Security Against Internal Attacks

Ismaila Adeniyi Kamiland Sunday Oyinlola Ogundoyin (2019). *International Journal of Information Security and Privacy* (pp. 109-138).

www.irma-international.org/article/a-privacy-aware-data-aggregation-scheme-for-smart-grid-based-on-elliptic-curve-cryptography-with-provable-security-against-internal-attacks/237213

Dual Image-Based Dictionary Encoded Data Hiding in Spatial Domain

Giridhar Maji, Sharmistha Mandaland Soumya Sen (2020). *International Journal of Information Security and Privacy* (pp. 83-101).

www.irma-international.org/article/dual-image-based-dictionary-encoded-data-hiding-in-spatial-domain/247428

Risk Analysis Using Simulation Software Applied on a Road Infrastructure Project

Vijaya S. Desai (2015). *International Journal of Risk and Contingency Management* (pp. 53-62).

www.irma-international.org/article/risk-analysis-using-simulation-software-applied-on-a-road-infrastructure-project/127541