

The risk assessment model for construction projects including value creation and protection aspects

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Abstract. The article focuses on the identification and classification of key risk management criteria that represent the value creation and protection aspects for the construction industry. Nowadays, the assessment of the risk level of a construction project is especially important for the quality of construction projects as well as the growth of enterprises and the sector. To establish the most important criteria for the successful growth of the construction sector including value creation and protection aspects are developed.

Keywords: risk, system, model, construction, value creation, aspects.

Introduction

Enterprises implement different projects to achieve goals stipulated in their organizational charter. However, timely completion of such projects is rarely successful despite the reached financial and qualitative goals. One of the most important factors that lead to the incompleteness of most projects is the lack of attention to the effects of risks, the aggregated effect of which becomes a major hurdle. In other words, the interactions among risks lead to the aggregated effect, which is greater than the total effects of individual risks.

1. Risks assessment

Risk assessment (Zavadskas, Turskis, & Tamošaitienė, 2010) in an environment involves a systematic and comprehensive methodology for quantifying the probability of the occurrence of a particular adverse event and the magnitude of the associated consequence of its outcome (Tamošaitienė, 2019; Zavadskas, Turskis, & Tamošaitienė, 2008b; Chan & Wang, 2013; Tamošaitienė, Zavadskas, & Turskis, 2013). In an environment, risk assessment faces different types of uncertainties that can be accounted by theories of probability, possibility, game and fuzzy set, respectively. The former type of uncertainty is often referred to as objective or stochastic whereas the latter is often referred to as subjective or state-of-knowledge.

Strategic objectives of an enterprise are accomplished through portfolios of risks. However, the materialization of portfolio risks may affect a portfolio's success and in the same time implemented the success of the activity (Ghasemi, Sari, Yousefi, Falsafi, & Tamosaitiene, 2018).

In life, each situation brings together many types of risks (Environmental Protection Authority, 2009; Project Management Institute, 2012; Zavadskas, Turskis, & Tamošaitienė, 2008a; Kumar, Singh, & Gregory, 2016; Zelenáková & Zvijáková, 2017). Risk management approaches depend on the context of the risk environment and the business activity, i.e. construction (Figure 1).

Each activity fields have some specification for the risk assessment. Risk assessment process and requirements in presented in several documents (Project Management Institute, 2003; Chapman, 1997; Standards Australia, 2004; International Electrotechnical Commission, 2001; Office of

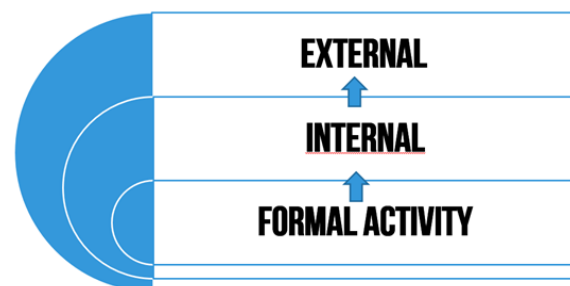


Figure 1. Risk management approaches

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Government Commerce, 2002; TBC, 2001). Most important risk field allocation in the construction sector are following. The external context of risks refers to factors, which are outside the organization but related to the management of legal risk. It includes:

- relevant regulations and changes;
- industry organizations;
- external service providers and advisors supporting the legal risk management, such as law firms, certification agencies, information management and analytics services providers;
- external stakeholders such as businesses, civil- society organizations, local governments, the public and communities of interest, press and media, and special interest groups including unions and their expectations regarding the management of legal risk;
- applicable international agreements, memorandums of understanding;
- the applicable market conditions related to the enterprises;
- third-party actions or claims; and laws of the countries, to which products/services are delivered;
- During the evaluation and assessment of the external context of legal risks for enterprises operating in multiple jurisdictions, the environmental and cultural differences among different jurisdictions should be considered. An extraterritorial application of national regulations and the governing jurisdiction may also require consideration in certain situations.

The internal context of risks is substantially in control of or subject to the authority of an organization through its governing and management systems, including:

- the nature of the legal entity;
- enterprises financial health and its business model;
- enterprises internal legal structure, governing processes and functions;
- enterprises governance, values and ethics structures that promote integrity, such as the code of conduct and other compliance guidelines; the current state of the enterprises legal matters and its approach to the management of risk;
- systems of stakeholder orientation and continual improvement of performance in matters of legal risk, systems and arrangements to improve stakeholder behavior concerning requirements and compliance management systems;
- experience and history of legal disputes or events triggered by risk in the enterprises;
- assets that the enterprises owns, such as intellectual property and other assets that it uses, e.g. processes;
- internal policy regarding the management of risk; and other information and resources related to risk and its management.

Formal activity of the construction risk criteria:

- is a subset of enterprises risk criteria;
- are measures identified and defined to evaluate the significant and acceptable level of one or a group of risks;
- should reflect the objectives, values, resources, preferences and tolerance of the overall risk management in relation to risk;
- should be reviewed on a regular basis and at the beginning of any major construction project to update criteria and the process for managing risk in construction processes;
- can be imposed by, or derived from, the application of laws or contractual obligations or liabilities of the construction sector;
- are dynamic and, once defined, belong to the construction processes responsible for the management of risk in construction; and
- should be aligned with the enterprises overall approach to the management of risk and/or policy by applying the conditions of the construction activity and construction project. An enterprise of construction should develop and adjust its risk criteria according to actual situations.

When determining the criteria for risk, factors to consider include:

- enterprises objectives and priorities;
- construction sector governance including the hierarchical level of authorities, allocation of accountabilities, roles and responsibilities for management of risk in the enterprises;
- relationships with third parties;
- the scope and objectives of the risk management and the categories of risks by applying the condition of the construction sector;
- the principles adopted to determine the level of risks in construction;
- the status of policies, protocols, frameworks, processes and methodologies for risk management in construction;
- the acceptance of risks or the tolerance of a risk level by stakeholders; and
- the measurements for the classification of risk levels in construction sector, project and construction enterprise.

2. The model for the risks assessment of construction projects including value creation and protection aspects

A systematic classification of each risk field must be adopted and can be presented including actuarial approach, all-hazards approach, probabilistic risk analysis, economics of risks, technical risk analysis, construction project risk analysis, social theory of risk, and cultural theory risks etc., including aspects of value creation and protection in the construction sector (Figure 2).

The risk assessment model for the construction sector must consider the most important risk fields:

- Conditions of the construction sector;
- Conditions of the construction project/build construction object;
- Conditions of the construction enterprise;
- Conditions of members of construction processes.

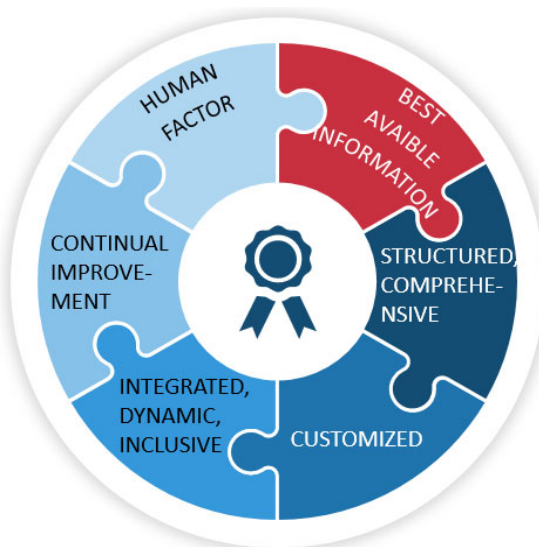


Figure 2. Value creation and protection aspects

Risk identification tools, such as Checklist, Influence Diagrams, Cause and Effect Diagrams, Failure Mode and Effect Analysis, Hazard and Operability Study, Fault Trees and Event Tree (Nieto-Morote & Ruz-Vila, 2011; Ammar, Berman, & Sataporn, 2007; Klemetti, 2006), which were used to develop the hybrid model, must be presented depending on the analyzed field of risk. Construction risks can be categorized in several ways based on the source of risk, the impact of risk or by a project phase (Valipour, Sarvari, Tamošaitienė, 2018; Hatefi & Tamosaitiene, 2018; Chatterjee, Zavadskas, Tamosaitiene, Adhikary, & Kar, 2018; Fouladgar, Yazdani-Chamzini, & Zavadskas, 2012).

Conclusions

Decision making, such as risk assessment results in construction projects, contractor, etc., is very important in the construction sector. Each construction site and construction conditions, project environment are unique. The risk assessment model for construction projects including value creation and protection aspects are presented.

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