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Integrated risk management process for building projects

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Abstract

The objective of this paper is to provide an integrated risk analysis method for building projects which tracks the probabilities of the occurrences of harmful events perceived by the owners from the conceptual phase to the end of the project. The risk management framework is built on traditional risk modeling bases and integrated with financial aspects. This extension of the original concepts defines the project goal by the minimum requirements to be achieved, then objectively identifies risk factors with measurable financial variables. The contribution to the current body of knowledge is threefold. On the one hand, from a project management point of view, the emphasis on the definition of project objectives shifted towards meeting financial goals by integrating relationships of financial minimum expectations at the model level. On the other hand, from a financial aspect, the opportunity of continuous monitoring and reassessment for risk management processes is created. Finally, based on this framework an automatized risk management process can be implemented, which will indicate if adverse processes start in the life of the project and action plans need to be launched. The automated procedure for risk analysis based on the integrated concept delivers a more effective practical tool to reduce project risks, and opens new research areas in construction project management.

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1. Introduction

A characteristic contradistinction of risk management in the construction sector is that the details of the owners' value-making approach are often lost at the level of operative management. It is not surprising that managers tend to identify the owner's expectations as finishing the construction project, as their role in the project company is tied to the construction process itself. The main problem is that 'harmful events' in operative risk management refer to

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events obstructing the achievement of the implementation goals of the construction processes, but not necessarily to barriers to the value creating processes. In contrast, the owners may realize added value with significant delays, cost overruns, or even without finishing the project. This paper represents a first step in seeking a common language for both the owners and the operative construction project management. To bring the two distinct approaches together, a system of criteria applied by the construction project management needs to be integrated with financial aspects.

2. Need for a revised risk management method

The need for the development and use of integrated risk management methods is beyond dispute; see e.g. Turnbull Guidance [1]. This report requires UK listed companies to develop and maintain an organization-wide risk management approach to internal control by making directors specifically accountable for risk management policies. However, the customization of risk management methods is described with elusive directives only. Although risk management is a mandatory element of corporate governance processes in the UK, its implementation is far from smooth. Beck (2004) points out that the general rules of Turnbull Guidance can be problematic because it provides only definitions and requirements without methodological details, thus risk management only becomes an obligation, not the value-added activity obvious for all participants, or the key element embedded in the organization's culture [2]. Therefore, the author predicts the stagnation of risk management. We, on the other hand, do not share his view and believe that a holistic, integrated risk management system for each industrial sector needs to be developed, where the added value for all stakeholders is clearly measurable based on financial principles.

Miller (1992) provides the conceptual directions with the categorization of risks for an integrated risk management framework in an international business environment [3]; however, the mathematical background is still to be elaborated. The level of integration has to go even beyond Miller's risk management (1998) [4], in which owner's interest did not receive enough emphasis as a decision principle.

In some industries specialized risk management frameworks have already been developed, and the added value of these specialized risk management methods is also demonstrated empirically. Tufano (1996) studied the effectiveness of methods developed for the gold mining industry [5]. He found little empirical relationship between risk management theories and stakeholder value, even though the methods in this industry are specifically concentrated on and reduced to the management of gold price risk. A more general, holistic risk management approach, however, has not been developed yet. In an empirical research project, Santomero and Babel (1997) found that the risk management processes of insurance companies are built on financial principles only [6]. In general those who adopted risk management methods found risk management tools practical and valuable, although measuring the effects of other elements in the company level project portfolio is still a challenge to overcome. In the oil industry specialized risk management methods based on a financial approach have existed for more than three decades (see [7]), therefore relevant information can be collected empirically about the value of holistic risk management methods. In the oil industry Mackay and Moeller (2007) measured the extent of risk management's added value, which reaches a significant 2-3% of corporate value [8].

For the construction sector, a widely accepted and specialized risk management method similar to the above-mentioned methods, has not been developed yet, at least the current academic value-creating approach is not an essential part of the current widely-used risk management methods. In the construction project management literature, risk is defined as a measure of the probability and consequence of not achieving project goals (see, e.g. [9]), where the project goals are typically related to the implementation of construction (time, cost, quality). Construction project management literature tends to concentrate on specifying risk classes that jeopardize these project goals and focus on how to manage risks based on those classes. For example Tserng, & al., (2009) recently showed an advanced ontology-based categorization of risk classes [10]. Risk has become increasingly understood conceptually as the likelihood of an event occurring within a project [11,12], although an 'event' continued to cover a wide range of meanings and the philosophical background is rather vague [13]. The principal methods of risk measurement have spread from other scientific fields to project management applications (for a summary see, e.g., [14]). Unfortunately, the ownership approach is still missing from the criteria in a mathematically justified way. The

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