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Educational simulation in construction project financial risks management

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Abstract

Construction sector is vulnerable to economic changes, especially during recession periods due to the high capital outlays, cost flexibility and high competition limiting the price. The changes of the business environment, often associated with shortage of funds, exchange rate fluctuation and political instability increase the construction projects financial risks. In this context, the application of structured approaches related to the financial planning, scheduling and monitoring of the projects is even more important. In order to execute these processes, the project managers should have the necessary competences. The development of financial management competencies cannot be achieved into the classical educational settings, by using common methods of knowledge transfer. Instead, the project financial management should be taught in active and experiential ways, stimulating students to think creatively and to act properly as project managers. Education simulations are very valuable in this regards.
The paper presents the experience gained in the master program of Project Management in Construction held in the Technical University of Civil Engineering Bucharest. Based on the main international project management competence standards and relevant educational experiences, the authors designed a simulation platform. The paper presents the architecture and functionality of this platform. A simulation scenario is presented as a case study.

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Keywords: knowledge management; educational simulation; project financial management

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1. Introduction

Financial aspects of the construction projects represented always a major challenge for any construction company, especially in changing economic settings. Due to the high project capital expenses, the low cost flexibility and the high competition limiting the final prices, the construction sector is vulnerable during recession periods, associated with shortage of funds, exchange rate fluctuation and political instability. Borghezi and Gaudenzi [1] consider that the credit interest rate, currency and liquidity to be the main factors which generate financial risks in construction projects. Hlaing et all [2] list the most relevant risk factors for the construction industry and the top four are: the lack of financial resources of the contractor, the weak financial stability of the client, the costs overruns and the contractor financial stability. Accepting too many risks, the construction companies become financially vulnerable. The lack of cash during the project implementation, at both client and contractor levels leads to delays, penalties and loss of opportunities, with a strong impact on the health of projects and organizations [3].

In 2014, KPMG [4] interviewed from more than 100 private and public organizations around the world, that carry out significant capital construction activity. The analysis followed four dimensions of the project management practices: preparation (the project planning and prioritizing and the talent management), project risk, controls and governance (project control and project management information systems), project performance (dealing with project failures and contingency planning) and leading relationships (collaboration between the owner and contractor). Regarding the project financial management, as some of the main findings, we can mention: 84% of the companies utilize financial and risk analysis to screen projects; 80% say the majority of capital projects are planned; only 31% of all respondents' projects came within 10% of budget in the past 3 years; 58% are lump sum (fixed price) contracts. The type of contract which is the base of the relationship between the parties have significant effects on the strategy the construction company will take in order to achieve it purposes in terms of cost, duration and profit. Considering the project delivery strategies, 72% of the participants hold full competitive tenders when awarding contracts. Despite some concerns about a lack of flexibility, the traditional design-bid-build approach remains one of the two most popular project delivery strategies, enabling the owner to work with various suppliers for different aspects of the project. One of the biggest concerns expressed by the survey participants is the accuracy of the estimated costs before committing to the project. The survey findings indicate that bigger organizations (which tend to have larger and more complex projects) are more likely to take a conservative view of contingency levels. Over half of the respondents from this segment report that the typical range of contingency is greater than 10 percent of the total estimated cost.

In order to manage financial project risks, most of the companies are focusing on the individual project level that does not reflect the overall risks at a corporate level. The simple sum of individual project's risks can be significantly different from the total risks of enterprise-wide perspectives [5]. The construction companies should have capital budgeting and planning policies and procedures in place, a cross-functional capital review committee, and a robust system for tracking and reporting across the portfolio. Several techniques from portfolio theory have been proposed, in order to reduce turbulent risk exposures and maximize the total value of the company [6].

According to [7], the major processes of project financial management are: the financial planning (identifying key financial issues to be addressed and assigning project roles, responsibilities and reporting relationships), financial control (monitoring key influences and taking corrective measures when negative trends are recognized) and administration and records (designing and maintaining a financial information database to enable financial control to proceed in a smooth way). Executing these processes, the project management professionals should address the associated risks, by identifying and assessing them, selecting strategies and implementing response plans.

In order to manage the project financial risks, the professionals should have the necessary competencies. The key project managers' competencies are mainly associated with hard skills (the technical methods and tools application), but soft skills (leading the people) should also be taken into consideration (such as: communication skills). The development of the project financial risk management competencies cannot be achieved into the classical