Risk Assessment and Allocation for Building Construction Projects in Preliminary Phase in Albanian Construction Industry

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Abstract

This study identifies the assessment and allocation of significant risks in Albanian construction industry in preliminary design phase of a building construction project. An in-depth study has been performed to determine risks affecting the building projects using some risk identification techniques. To identify critical risks, a real building project is selected as a case study.

This study reveals that economic risk such as change of prices, budget construction, inflation, shortage in materials and labor supply are significant. Other significant risks include political and social risks as building and electrical permissions. Owner risks such as unrealistic design construction schedule, improper intervention and changes in designs are found significant as well. More risks are allocated to contractors or shared between contractors and owners or directly to owners.

Keywords: Risk management, Risk allocation, Case study, building construction, Albania.

1. Introduction

The construction sector is one of the largest segments in Albanian economy. It provides jobs for almost 22% of all employers and contributes with 8% to the country's GDP in 2011 (M.FA, 2011; MBT, 2011). As a quality of the buildings and infrastructure has a direct impact on the level of people's life, a well-functioning construction sector is an important factor for the development of society.

Construction projects are usually characterized by many varying risks. Being able to manage risks throughout the construction process is an important and central element preventing unwanted consequences. Risk management is also decisive for achieving a good final result with a secure economy. Many different actors are involved in a construction project and often they have no or limited experience of earlier collaboration with each other. In many projects there is an attempt by actors to try avoiding risks as far as possible and letting somebody else in the value chain deal with them. Considering the effects that risk management and risk sharing have on projects goals in the form of both quality and economy, these processes ought to take place in an open and conscious way. In each phase of construction project, namely

program planning, procurement and production, the management of specific risks should be allocated to the party that has the best corresponding qualifications.

One of the problems identified in the reports of Albanian Construction Organization is that many actors are involved in each phase of the construction project process. They often focus on short –term economic results and protect their own interests rather than the project overall. This leads to a less effective risk management process. Little attention in research community so far is paid to identify the roles of individual actors in risk management through the project's different phases. The objective of this paper is to analyze the risk assessment and allocation in a construction project from the perspective of the client, and contractor. In particular to examine the ways and extent to which the actors are involved in risk management through the different phases of the project. The study is based on the literature review and a case study. Real data from Turgut Özal Education Complex' project has been obtained to identify the risks.

This paper is organized as 5 sections. After having an overview of the literature. detailed information about the case study is given. In section 4, the research methodology is explained. Lastly, the conclusions of research and recommendations for future studies Are given.

2. Overview on risk, risk assessment, and risk allocation

2.1 Risk

There are several definitions on the project risk in the literature (I.E.C, 2001; PMI, 2000; Baloi, 2003; Barber, 2005). A formal definition is given in the International standard IEC 62198 as a combination of the probability of an event occurring and its consequences for the projects objectives. Ward and Chapman (Ward, 2003) discuss the concept of risk in greater detail and suggest using more general concept of uncertainty. A questionnaire survey conducted by Akintoye and MacLeod (Akintoye, 1997) shows that the majority of project actors perceive risk as a negative event. According to Smith et.al (Smith, 2006) all project risks can be divided as known risks, known unknowns risks, and unknown unknown risks. The difference between them is the decreasing ability to predict or foresee the risks.

2.2 Risk Management

The guide to the Project Management Body of Knowledge (PMI, 2000) identifies 4 steps in the risk management process: risk identification, risk assessment, development of risk response and management of risk response. Baloi and Price (Baloi, 2003) include an additional step of risk communication. Chapman and Ward (Chapman, 2003) present SHAMPU (Shape, Harnes, and Manage Project Uncertainty) framework which involves the stages of the process.

2.3 Risk Identification

Risk identification is the first step of the risk management process. It is aimed at determining potential risks, i.e. those that may affect the project. PMBOK (PMI 2000) suggests that as many project stakeholders as possible should participate in the risk identification process. There are a number of tools and techniques for identifying the project risks (IEC, 2001). These are brainstorming, expert opinion, structured interviews, questionnaires, checklists, historical data, previous experience, testing and modelling, evaluation of other projects.

Empirical studies of risk management practice (Akintoye, 1997; Lyons, 2004; Uher, 1999) show that checklists and brainstorming are the most usable techniques in risk identification.

They also highlight that risk identification often relies on individual judgments of the project participants. In this context, it is interesting to mention a recent study by Maytorena et al (Maytorena, 2007) that suggests that the role of experience in risk identification is less significant than is commonly assumed.

During the risk identification process the potential risks fall in the different groups. There are several approaches to classifying project risks and risk sources (Baloi, 2003; Jaafari, 2001; Leung, 1998; Li, 2005; Mbachu, 2005; Tah,r 2000; Zhi, 1995). In general, the sources of risk in construction projects may be divided into three groups:

- Internal or controllable risks (e.g. design, construction, relationships);
- External or uncontrollable risks (e.g. financial, economic, political, legal);
- Force majeure risks (e.g. flood, fire, earthquake).

Several studies contributed to knowledge by identifying unique, specific and country-related risks (Andi, 2006; Ling, 2006; Zou, 2007).

2.4 Risk Assessment

Risk assessment is performed in different ways, tools and techniques have been developed using historical data, statistical data or judgments translated in numerical information (Aven, 2003; Grey, 1995). They share estimates of probability and consequence and the use of software tools to manage the data (Flanagan, 1993). The research literature offers a large number of models use both qualitative and quantitative methods for assessment of project risks. Tah and Carr(Tah, 2000) develop a formal model for qualitative risk assessment based on fuzzy estimates of risk components. Baccarini and Archer (Baccarini, 2001) describe a methodology for risk ranking to projects, which allows an effective and efficient allocation of the resources for the management of project risks. The JRAP (Judgemental risk analysis process) model proposed by Öztas and Ökmen (Öztaş, 2005) is a pessimistic risk analysis methodology, which is effective in uncertain conditions within construction projects. Zeng et al. (Zeng, 2007) propose a risk assessment methodology based on fuzzy reasoning techniques and aimed at dealing with risks in complex projects. A fuzzy system is also used by Motawa et al. (Motawa, 2006) to evaluate the risk of change in construction projects. Poh and Tah (Poh, 2006) have developed an integrated model that takes into account both duration and cost risks and can be used for modeling risk impacts that affect the project. Dikmen and Birgonul (Dikmen, 2006) propose a methodology for both risk and opportunity assessment of international projects.

Empirical research on risk assessment practice investigates the use of the different risk assessment techniques in construction projects. A study by Baker et al. (Baker, 1998) shows that the construction companies in UK use both qualitative and quantitative techniques for assessing the project risks. Personal and corporate experience and engineering judgment are the most successful qualitative techniques, while quantitative techniques include break-even analysis, expected monetary value and scenario analysis. Several authors report rather opposite results on the usage of quantitative techniques. The studies of risk management practice in the UK construction industry show that the practitioners rely mostly on professional judgment, intuition and experience (Akintoye, 1997; Wood, 2003). A questionnaire survey conducted by Tang et al. (Tang, 2003) shows that qualitative analysis is the most commonly used technique in the Chinese construction industry, while the use of quantitative methods is very low. The results of the study conducted by Simu (Simu, 2006) show that the Swedish contractors mostly use professional experience and gut-feeling in risk

assessment. Kähkönen (2007) argues that the quantitative methods used in risk management have advantages in comparison with the qualitative methods but their use is limited due to difficulties that practitioners face. He also discusses the elements that contribute to development of a workable solution for quantitative risk assessment.

2.5 Risk Allocation

An appropriate allocation of risk between actors in construction project is important because it is impossible to eliminate all potential risks. Usually contractors indicate that they have to bear the majority of risks (ANDI, 2006). A study by Zaghloul and Hartman (Zaghloul, 2003) shows a significant relation between risk allocation and trust.

A number of models providing a framework for risk allocation decisions can be found in the literature (Lam, 2007; Li, 2005; Olsen, 2005). Smith et al. (Smith, 2006) highlight the importance of considering the following issues when making risk allocation decision:

- who has the best ability to control risk events;
- who has the best conditions to manage risks;
- who should carry the risks that cannot be controlled;
- how much does it cost to transfer the risks.

Risk allocation strategy in construction projects is defined through the contractual arrangements. The contract is a written agreement between a client and a contractor where the liabilities and responsibilities of each party are assigned. The contract can also be defined as a trade-off between the contractor's price for executing the project and his willingness to take the risks (Flanagan, 1993). The objective of clients is to choose the strategy that ensures achievement of the project objectives in the most efficient way.

Two contract strategies that are mostly used in Albania are separated (design-bid-build) contracts and integrated design-build contracts. The collaborative form of partnering has become popular in Albania during the last decade. In contrast with the UK, partnering does not have the status of a contractual form in Albania. As a form of project implementation, partnering is intended to create effective collaboration between the project's actors.

2.6 Risk Response

The risk response process is directed at identifying a way of dealing with the identified and assessed project risks. There are four main risk response strategies: risk avoidance, risk reduction, risk transfer and risk retention (IEC, 2001; PMI, 2000; Smith, 2006). Risk avoidance deals with the risks by changing the project plan or finding methods to eliminate the risks. Risk reduction aims at reducing the probability and/or consequences of a risk event. Those risks that remain in the project after risk avoidance and reduction may be transferred to another party either inside or outside the project. Risk retention or acceptance indicates that the risk remains present in the project. Two options are available when retaining the risk: either to develop a contingency plan in case a risk occurs, or to make no actions until the risk is triggered. Several studies (Baker, 1999; Lyons, 2004, Tang, 2007) have identified risk reduction as the most frequently used technique within the construction industry. The results of a questionnaire survey (Akintoye, 1997) report that risk transfer is the most preferable strategy among the UK practitioners.

3. Case study :Turgut Özal Education Complex

Turgut Özal Education Company (TÖEC) has started the education activity in Albania at February 1993. TÖEC, as a first private company in education in Albania, has brought a new area of education to the country after the communist system ruling for 45 years. Since then the company grows up through the years and now after 20 years there are several schools and also has a university operating in Albania adding to the country's Education system a new philosophy. TÖEC is a leader company in the education area in Albania.

As mentioned, there are several schools in Albania under the administration of this company. One of this are the schools in Durres; the elementary school, the middle school, and the high school which are operating in 3 rented buildings since 2001 with a capacity of 560 pupils. During the last 10 years, the education system in Albania grows up not only in education quality but also in economic and physical conditions. There has been made several investments by the government in the public schools and also there were opened other 20 private schools in the Durres city making the competition very high. Considering this, the company was planning to build a new Education Complex in Durres. The complex will be 16,000 m^2 with a capacity of 1000 pupils. The school construction is planned to be completed in less than one year, and to be opened at September 2012. Also, management of company would like to stay as a leader in this area in this city as in the whole country.

It is necessary for the company before making this decision to consult building management sector for the risks may be encountered during the design and construction process. Company should concentrate on the potential risks, their assessment and allocation at the preplanning phase of project.

In this study, 3 major risks on T.Ö.E.C. project namely economics risks, political and social risks, and technical risks are considered. Then, these risks are assessed and allocated to relevant project participants.

3.1 Risk Identification

The project documents are investigated in detail to identify and categorize the risks that could affect the project. The list of these risks are as follows:

Economic risks: change of prices, budget construction, inflation, shortage in materials, and labor supply.

Political and social risks: building permissions, electrical permissions.

Technical risks: unrealistic design, construction schedule, improper intervention, and changes in designs.

After these major risks are identified, it is useful to consider the source of the risk when conducting a risk assessment.

Risks can be classified as either internal or external. Internal risks are those that arise within the scope and control of the project team. Most internal risks can be referenced to a specific project document such as a cost estimate or a schedule. Internal risks usually refer to items

that are inherently variable. External risks are items that are generally imposed on the project from establishments beyond the limits of the project. Interactions with citizens groups or regulators are typical external risks. Funding constraints and restrictions are other common external risks. External risks tend to refer to items that are inherently unpredictable but generally foreseeable. In the case study, risks are classified based on the Project Management Institute (PMI, 2004) format as shown in Figure 1.

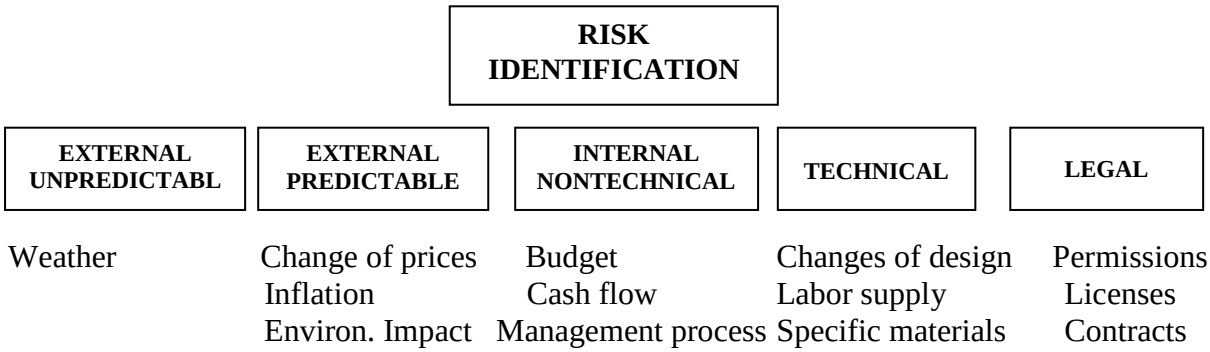
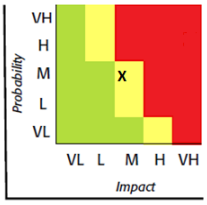


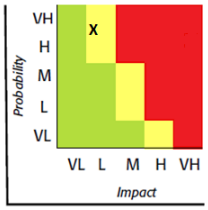
Figure 1: Risk identification and classification (PMI, 2004)

3.2 Risk Assessment

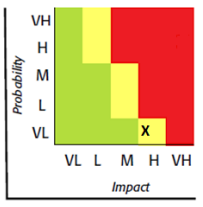
Risk assessment is a process of quantifying risk events identified as risks before. It has 2 aspects: to determine the likely hood of risk (frequency) and to judge the impact of it (the consequence). In our case the goal of risk assessment is not eliminate all risk from the project but to recognize the significant risk challenges to the project. In risk assessment risk matrix is used.



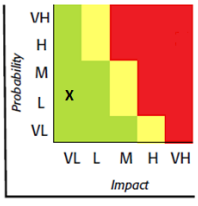
Project design.(**Technical):** An unrealistic projects design and changes design during project construction project and also improper intervention in different phases of project would have an impact in our goal.



Construction and electrical permission (**Legal**): It is very difficult to be solved in a normal time in Albania because of different procedures and would have a low impact in our goal because of political and social system intervention in construction industry in Albania.

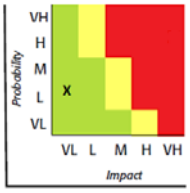


Weather and environmental impact (**External predictable**): the raining weather in Durres during the underground floor construction may be low but the impact if it happens will be very high in the project.



The economical problems such as the budget(**Internal non technical**),the change of prices and inflation (**External predictable**)in Albania because of the economic system of Albania during these years would have a low impact in our project in such a short time.

Construction materials (**Technical**): the specific technology in using some of them in the project for the first time may be a real technical risk in the complex project.



3.3 Risk Response

To have a response for each risk, a method is identified for the type of risk for each event either to retain, to reduce, to transfer or to avoid them.

Event	Type of risk	
Project design	Speculatıve risk	Company risk
Construction permission	Pure risk	Company ,contract and project risk
Weather	Pure risk	Company ,project risk
Electrical and sweage permission	Speculatıve risk	Company and contract risk
Financial probelms(budget,change of prices,inflation)	Speculative risk	Company risk
Construction materials and specific techonology	Pure risk	Contract risk

Table 1: Event and Risk types

Risk retention produce individually small repetitive loses so we retain a portion of risk in certain circumstances. In our case, Construction permission (legal) and financial problem (External predictable) which is a risk that company should retain in any case to end the project.

Risk reduction is to reduce the risk sharing it with the other partners as the contractor and the project design office. In this case project the project design risk (Technical) is shared with the project office and the weather risk (External predictable) is shared with the contractor.

Risk transfer does not reduce the source of risk but it just removes it to another partner. In our case project, the risk of having the electrical and sewage permission (legal) is transferred totally to the contractor.
Risk avoidance is to refuse accepting the risk. In our case project, the materials and the specific technology (Technical) is refused.

4. Conclusions

In this paper, we presented the results of a risk assessment and allocation in a civil building in a preliminary phase in Albania construction industry which aims the identification of critical risks in a real project study using some risk identification techniques.

It is found that the economical risks (budget construction, cash flow, inflation, labor supply) political risks (building, electrical and other permissions) and technical risks (project design, improper intervention, building materials) weather and risks allocated between owners and contractors are significant in the final over goal of the project.

In particular, in this case project it has been showed that an unreal design project with many changes would create a lot of risks. The cancelling of underground floor would avoid the main high risk of this project (time and cost). One important observation is the that the economical risks such as inflation and changes of prices should be taken in consideration before making the contract deal between the owner and contractor.

Finally after the identification of risk, an assessment method to deal with these identified project risks should be chosen. We retained a part of legal risks as permission construction, reduce technical risk as project design with the project office, transfer totally some legal risks as electrical permission etc to the contractor and avoid some risks such as materials and specific technology used.

The overall conclusion of this paper is to increase the understanding and importance of Risk Management Process (risk identification, assessment and response) in preliminary phase in each project to contribute to a better project output and a better value for both client and contractor.

References

Akintoye, A. S. & MacLeod, M. J. (1997) Risk analysis and management in construction. International Journal of Project Management, 15 (1), 31-38.

Andi (2006) The importance and allocation of risks in Indonesian construction projects. Construction Management and Economics, 24 (1), 69-80.

Atkin, B. (2006) Notes in course on research methodology. Lund University.
Baccarini, D. & Archer, R. (2001) The risk ranking of projects: a methodology. International Journal of Project Management, 19 (3), 139-145.

Baloi, D. & Price, A. D. F. (2003) Modeling global risk factors affecting construction cost performance. International Journal of Project Management, 21 (4), 261-269.

Barber, R. B. (2005) Understanding internally generated risks in projects. International Journal of Project Management, 23 (8), 584-590.

Baker, S., Ponniah, D. & Smith, S. (1998) Techniques for the analysis of risks in major projects. J. Operational Research Society, 49 (6), 567-572.

Chapman, C. & Ward, S. (2003) Project risk management: processes, techniques and insights, Chichester, John Wiley & Sons.

Chapman, C. & Ward, S. (2004) Why risk efficiency is a key aspect of best practice projects. International Journal of Project Management, 22 (8), 619-632.

Jaafari, A. (2001) Management of risks, uncertainties and opportunities on projects: time for a fundamental shift. International Journal of Project Management, 19 (2), 89-101.

Flanagan, R. & Norman, G. (1993) Risk management and construction, Oxford, Blackwell Scientific Publications.

Keci, J. and Oztas, A., "Investigation of Risk Management perception in Albanian Construction Industry", First International Conference on Architecture & Urban Design (1-ICAUD), 19-21 April, Tirana,Albania, 2012.

Oztas, A. & Okmen, O. (2005) Judgmental risk analysis process development in construction projects. Building and Environment, 40 (9), 1244-1254..

Öztaş, A. Ökmen, Ö. (2004) "Risk Analysis In Fixed-price Design-build Construction Projects", J. Building and Environment, Vol. 39, no. 2, pp. 229-237, U.K.

PMI (2000) A guide to the project management body of knowledge, Newton Square, Project Management Institute.

Tah, J. H. M. & Carr, V. (2000) A proposal for construction project risk assessment using fuzzy logic. Construction Management & Economics 18 (4), 491-500.

Zaghloul, R. & Hartman, F. (2003) Construction contracts: the cost of mistrust. International Journal of Project Management, 21 (6), 419-424.

Zeng, J., An, M. & Smith, N. J. (2007) Application of a fuzzy based decision making methodology to construction project risk assessment. International Journal of Project Management, 25 (6), 589-600.

Zhi, H. (1995) Risk management for overseas construction projects. International Journal of Project Management, 13 (4), 231-237.

Zou, P. X. W., Zhang, G. & Wang, J. (2007) Understanding the key risks in construction projects in China. International Journal of Project Management, 25 (6), 601-614.