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Risk Management in Different Forms of Contract and Collaboration – Case of Sweden

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ABSTRACT

Risk management in construction projects depends on the choice of contractual and collaboration form. In this paper we analyse three major forms used in Sweden: performance-based contracts, design-build contracts and collaboration form partnering. From the perspective of dealing with risks in construction projects we highlight strengths and weaknesses of each form. We show that the design-build contracts are attractive for the client due to their single responsibility and more risk allocated to the contractor. The performance-based contracts give the client more flexibility in terms of the design but imply more risk allocated to the client. Recently the collaboration form partnering show promising performance in Sweden and may be successfully used when a trust relationship exists between project actors. We conclude that additional research is needed in how the risk management process can be further developed, based more on openness and trust rather than on sharp contract formulations.

Keywords: Risk management, Risk allocation, Construction project, Contracts, Sweden

1. INTRODUCTION

The construction sector is one of the largest segments in Swedish economy. It provides jobs for almost ten percent of all Swedish employees and contributes with four percent to the country's GNP in 2005. As the 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.

Due to their project-oriented nature, construction activities are usually characterized by many and varying uncertainties that can be conceived of as both risks and opportunities. In order to be able to carry out a construction project with the expected final result professional risk management as well as a conscious risk sharing among the partners in the project are required from both the client and the contractor. It should be natural for different risks to be divided and managed among the project's different actors on the basis of who has the best qualifications for dealing with a specific risk. Instead it often happens that the efforts are directed at avoiding risks as far as possible and often at the expense of other actors.

Risk management in construction projects is to a large extent governed by the choice of contractual form and what is stated in the related contractual documents. Two contractual forms that are mostly used in Sweden are performance-based contracts and design-build contracts. There is an ongoing development of organisation and contractual forms of project implementation. Based on the experience from the UK and Denmark such form as partnering is adopted in Sweden. So far, the experiences of partnering are positive, however further development of the form is required. A question of a particular interest for the actors in Swedish construction industry is the way how the project risk management needs to be further developed, based more on openness and trust rather than on sharp contract formulations.

In this paper we present the results of the state-of-the-art analysis in the area of project risk management. We describe three forms of contract and collaboration that are typically used in Sweden: performance contracts, design-build contracts and collaboration form partnering. We analyse how project risks are allocated between the actors in a construction project depending on the chosen form of contract and collaboration. From the perspective of dealing with risks in construction projects we highlight strengths and weaknesses of each form. Finally, we discuss directions for further research.

The paper is organised as follows. In section 2 we discuss main theoretical issues of risk management in construction: definition of term risk, classification of risk sources and main steps of risk management process. In section 3 we describe different forms of contract and collaboration in Swedish construction sector and discuss risk allocation in these forms. Discussion and directions for further research are presented in section 4. Section 5 is a final section for conclusions.

2. RISKS IN CONSTRUCTION

Project risks are uncertain events or conditions that may have an impact on one or several project objectives. A risk has a cause and, if it is triggered, also a consequence. Different research studies offer different definitions of the project risk (e.g. IEC 62198, 2001, PMBOK, 1998, Baloi and Price, 2003, Barber, 2005). A formal definition of the concept of project risk is given in the international standard IEC 62198 as combination of the

probability of an event occurring and its consequences for project objectives. Ward and Chapman (2003) discuss the concept of risk in greater detail and suggest using a more general concept of *uncertainty*. The questionnaire survey conducted by Akintoye and MacLeod (1997) shows that the majority of project actors perceive risk as a negative event.

Different risks occur in different phases of a project. In many cases risks are inherited from one project phase by the next one. There are several approaches for classifying project risks and risk sources (Leung *et al.*, 1998, Tah and Carr, 2000, Baloi and Price, 2003, Li *et al.*, 2005). In general the sources of risk in construction projects may be divided into three main categories:

- Those related to external factors, for example financial, economic, political, legal and environmental risks;
- Those related to internal factors, such as design, construction, management and relationships;
- Force majeure risks

The overall goal of risk management process is to maximise the opportunities and minimise the consequences of a risk event. According to the Guide to the Project Management Body of Knowledge (PMBOK) (1998), developed by Project Management Institute (PMI), risk management in a project consists of risk identification, risk assessment and risk response processes. The risk identification process aims at deciding potential risks that may affect the project. During the risk assessment the identified risks are evaluated and ranked. The risk response process is directed to identifying the way of dealing with the project risks.

Several surveys conducted among the construction industry actors (Akintoye and MacLeod, 1997, Uher and Toakley, 1999, Lyons and Skitmore, 2004) show that checklists and brainstorming are the most usable techniques in risk identification; subjective judgment, intuition and experience are used mostly in risk assessment; and transfer, reduction and avoidance are the most applied methods for risk response.

Number of methodologies for the risk analysis in a construction project was proposed in the research literature. Baccarini and Archer (2001) describe a methodology for the risk ranking of projects, which allows an effective and efficient allocation of the resources for management of the project risks. Öztas and Ökmen (2005) develop the judgmental risk analysis process. This is a pessimistic risk analysis methodology, which is effective in uncertain conditions in construction projects. A fuzzy system proposed by Motawa *et al.* (2006) helps to determine potential changes, which occur during the construction project lifetime.

3. CONSTRUCTION CONTRACTS AND RISK ALLOCATION

Construction contracts deal with project risks through their allocation to the involved parties. The contract is a written agreement between a client and a contractor where liabilities and responsibilities of each party are

assigned. Construction contracts form the behavior of different actors in a project and have a major impact on the successful completion of the project.

Today the majority of Swedish contracts are based on the standardized conditions of contract. These documents are developed and issued by the Building Contracts Committee (BKK). BKK is a non-profit association consisting of authorities and organizations in the Swedish construction sector. The main objective of BKK is to constitute a negotiation body for the principals regarding general conditions for different kinds of contracts, to draw up such conditions, to work for the observance of agreements made within the association and to conduct other activities connected therewith.

3.1 Forms of contract and collaboration

Performance-based contracts are the contracts where the client is responsible for planning, design and function of a construction object and the contractor is responsible for job execution. Within this contract form two main organisation alternatives are possible: divided contracts and general contracts. Schematically their organisation structure is shown in fig. 1.

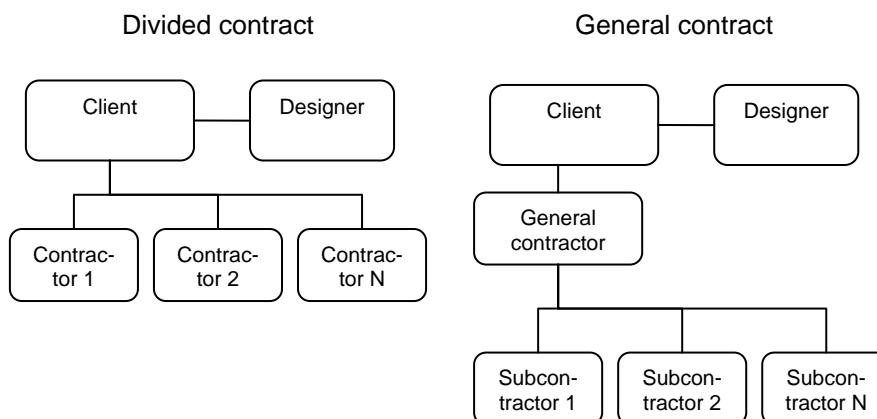


Figure 123.1 Organisation structure in performance-based contracts

A *divided contract* implies that a client appoints several contractors and signs a separate contract with each contractor. This form allows the client to choose the best possible tender for every part of the work. On the other hand, the coordination costs are very high and it could be difficult to identify exactly which contractor is responsible for a particular error. A *general contract* implies that a client signs only one contract with a general contractor, which in turn appoints the subcontractors to carry out the work. The general contractor is solely responsible for coordination of

subcontractors. This type of organisation is more often used in Sweden than divided contracts.

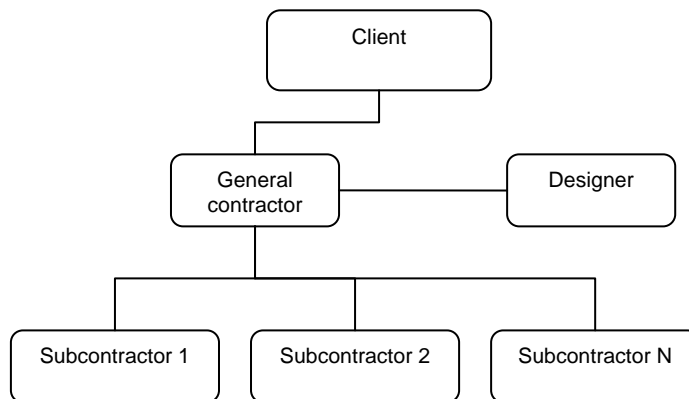


Figure 123.2 Organisation structure in design-build contracts

The organisation structure of design-build contracts is illustrated in fig. 2. In this type of contracts the contractor is responsible for both design and construction. The client signs only one contract, thus this form is the most straightforward one from responsibility point of view. In the procurement documents the clients set their demands on functionality. The contractors carry out design and construction. Öztas and Ökmen (2004) state that popularity of design-build contracts are increasing in recent years because single point of responsibility attracts the clients.

Over the last decade collaboration form *partnering* has become popular in the construction industry. The concept of partnering is differently defined in the research literature. To summarise, partnering is a way to create an effective collaboration between the projects actors. Such components as common goals, continuous improvement and structures for problem solving form the concept of partnering. Effective collaboration leads to decreased number of disputes, lower construction costs and a better quality of the product. Based on the experiences from the USA, the UK, Norway and Denmark partnering concept has been adopted in Sweden. One of the goals of partnering is better utilisation of the overall qualifications of the project's actors. Some current examples of partnering projects are presented in Rhodin (2002) and Kadefors (2002). Since 1999 NCC, one of the largest construction companies in Sweden implemented about one hundred partnering projects. According to NCC's assessment these projects showed good final results.

3.2 Risk allocation in different forms of contract and collaboration

An appropriate allocation of risks between actors in a construction project is important due to impossibility to eliminate all potential risks. Risk allocation influences the behaviour of the project actors and, therefore, has a significant impact on the project performance in terms of the final total cost.

Many countries have a legislation that regulates contract relationship. In Sweden the relationships between the client and the contractor are regulated by general conditions of contract. The performance contracts are based on "General Conditions of Contract for Building, Civil Engineering and Installation Work" (AB) (BKK, 2004). The design-build contracts are regulated by "General Conditions of Contract for Building, Civil Engineering and Installation Work performed on a package deal basis" (ABT) (BKK, 1994). AB and ABT assign responsibilities and liabilities of each contracting party regarding job performance, organisation, timeframes, guarantees, errors and economy. These documents are very well known for both the client and the contractor and regularly used in the majority of construction projects. Even partnering projects are based on the general conditions. Parties often consider deviations from the general conditions as a risk by itself.

Table 123.1 Strengths and weaknesses of different form of contract and collaboration from the risk perspective

| Form | Strengths | Weaknesses |
|------------------------------|---|--|
| Performance - based contract | Flexibility for the client in terms of design Possibility to choose the best tender for both design and construction | Higher coordination costs Higher construction costs Lack of information and knowledge transfer between actors |
| Design-build contract | Shorter building time Single responsibility | Cost uncertainty Quality uncertainty Necessity of high professional skills from the contractor |
| Partnering | Increased returns Shorter building time Openness for alternative solutions Knowledge transfer between actors | Increased number of meetings Necessity of high professionalism from all actors Difficulty to get a fix price of the contract |

From the risk management perspective the design-build contracts are more attractive for the client as the responsibility for design implies more risk allocated to the contractor. On the other hand, the design-build alternative may be more expensive compared with the performance contracts. Furthermore, the quality of the final product may be lower if the contractor uses cheaper solutions, trying to decrease own costs. This problem is especially relevant in the contracts with the fixed price type of payment. When the project has relatively simple design and the technical solutions are not of a great importance to the client, the design-build contract is the easiest one from responsibility perspective. In terms of time the design-build system provides the quicker start of project execution. From the contractor's point of view the design-build construction projects could be very risky when the contractor lacks knowledge and experience of the design-build system.

Partnering is a good alternative for project implementation when a trust relationship between the actors exists. It allows a more efficient risk management process based on the common goals. Both parties get a final product with a good quality, shorter building time and less disputes. Furthermore, partnering helps in transfer of knowledge and experience between the project actors. It is important to mention that partnering concept demands high professionalism and very good knowledge of the project from both the client and the contractor. One of the problems is that such close collaboration may create a false feeling of easy problem solving and lead to hiding of the serious conflicts. Table 1.1 summarises strengths and weaknesses of the contract and collaboration forms mentioned above from the risk management perspective.

Several studies of the risk management aspects in different forms of contract were performed in Sweden. Toolanen (2004) made a survey of choices of contractual forms in different decision environments where uncertainty was a parameter. He found that the clients choose the design-build contracts more often when the project's timeframe and availability of resources are critical factors. Håkansson *et al.* (2007) highlight that the competence requirements are higher in the design-build contracts, and structured risk analysis should be done very early in the project. Simu (2006) showed that the smaller contractors in Sweden prefer the performance-based contracts or general contracts in particular. In the case when a design-build contract is used the contractors increase the price by including the insurance for the extra risks.

4. DISCUSSION AND FURTHER RESEARCH

The research literature identifies several problem areas in risk management in construction. One of the problems is that project actors often focus on the short-term economical results and protect own interest rather than the project overall. Risk management in construction projects depends on the choice of contractual form and the content of the corresponding contractual documents. General contract conditions that are

widely used in Sweden formalise risk allocation between the client and the contractor. However, according to the Construction Commission report (SOU 2002:115), the number of errors is not decreasing in the Swedish construction sector.

A stronger focus on how risks are managed in the different forms of contract seems necessary in order to decrease the number of errors and construction costs for both the clients and the contractors. Considering the effects that risk management and risk allocation have on the project goals in terms of both quality and economy, these processes ought to take place in an open and conscious way, preferably starting out from the party that has the best qualifications for dealing with the risk. The risk management in the particular project could then be based on the partners shared view on what the risks are and who should carry them, whereby the contract would express a form of joint risk management. One model might be that the client prepares its view on the risk aspects of the project and the tendering contractor responds with its respective risk analysis. The total picture of the client's and the contractor's risk analyses and a shared insight will then form the basis of a conscious risk management process and risk allocation in the contract. Collaboration form partnering is of special interest here as it allows to base risk management process on trust and openness rather than on sharp contract formulation.

In our future work we will perform case studies on several construction projects with varying contract and collaboration forms. These case studies will aim at understanding the two major questions. We will study the ways and the degree of actors' involvement in the risk management process through different phases of the construction project. Secondly, it is important to understand the factors, which determine whether or not the actors consider an open discussion, risks management and risk sharing are advantageous.

5. CONCLUSIONS

In this paper we presented the results of the initial phase of the research project, which aims at creating improved profitability and a better final product for the construction project actors. We considered questions of risk management within the framework of the chosen contract form from the point of view of clients and contractors. From the perspective of dealing with risks in construction projects we considered three forms of contract and collaboration that are typically used in Sweden and highlighted their strengths and weaknesses.

In particular we showed that the design-build contracts are attractive for the client due to their single point of responsibility; however, the quality of the final product might suffer due to the contractor's attempt to decrease the costs. The performance-based contracts give the client more flexibility in terms of the design but imply more risk allocated to the client. When trust relationships between project actors exist, collaboration form partnering shows good results of the project implementation.

One important observation is that the number of errors is not decreasing in the Swedish construction sector despite the wide use of general contract conditions, which formalise allocation of project risks. We concluded that the risk management in the particular project should be based on the partners shared view of potential project risks, whereby the contract would express a form of joint risk management.

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