

RISK IN EVALUATION OF BIDS FOR PUBLIC CONTRACTS. EMPIRICAL RESEARCH FROM THE CZECH REPUBLIC.

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Abstract

Public contracts especially construction works are connected with high risks. Previous research shows a significant number of contracts with higher costs than expected and delays. Theory of decision making offers a variety of approaches to incorporate risks into decisions: adding criteria measuring risks; assessment of the risk of two best options; determining stochastic consequences of alternatives using decision trees, payoff matrixes, scenarios or Monte Carlo simulation or calculation of costs of preventive and contingency actions. Public contracting entities have limited possibilities to use these approaches due to legal requirements such as transparency, the order of steps while contracting etc. The aim of the paper is to identify possibilities of risk incorporation into an evaluation of bids in public contracts and analysis of the behaviour of public contracting entities from the perspective of risk incorporation. The research was conducted on contracts for construction works in the Czech Republic. The data show that contracting entities used the criteria as sanctions, guarantees, warranty period etc. transferring risks on contractors.

Key words: Public contracts, risk, evaluation criteria, contractor selection

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Introduction

A considerable amount of public contracts ends up with higher costs than contracted. Media cover cost overruns of large construction projects such as urban tunnel complex Blanka, Hamburger Philharmonie etc. Problems with meeting the contracted costs occur not only on large construction projects. Pavel and Beblava (2012) found out that the percentage of contracts where the final budget is higher than the contracted one ranged from 15 to 17% based on the type of contracting entities. The research was conducted on a sample of 387 public contracts in Slovakia. The average price increase was 18.2%. Contract amendment appeared in a quarter of contracts (Pavel & Sičáková-Beblavá, 2012).

Considering the length of contracting process, it is understandable that changes happen both inside and outside from contracting entities. Despite the fact that the changes in contract

realization are understandable, they are undesirable and should be minimized. The legal regulation allows contract amendments but under specific conditions and in a limited extent. As valid to June 2016, the limit is 30% of the original value of the contract. In the upcoming amendment of the Act, the limit should be 50% in concordance with the EU regulations.

The changes in contract costs indicate that decisions about public contracts are decisions under risk. Approaches and methods of risk analysis should be applied to reduce the chances of cost overruns of public contracts. Risk analysis and risk management have a long history in construction projects. Covello and Mumpower illustrate that people have been dealing with risks for a long time with an example of a group of Asipu from the ancient Mesopotamia (Covello & Mumpower, 1985).

Aim of the paper is to identify possibilities of risk incorporation into evaluation of bids in public contracts and analysis of behaviour of public contracting entities from the perspective of risk incorporation. The problem is viewed from the perspective of contracting entities. The bidders have to deal with risks also but they have different possibilities. The research of behaviour of contracting entities was conducted on contracts for construction works for its homogeneity compared to supplies and services and allows revealing patterns. The research focuses on contracts from the Czech Republic. Previous research (Ochrana & Hrnčířová, 2015) proved the differences in behaviour of Czech contracting entities compared to Western European countries. Czech contracting entities prefer evaluation of bids according to one criterion – price (around 80% of contracts) while Western countries prefer multi-criteria evaluation.

The first chapter introduces theoretical approaches of risk incorporation into decision making with the assessment of their applicability for public contracts based on their harmony with legal regulation. The second chapter summarizes findings of previous research dealing with risk in decisions about contractors in public contracts. The third chapter contains information about empirical research and is followed by discussion and conclusion.

1 Risk incorporation into decision making and its applicability for public contracts

Theory of decision making offers different approaches how to incorporate risks into decision making. Svecova and Fotr present four basic approaches how to incorporate risk into multi-attribute evaluation of alternatives (Svecova & Fotr, 2013): (1) adding a criterion expressing risk into the set of criteria; (2) ranking alternatives without risk and subsequent assessment of

risks for the two best alternatives; (3) using stochastic consequences of alternatives such as mean; (4) multi-attribute utility function.

In a broader perspective, it is useful to add one more area dealing with risk incorporation into decision making which is (5) preventive and contingent actions aiming to prevent respectively minimize negative consequences of risks.

Public contracting is highly legally regulated. The main act in the Czech Republic is the Act on Public Contracts no. 137/2006 Coll. (the Act). It is harmonized with EU legislation. The Act defines rules for contracting entities by stating required behaviour and also forbidden behaviour. Legal regulation is the main source for the assessment of applicability aforementioned approaches of risk incorporation into public contracts. Key characteristics of decision making within public contracts are: order of steps when criteria, and evaluation process have to be announced before receiving bids which are alternatives; the Act forbids to use some criteria such as contractual terms and conditions (§ 78); contracting entities should comply with the three basic principles: transparency, equal treatment and non-discrimination (§ 6).

The first approach – **adding a criterion expressing risk** into the set of criteria – is based on the concept of four merits – BOCR (benefits, opportunities, costs and risks) (Saaty & Vargas, 2013). The alternatives are evaluated based on these four merits. This approach enables to distinguish alternatives according to their risks. It would not be possible to add criterion risk into a set of criteria for bid evaluation for public contracts with a description that it expresses the level of risk of each alternative. It is not clear and transparent enough. The solution is to decompose risk into more specific aspects and define the method of its measurement.

Assessment of risks for the two best alternatives based on evaluation without risks is based on (Kepner & Tregoe, 1997). This approach is not so demanding in comparison with the previous one because it does not require the risk assessment for all alternatives but only for the two best alternatives. It is not possible to use this approach for public contracts. The process of bid evaluation has to be announced in advance and transparently. It would not be possible to describe the process transparently without knowledge of the bids. It is also not possible to assess only two best bids and ignore others.

Using **stochastic consequences of alternatives** requires estimating future values of risk factors including their probabilities either continuously or discretely. Supporting methods for this approach are Monte Carlo simulation, probability tree, decision tree, payoff matrix and scenarios (Svecova & Fotr, 2013). The methods help to map the future values of a criterion and to determine mean and other statistical characteristics which are key information for decisions. This approach is also not applicable for public contracts. The statement is supported by the

following reasoning. Two possibilities exist on the subject who would determine values of risk factors etc. contracting entities or bidders. If contracting entities do it, it would mean adjusting information received through bids. Specifically, it would mean for the contracting entities to take e. g. costs (price) and identify risk factors which could cause increase and estimate the level of increase and its probability. This would be done for all bids. It is not possible for the requirement of transparency. It is not possible for contracting entities to change received information, in this case price, in a different way than described in contract announcement and it would not be possible to describe the process prior receiving bids. If bidders do it, it would not be appropriate for contracting entities due to different perspectives of risks.

Multi-attribute utility function (MAUF) is based on utilities expressed quantitatively for each alternative and each criterion. To obtain a utility function, two assumptions have to be fulfilled – preferential independence and utility independence of criteria (Keeney, 1973). Besides the demanding character of MAUF, it has again the problem with transparency. The utility function is a subjective method. It is not applicable for public contracts.

Preventive and contingent actions are typically connected with extra costs in a trade-off for risk reducing. These extra costs should be part of the total costs. Quantitative assessment of risk via pre-mitigation contingency offers (Salah & Moselhi, 2016).

Previous paragraphs show that public contracting entities have limited possibilities how to incorporate risk into bid evaluation. They can reflect risk into expected costs and other aspects such as delivery time or they can add some aspects of risk into the set of evaluation criteria. The aim of the research is to investigate the set of criteria from the perspective of risk.

2 Literature review

Literature review shows publications about risk in public contracts for construction works and construction works generally. Bayram and Al-Jibouri focus on methods of forecasting the price of construction projects. Their research builds on the concept of ongoing construction projects' cost overruns despite the improvements in estimation and forecasting methods. They calculated the level of optimism bias on construction projects in Turkey (Bayram & Al-Jibouri, 2016). The focus is on steps before searching contractor.

Jung et al. focus on risk analysis including identification of risk factors, their importance assessment with the goal to estimate contingencies and thereby cope with cost overruns (Jung, Kim, & Lee, 2016). They define contingency as “*an expense set up to cope with and handle the cost overrun factors caused by inaccurate understanding of project at the time of project cost*”

estimation, or by uncertainties such as unexpected change order, schedule delay, and uncontrollable factors”.

Previous research did not deal specifically with criteria for contractor selection under risk. Weber et al conducted a strongly cited meta-study in which they compared 74 articles dealing with vendor selection criteria. Only one of the criteria dealt closely with risk – Warranties and claims. This criterion appeared only in one of the articles and was ranked as the least relevant according to bibliography appearance (Weber, Current, & Benton, 1991). Kar and Pani researched several supplier selection literature reviews and presented a list of over 60 generic criteria. Criteria dealing directly with risk were Warranties and Risk perception. A Delphi study was conducted to identify the critical supplier selection criteria from the list across manufacturing industries in India. A fuzzy analytic hierarchy process for group decision making was applied to estimate the relative importance of these criteria. None of the criteria dealing directly with risk was ranked among the 7 most important (Kar & Pani, 2014).

Both aforementioned articles did not deal specifically with public contract selection criteria, meaning that the lists contained criteria, which are banned by the Act.

The literature review shows that there is no research on real public contracts aimed at criteria used to deal directly with risk.

3 Research

Data for the research were retrieved from the Bulletin of public contracts (www.vestnikverejnychzakazek.cz). Contracting entities has to publish information about their contracts on the Bulletin. The Bulletin contains almost complete data from the field of public contracts. Exception from the publication rule has contracts for construction works below 6 mils. CZK (valid until 1.4.2012), and below 3 mils. CZK (valid after 1.4.2012 till 31.12.2013) and specific contracts such as defence.

Collected data include information about contracts published in the time frame 2011-2013 for construction works which were evaluated using multiple criteria. The number of such contracts was 1765. Specification of evaluation criteria is not mandatory. 473 contracts did not include the information. The sample consists of 1292 contracts.

Half of the sample was evaluated according to two criteria, 33% of contracts used three criteria. The maximum number of criteria in the sample was 9 and it was used twice.

The methodology of research was inspired by (Pastor-Ferrando, Aragonés-Beltrán, Hospitaler-Pérez, & García-Melón, 2010) and included following steps:

1. Clarification of criteria – formulation of criteria contained many typos and misspellings. For some contracts, it was necessary to search for additional information to understand the meaning of criteria.
2. Cluster creation – two researchers went through the criteria each alone and named groups of criteria with a similar content using post-its. After a discussion, final list clusters were revealed.
3. Criteria clustering – each criterion was assigned to one cluster. This step allows listing typical representatives of each cluster.

4 Results

Five clusters of criteria were identified: quality, time, financial aspects, terms and conditions and guarantees. The first three clusters are considered as not dealing directly with risk. Identified sub-criteria in the quality cluster were: quality plan, technical and functional aspects, schedule, and quality in general without further specification. Time cluster contains sub-criteria such as a period of completion, shutdowns on regular operations and time limit reductions. Price and operations costs are grouped in cluster financial aspects.

Tab. 1 illustrates the clusters connected closely with risk and percentages of contracts for which they were used in 2011 on the total number of contracts for construction works evaluated according to multiple criteria.

The situation changed significantly during the analysed period of time. In the so-called transparency amendment of the Act (valid from 1.4.2012) is clearly stated that “Contractual terms and conditions, the purpose of which is to secure the obligations of the economic operator, or terms of payment shall not be a partial evaluation criterion”. Some criteria were banned. Warranty period is still very popular criterion used in 31% of contracts for construction works evaluated with multiple criteria in 2013 and is the third most used criterion after price and period of completion.

Tab. 1: Identified clusters of criteria dealing with risk

Cluster of criteria	Specific sub-criteria	2011
Guarantees	• Bank guarantees	17.15 %
	• Guarantees in general	5.01 %
	• Sanctions	42.58 %
	• Service	3.85 %

	• Warranty period	67.24 %
Terms and conditions	• Due date of payment	4.62 %
	• Terms and conditions in general	2.12 %

Discussion

The research has its limitations. The biggest limitation is the connection to legal regulation and its frequent amendments. The amendments impair possibilities of longitudinal research. The sample in this contribution includes contracts with different values. Previous research shows how contracting entities in the Czech Republic change behaviour according to change of regulation (Nikolová, Paguta, Pertold, & Vozár, 2012). Another changing part of legal regulation affecting the research is permitted criteria. The majority of criteria used as ways of protection against risk are banned now.

Future research of risk in public contracts should be focused on steps prior to bids evaluation, specifically how contracting entities deal with risk while estimating costs of the contracts. The interesting research topic also changes the behaviour of contracting entities forced by changes in the Act. A significant number of contracting entities used criteria related to their securement against risks.

Conclusion

Contracting entities are very limited in possibilities to deal with risk compared to private subjects. From the possible approaches to incorporate risk into decision making, they can only add some aspects of risk into the set of evaluation criteria or they can incorporate risk into expected costs and other aspects. It is necessary to realize that it is not possible to use this approach for all risks. Some risks are related to the merit of the contract such as the future demand. More approaches could be used dealing with such risks.

Findings from the research show that contracting entities were used to transfer risk on contractors by choosing the criteria related to sanctions, services, guarantees, warranty period. These criteria were highly used before the amendment of the Act forbade it. The significant number of contracts using these criteria shows the importance of the securement against risks for contracting entities.

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