

Chapter 66

Bidder Selection in Public Procurement using a Fuzzy Decision Support System

Vjekoslav Bobar

University of Belgrade, Serbia

Ksenija Mandic

University of Belgrade, Serbia

Milija Suknovic

University of Belgrade, Serbia

ABSTRACT

Bidder selection in public procurement is a decision making problem whose primary purpose is to achieve the cost effectiveness and efficiency in the expenditure of public money. This principle is also known as the principle of “value for money”. This selection is based on many alternatives and many quantitative and qualitative criteria where qualitative criteria are often expressed as linguistic uncertain variables. The theory of fuzzy sets is a tool suitable to model uncertainty when applied to a variety of problems in real life. However, many fuzzy methods require complex calculation and they are not appropriate for using in public procurement because they slow down this process. In this paper, in order to make a quick decision in public procurement, a Decision Support System based on the fuzzy extent analysis method is developed. In order to demonstrate the usefulness of this system, a real-life case scenario of public procurement is presented.

1. INTRODUCTION

Public procurement means the procurement of goods, services and work by the government authority, in the manner and under conditions prescribed by the Law of public procurement in Serbia (Public Procurement Law, 2012). The primary purpose of this process is to achieve cost effectiveness and thereby attain an implicit level of efficiency as regards the expenditure of public money. This principle is also

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known as the principle of “value for money” - meaning to achieve the best possible ratio between the amount paid and the value received. The importance of this process becomes evident when we consider the fact that in Serbia public procurement accounts for some 7.27% of gross domestic product (GDP), that in the EU it approximates to 19% of GDP (European Commission, 2012) and that public procurement represents around 15% of the world’s GDP.

The public procurement process consists of two main stages: the pre-award stage and the post-award stage. The pre-award stage has the sub-stages like call preparation for public procurement, notification, bid submission, bid evaluation and the selecting the most suitable bid. The post-award stage has sub-stages like ordering, invoicing and payment (Bobar, 2013).

The one of very important phase in public procurement is bid evaluation and selection of the most acceptable bid. This evaluation and bidder selection in the public procurement procedure can be viewed from the perspective of the Multi-Criteria Decision-Making (MCDM) problem (Bobar, 2013), where a contracting authority as decision maker must compare the bids against pre-defined criteria, select one of the potential bids or conversely reject all of them. For solving MCDM problem is specific that is not a search for the optimal solution, but this kind of decision-making helps decision-makers to process complex data which are involved in their problem and, in that way, progressing towards the most appropriate solution (Roy, 1990). In the public procurement process there is the same situation: there are many complex data (criteria and bidders) where the decision-maker (contract authority) wants to find the most suitable bidder.

The specific characteristic of public procurement is that this process must comply with specific legislative requirements. For instance, in the EU this matter is regulated by the 2004/18/EC Directive (2004), also called the Public Procurement Directive (Falagario et al. (2012). In Serbia, the public procurement is regulated by the Public Procurement Law (2012), which sets the application of one of the two following criteria for evaluating bids in public procurement processes: the Lowest Price offered and the Most Economically Advantageous Bid (MEAB). Depending on the subject of public procurement, the MEAB criterion is based on various elements of the criterion (price, quality, references, time delivery, etc.). The selection and evaluation bids based on MEAB criterion can be viewed from the perspective of the decision making phenomenon, where selection of the most acceptable bid, in fact, represents the objective of a decision making problem based on many alternatives and criteria. Alternatives are the bids or bidders who possess specific resources that they wish to place in the service of satisfying the purchaser’s needs. Therefore, alternatives are possible solutions that suit, more or less, the realization of an objective of a decision making problem, which in the case of public procurement corresponds to the purchaser’s requirements. Essentially, a criteria are a function that associates each action with a number indicating their desirability according to consequences related to the same “point of view” (Roy & Bouyssou, 1991). In one word, criteria are attributes for describing offered bids and they indicate the extent to which individual bids realize the set objective of public procurement. In public procurement, we have a much quantitative (price, distance, time) and qualitative (quality, design, technological performance), often conflicting criteria. Based on these criteria, contracting authority can make selecting a suitable bidder.

In practical usage of existing public procurement software, we cannot compare bidders using both criteria at the same time: qualitative criteria (quality, technical performance, etc.) and quantitative criteria (price, time delivery, references, etc.). For example, the public procurement software in Malta (see <https://www.etenders.gov.mt/epps/home.do>, Government of Malta, 2009), in Armenia (see <http://www.armeps.am/epps/home.do>, Ministry of Finance of Republic Armenia, 2009) and in The Former Yugoslav Republic

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