Website Tenders Evaluation Using Fuzzy Logic

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ABSTRACT

Developing a new website for a government institution is one of common tenders issued by various ministries and government institutions in the world. The country of Jordan usually has at least 22 different ministries and government institutions at a given time. Each one of these entities has its official website which is revamped every three years because of the rapid changes in information and technology. In most cases the ministries and institutions issue a tender to the public, then after collecting tender offers from different companies, only one offer would be selected. The selection process would choose the most appropriate contractor to deliver the project with respect to quality, time and cost. This article presents a new fuzzy logic system for tender evaluation which is based on both the technical qualification of the bidder company and its experience. The proposed system has shown better performance evaluation when compared to the traditional evaluation method currently used by the government.

KEYWORDS

Fuzzy Controller Logic (FIC), Mamdani Model, Tender Evaluation, Tender for Website Development

1. INTRODUCTION

In Jordan, at least 22 different ministries and government institutions are available at a time. Each one of these entities has its official website which is improved at least every three years because of the rapid changes in information and technology. In most cases the ministry or institution would issue a tender to the public for revamping its website. Once the tenders are submitted then the evaluation process would start to select one winner bidder. Ministries in Jordan have realized for some time that the lowest price bid is not always the best choice. In many cases the quality of the proposed services, products or projects is not necessary met by the lowest bidder. This has been noticed in the past with different tender types, including hardware equipment, software, services, building construction, etc.

Many approaches for tenders’ evaluation do currently exist. The most common one is to have a mathematical equation which relies on weighted criteria or factors, that not only depends on the price but also have factors related to quality, such as company experience, new technologies used, project management, risk managements and other factors.

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(Liu & Lai, 2000) have shown that evaluations that depends on price only have bad results. That is because it will ignore the importance of other attributes, such as quality, experience, performance, time, safety, and others. Liu have presented a multi attribute model based on weighted mathematical equation. The major selected attributes were as follows: safety, time, quality and cost.

Besides using equation of multi weighted criteria, fuzzy logic was introduced in many ways in tenders’ evaluation because most of the criteria used in evaluation are qualitative in nature. This makes using fuzzy approach more suitable for this kind of evaluation.

Many fuzzy logic-based models were applied to tender evaluation in building construction and engineering projects (Zhang, 2015; Liu & Lai, 2000; Nguyen, 1985; Hsieh, Lu & Tzeng, 2004; Jianxiang, 2010; Morote & Vila, 2012; Bendana, Del Cano & De La Cruz, 2004). A model for engineering project tender evaluation based on fuzzy Data Envelopment Analysis (DEA) and grey relational analysis have been presented (Zhang, 2015; Shen & Li, 2005; & Huang & Qiu, 2003). The presented model has used fuzzy synthetic assessment and DEA for qualitative indicators such as Project Quality, Construction Technology and Corporate Reputation. The following linguistic values in the assessment: very poor, poor, medium, good, and excellent have been used by (Zhang, 2015). The grey system theory for quantitative indicators that were actually cost indicators such as Project Quotation (in million-yuan) and Project Duration (in Days) have also been used by (Zhang, 2015). (Zhang, 2015) not only have shown how it is useful to evaluate the tenders based on qualitative and quantitative indicators but also found the reasons for ineffectiveness of bad bidders.

A fuzzy and multi-criteria model for tender evaluation have been proposed by (Nguyen, 1985; Brown & Yao, 1983). The proposed model has depended on the following three main criteria: cost, past experience of tenderers and present bid information.

A model for selecting alternatives for planning and design (P&D) in public office building have been presented by (Hsieh et al., 2004; Altrock & Krause, 1994; Baas & Kwakernaak, 1997; & Chang & Chen, 1994). First, the model has included the following three interest groups: owners, users and expert representatives. The model has used the Fuzzy Analytic Hierarchy Process (FAHP) to calculate the weight factors to each interest group. Second, it did use Fuzzy Multiple Criteria Decision Making (FMCDM) to represent group decision. (Hsieh et al., 2004) has effectively simplified the complicated multi-criteria and fuzzy perception problem of selecting alternatives for building P&D.

A framework for tender evaluation of infrastructure projects of institutions of higher education in China have been presented by (Jianxiang, 2010; & Guoyin, 2001). It did use rough set theory to evaluate the tender based on the following variables: price indications, quality indicators, production and technical indications and project progress indicators. Rough set theory is a theoretical method used to represent incomplete and uncertain knowledge, data expression, and data study and data induction. It is also used to study object set that is described by multi-valued property.

A bidder qualification model for building projects using fuzzy set theory which handles the inconsistencies in the performance evaluation of bidders according to qualitative and quantitative criteria have been presented by (Morote et al., 2012; & Jaskowski, Biruk, & Bucon, 2010). The selected criteria that were used are the following: technical capacity, company past experience, management capability, financial stability, performance of similar projects, the quality of health and safety policy. The model have generated a hierarchical structure of criteria in order to define the weights for each criteria, then calculated the performance value for the contractors.

Several researchers have dealt with contractors’ selection system based on fuzzy control (Bendana et al., 2004; & Pack, Lee, & Napier, 1992). The system was used in the private sector, in the traditional design-bid-build projects. The system has included an estimation for several qualitative and quantitative criteria. The system has used the following three different selection policies: cost, time, and quality.

A fuzzy logic framework to help decision-makers evaluate tenders of building projects have been presented by (El Agroudy, Elbeltagi, & El Razek, 2009). A fuzzy logic model was developed to build a framework for contractor selection to evaluate contractors against vague qualitative criteria.
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