

Proposing a hierarchical approach based on fuzzy logic to choose a contractor in the bank

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Abstract

Given the importance of implementing projects in the countries and the role of contractors as the most important factor in the project's implementation, one of the most important concerns of employers choose the right contractor. For years, many researchers have attempted to provide appropriate contractor selection criteria and these criteria have been introduced each given category. such as financial problems, poor performance or events that arise due to lack of safety considerations in the work, has experienced. Selecting the right contractor is very important and will affect the results of the project. According to studies, one of the most important activities in planning and decision making for projects appropriately, can be done to choose the right contractor for their implementation. using fuzzy hierarchical analysis and weighting of evaluation criteria has been paid, as a result of the experience of the most important criteria, management and price offer presented.

Keywords: Contractor selection criteria, quality, fuzzy hierarchical analysis

Introduction:

Today's complex business environment, increased competition among manufacturers, limited resources and many other factors, has caused the production to the use of medications and optimal decision processes in motion to thereby possible to ensure the survival of progressive organizations (Elyasi M. et al, 2012a, 2012b; Jafarzadeh, H. et al. 2014). Obviously, specialization and thus limiting the scope of experiences can, if possible, that would be part of the tasks to contractors outside the system. In fact, outsourcing is the loss of core or non-core activities of the organization on the basis of decisions made, which leads to lower rates of vertical integration is made (Hasani, et al., 2013). Traditionally "provided outside the organization" Brvn Spary called simply; outside the organization actually means value for

your organization without the presence of the organization's business process value. So outsourcing refers to products and services that in the past by the organization itself and within the My Shdh is provided.

The contractor selection criteria include:

- Choose based on quality and price
- Selected based on the quality
- Choose fixed-price
- Selected on the basis of the minimum price
- Consultant selection based on qualifications
- Exclusive consultant

Contractor selection process due to the possibility of a conflict of standards is complex. Many researchers have tried to identify the most important criteria for choosing the right contractor for outsourced assist managers in making decisions. In fact, the factors that evaluators can use their criteria, contractors and their performance evaluated the different projects. Some companies and organizations in tenders for contractor selection criteria are cost, if these measures alone can not guarantee success and quality of your project (Jafarzadeh, H.et al. 2017; Moradinassab et al, 2018).

One of the main reasons for the failure of outsourcing projects, contractor selection is inappropriate. A good contractor should have the ability to meet current and future needs of the organization. Reputation technical competence, financial stability and ability to contract manufacturing, outsourcing to affect the process. Since the wrong decisions about choosing the right contractors for the organization will be irreparable consequences; therefore, assess, manage and choose the best contractor of potential contractors is necessary.

Theoretical basis of research:

Contractor selection criteria

Based on the results of the study Watts and colleagues (2010) [5], it is known that past performance, technical expertise and cost are important criteria in selecting a contractor and organizational criteria is less important. Based on Jaskowski and colleagues (2010) for the qualifications of the contractor in the tender procedure, the contractor identified five criteria. They are

- Manpower and equipment
- Financial capacity
- Performance in previous projects
- Organizational experience

- Management systems (quality systems, safety policy).

Criteria specified by waiting and colleagues (2009) for vendor selection, including six sets of variables that include price, service, delivery time, flexibility seller, quality and political factors.

As can be seen in Table 1 Some criteria that should be considered in the selection of contractors, provided.

Table 1. Criteria for the selection of contractors (Homan, 2005)

Outlines criteria	Criteria for selection	Row
Long-term relationship between supplier and outsourcer would share the risk and reward between the two, and ensures cooperation between them. The possibility of controlling some opportunistic behavior provisioning provides for outsourcing.	LTR [*] (	١
Periodic evaluation of supplier performance opportunities for both sides in order to identify the current status of the favorable situation on several occasions, including services provided at the right time shipments, inventory accuracy, reduce costs and provide security.	PM [†] (	٢
The consent of the supplier retains some of its staff outsourcing, which would otherwise be unemployed after the outsourcing contract. This measure creates goodwill between the outsourcer and provider is improving.	WIL [‡] (	٣
Flexibility in terms of billing, receipt and payment of the increased goodwill between the two parties.	FBP [§] (	٤
Management quality supplier to provide services not only appropriate, but also create and nurture a long-term relationship between the parties.	QM ^{**} (	٥
Mutual trust is the basis for the sharing of information between the parties and the agreement is needed not only to continue but also continuous improvement of services as well.	INF ^{††} (	٦
The performance of supplier performance metrics such as delivery services, the ability to monitor performance, report statistical information on outsourcing, the ability to identify shortcomings and failures, detailed accounting, security, privacy and compliance with the principles of the protection of sensitive information.	OP ^{‡‡} (	٧

*- Long-Term Relationship

†-Performance Measurement

‡-Willingness to Use Logistics Manpower

§-Flexibility in Billing and Payment

** -Quality of Management

††-Information Sharing and Mutual Trust

‡‡-Operational Performance

Ability top supplier in the field of information technology, it is important to reduce uncertainty and inventory levels. The provider can exploit conditions of the advanced capabilities of your IT outsourcing created and no longer need to invest in information technology by outsourcing some resolve.	IT ^{\$\$} (	٨
The criterion for proper operation of the operation is effective. If you can provide quality equipment including air conditioning, warehouses and transport to adapt to the needs of the outsourcer is a strong point for him.	FA ^{***} (	٩
Early experience as a supplier in connection with outsourcing production line for outsourcing is an advantage.	ESP ^{†††} (	١٠
This criterion has two dimensions, speed and reliability in the delivery of activities.	DP ^{†††} (	١١
The importance of this measure employee satisfaction in supplier that can not demonstrate the possibility of strikes, sit-ins, subversive activities and any other activity that would show the closure of the supplier. These issues caused a negative impact on the operations outsourcing.	ESL ^{\$\$\$} (	١٢
Financial performance provides smooth, logical ensure continuity of service and update equipment and services that are used in the operations provided by the supplier to provide.	FP ^{****} (	١٣
The supplier's market share reflects the financial performance, customer satisfaction and reputation it.	MS ^{††††} (	١٤
High geographical distribution and the ability to provide services in high dimensions is desirable to increase the availability of outsourcing to different markets and at the same time can be saves distribution costs and marketing outsourcer.	GS & RS ^{††††} (	١٥
This standard provides the ability to deliver applications and unanticipated events show. According to this criterion to ensure continuity of service is required.	RM ^{\$\$\$\$} (	١٦
If the probability of sudden and unexpected increase in demand from outsourcing any of these criteria is important.	SC ^{*****} (	١٧
Create a controversy and disagreement between the parties in the long run is not a matter of surprise, and thus create a situation arbitration and the parties agreed to terminate the contract that is essential.	CAR ^{†††††} (	١٨
Flexibility in operations and delivery of service for customers, particularly the demand for outsourcing provides uncommon.	FOD ^{†††††} (	١٩

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^{\$\$}-Information Technology Capability

^{***}-Size and Quality of Fixed Assets

^{†††}-Experience in Similar Products

^{†††}-Delivery Performance

^{\$\$\$}-Employee Satisfaction Level

^{****}-Financial Performance

^{††††}-Market Share

^{††††}-Geographical Spread and Range of Services Provided

^{\$\$\$\$}-Risk Management

^{*****}-Surge Capacity of Provider

^{†††††}-Clause for Arbitration and Escape

^{†††††}-Flexibility in Operations and Delivery

The proposed method of analysis

In this study were identified after the criteria and sub criteria to be determined by the method of hierarchical fuzzy. After the importance became clear criteria for evaluation and selection of contractors is fuzzy techniques. The analysis in this study are summarized in the algorithm is as follows.

1. Identification and selection of the most important criteria of assessing and selecting contractors using the literature
2. Calculate the relative importance of factors and weighting them using FAHP

Fuzzy Logic

Uncertainty in preferential judgments, prioritizing alternatives uncertainty increases, as well as to determine the agreement) of logical consistency (Priority difficult. Uncertainty is everywhere in fact that is difficult to describe and explain the parameters or even impossible. for example, to estimate customer demand, travel time, inflation and so on. in this study, we assume no precise information available about the criteria of performance evaluation is not available, so important have been estimated by knowledge experts. in this some of the main definitions of the fuzzy sets, fuzzy numbers is presented. definitions and symbols presented in this section will be used in the following sections.

1. The definition of fuzzy set, the set whose members are the values between 0 and 1 If X is a reference set of elements $\{X\}$, then a fuzzy set with membership A function defined $\mu_A(x) : X \in [0,1]$ as the amount of each member of the $[0,1]$ (Fig. 1).

$$A = \{(x, \mu_A(x)), x \in R\},$$

Definition 2. If the fuzzy A set is convex

$$\mu_A(\lambda x_1 + (1-\lambda)x_2) \geq \min\{\mu_A(x_1), \mu_A(x_2)\}, \quad x_1, x_2 \in X, \quad \lambda \in [0,1]$$

3. If $\sup_x \mu_A(x) = 1$ the definition of fuzzy set A is normal.

4. The definition of approximate numbers can be represented by triangular fuzzy number, such as "Almost 6" can be seen, $\{8, 6, 4\}$ recounted that the membership function 1 to 4 and 6 to 8 is zero. Membership function between 6 and 4, 8 and 6 number between zero and one. In general triangular fuzzy number A defined as follows (Figure 1).

$$\tilde{A} = (a^p, a^m, a^o)$$

$$\mu_A(x) = \begin{cases} 1 - \frac{a^m - x}{a^m - a^p}, & a^p \leq x \leq a^m, \\ 1 - \frac{x - a^m}{a^o - a^m}, & a^m \leq x \leq a^o, \\ 0, & \text{otherwise.} \end{cases}$$

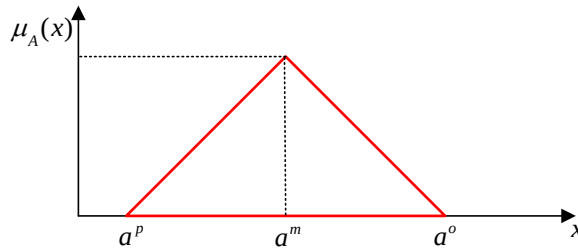


Figure 1: The triangular membership function

Definition 5. Assuming triangular $\tilde{A} = (a^p, a^m, a^o)$ & $\tilde{B} = (b^p, b^m, b^o)$ fuzzy numbers defined and compulsions in this case the numbers are defined as follows.

$$\tilde{A} + \tilde{B} = (a^p + b^p, a^m + b^m, a^o + b^o).$$

$$\tilde{A} - \tilde{B} = (a^p - b^p, a^m - b^m, a^o - b^o).$$

$$\tilde{A} * \tilde{B} = (a^p * b^p, a^m * b^m, a^o * b^o).$$

$$\tilde{A} / \tilde{B} = (a^p / b^p, a^m / b^m, a^o / b^m).$$

Introducing a hierarchy based on fuzzy logic

Uncertainty in preferential judgments, prioritizing alternatives uncertainty increases, as well as to determine Agreement (logical consistency) Priority difficult. Many studies of different aspects of fuzzy AHP method was carried out, and ultimately to provide. AHP Fuzzy avoid the hazard function was developed to solve the problems of hierarchical ambiguous.

In this method, based on the values of the triangular fuzzy, vague and alternative data to a specific level hierarchy, pairwise comparison matrix is formed. The fuzzy logic approach, for each pair-wise comparison, the point of intersection is found, and then join the point is equal to its weight.

After define criteria, levels of importance of the criteria to be determined.

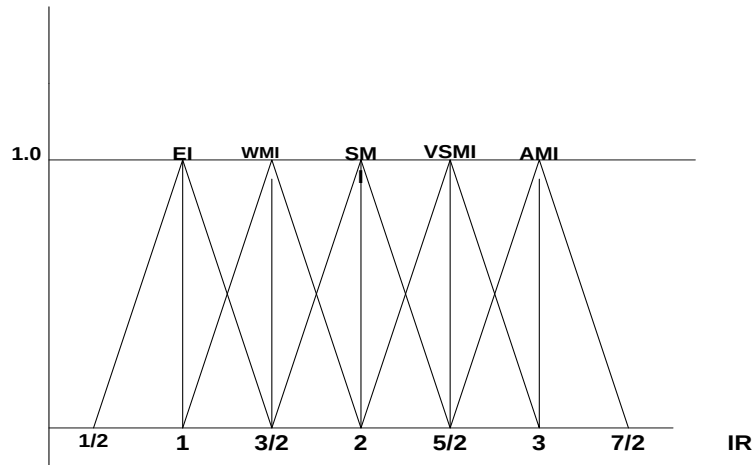


Figure 2: Fuzzy Numbers

Table 2: fuzzy numbers to calculate weights

Triangular fuzzy numbers	Fuzzy numbers	The usual numbers	
(1,1,1)	(1,1,1)	1	Equally important
(2/3,1,3/2)	(2/3,1,3/2)	2	Slightly important
(2/5,1/2,2/3)	(3/2,2,5/2)	3	Important
(2/7,1/3,2/5)	(5/2,3,7/2)	4	Very important
(2/9,1/4,2/7)	(7/2,4,9/2)	5	The absolute importance

Results

In this study, using a hierarchical approach based on fuzzy logic used to select the contractor has better conditions.

Compare the proposed method [15] better results are obtained.

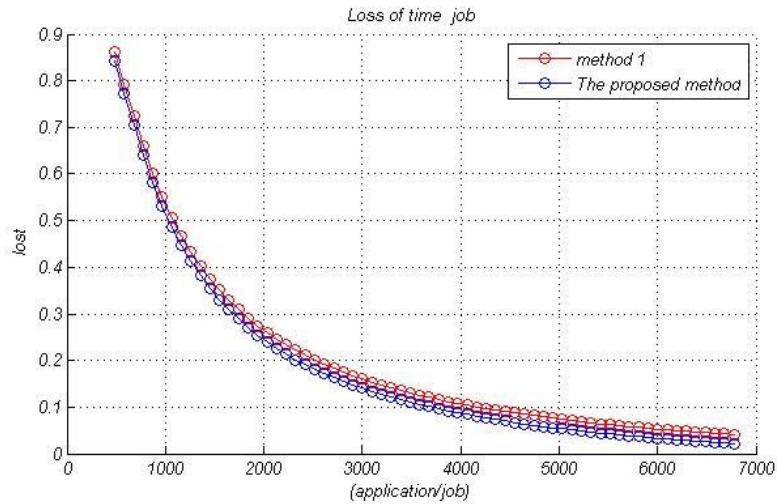


Figure 3: Compare time lost for the selection of contractors

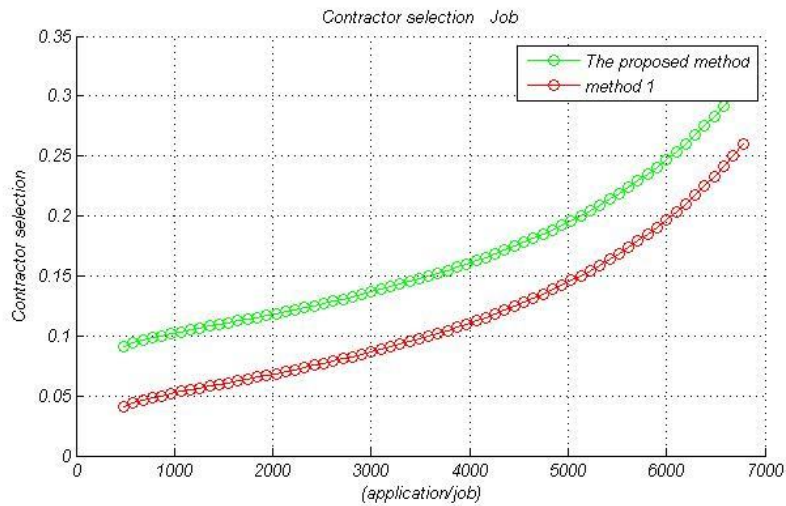


Figure 4: Compare the right choice and better contractor

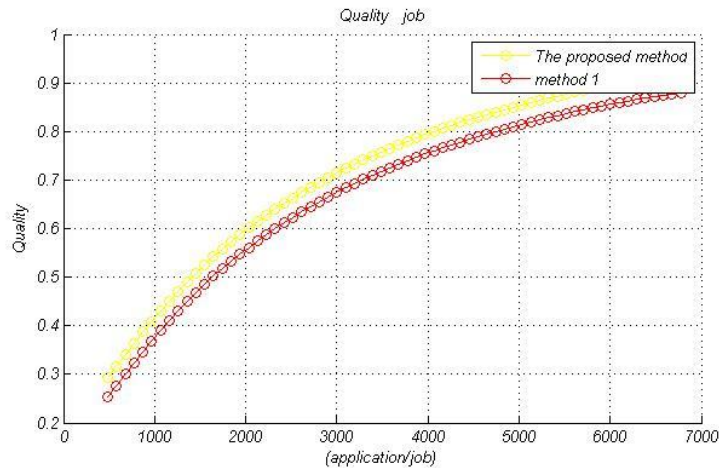


Figure 5: Compare the quality of the result of the decision

Conclusion:

In this study, fuzzy adaptive grid technique used to predict the failure of payment in banking. The results show that we can use The method to give a good approximation for the future and assess the current position.

In other words, we can use this tool not only for owners of accounts in different banks, but also for all new supplicants who have no bank account is an effective tool.

So, the first question we claim that we can study the effectiveness of this method with a confidence level of 90% guarantee. The main reason for working with data that unlike other methods of statistical and mathematical methods, assumptions that simplification is removed and is on fact.

To answer the second question, we can conclude that the most important variables can be classified in three main forms: personal, financial and business. Based on the final weights of fuzzy methods, we can test the most important indicators.

was. This method, despite confusing or lost data, we can show proper operation.

Finally, known factors taken into account in the study included previous work, co-registered, registration of outstanding loans and the loans and average assets and return value, current ratio, debt collection and the current debt stock. In this study, because of the particular economic conditions as important factors to consider are unable previous records.

According to the results suggest that more than anything to the ability of the contractor to pay the project. In fact, the results indicate that the most important criterion in selecting a contractor to contractor. In this case, innovation, use of new technology, optimal performance and experience of the contractor be considered.

It also recommended that special attention be placed next to the price control measure. Results showed that the criterion of management as the most important criterion is the ability of the contractor. This can be the contractor of human resources management skills, flexible contracts and the ability to manage contractor identified.

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