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Providing a plan for improving supply chain performance improvement with attitude to factors affecting the time of goods delivery

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Abstract

This study titled "Providing a plan for supply chain performance improvement with attitude to factors affecting *the time* of *goods delivery"* (Procurement Commodity Management of the National Iranian South Oil Company Procurement Commodity Management of the National Iranian South Oil Company (NISOC)", was carried out aimed to prioritize the factors affecting the identification of the best and most suitable suppliers among the suppliers in the oil projects. This study is considered as a descriptive research in terms of objective and in terms of data collection method, is considered as descriptive research. According to the results of this study, the most important factors in choosing the supplier are the factors related to the quality of life and financial factors.

Keywords: Supply Chain, Fuzzy Delphi, Hierarchical Analysis

Fornecendo um plano para melhorar a melhoria do desempenho da cadeia de fornecimento com atitude aos fatores que afetam o tempo de entrega dos produtos

Resumo

Este estudo aborda um plano para melhoria do desempenho da cadeia de suprimentos com relação a fatores que afetam o tempo de entrega de mercadorias" (Gestão de Commodities do Procurement of National Iranian South Oil Procurement Commodity Management of National Iranian South Oil Company (NISOC). O objetivo deste trabalho foi priorizar os fatores que afetam a identificação dos melhores e mais adequados fornecedores entre os fornecedores dos projetos petrolíferos, sendo considerado como pesquisa descritiva em termos objetivos e de coleta de dados, considerado como pesquisa descritiva. De acordo com os resultados deste estudo, os fatores mais importantes na escolha do fornecedor são os fatores relacionados à qualidade de vida e fatores financeiros.

Palavras-chave: Supply Chain, Fuzzy Delphi, Análise Hierárquica

Proporcionando un plan para mejorar la mejora del desempeño de la cadena de suministro con actitud a los factores que afectan el tiempo de entrega de bienes

Resumen

Este estudio aborda un plan para la mejora del rendimiento de la cadena de suministro con actitud ante los factores que afectan el momento de la entrega de los bienes" (Gestión de productos de adquisición de la National Iranian South Oil Company Gestión de productos de adquisición de la National Iranian South Oil Company (NISOC). Fue llevado a cabo con el objetivo de priorizar los factores que afectan la identificación de los mejores y más adecuados proveedores entre los proveedores en los proyectos petroleros. Este estudio se considera como una investigación descriptiva en términos de objetivo y en términos del método de recolección de datos, se considera como investigación descriptiva Según los resultados de este estudio, los factores más importantes en la elección del proveedor son los factores relacionados con la calidad de vida y los factores financieros.

Palabras clave: Cadena de suministro, Delphi difuso, Análisis jerárquico

1. Introduction

Due to the *competitive* nature *of today's world*, the managers of co companies and organizations more than ever they have found that there is need for focus more on their core activities to make then enable to do their competitive activities with more energy by eliminating non-core activities from their daily programs. Supplier selection[1] as a strategic decision is considered as a major issue that has attracted the attention of many researchers, because suppliers are the first piece of the chain and any failure in this sector continues to last piece of the chain and its effect will be intensified. Generally, the supply chain includes all activities related to transporting the flow of materials and services (*Boycousin* et al., 2004).

Nowadays, a highly competitive environment is created due to the dynamic and changing environment governing the business, so that providing innovative and efficient methods in all aspects of their activities is necessary for survival and success of the organizations. Therefore, supply chain management, as one of effective factors on the quality of the organization's performance, has attracted much attention of researches. Given that the quality of the end product[2] is heavily dependent on the raw material and the supplier's performance, the proper performance of the suppliers will ensure the sustainability of the supply chain. The supplier selection process includes defining models and methods for choosing the most appropriate supplier (Barano et al., 2012).

The present study was carried out aimed to provide an integrated composite model of multi criteria decision-making methods in order to identify and prioritize effective metrics in supplier selection.

[1] Supplier selection is the process by which firms identify, evaluate, and contract with suppliers. The supplier selection process deploys a tremendous amount of a firm's financial resources. In return, firms expect significant benefits from contracting with suppliers offering high value.
[2] The final result of an activity or process, especially the finished article in a manufacturing process

2. Theory and background of research

In 2017, Tang et al., made a decision on *Economic Order Quantity*[3] with an increase in supply chain intermediaries. This study was carried out aimed to create an economic order quantity by reducing the uncertainty in demand by adding an intermediary to the supply chain. Lin (2014) has introduced a two-stage approach for supplier selection. His approach is based on multi-*indicators* and multi-objective decision making. According to this approach, first, the weight of each supplier is determined using a fuzzy grid analysis process-based approach, then the weight obtained is used as the objective function coefficient in the second step. The criteria used to determine the weight of each supplier in the first step include: validity, timely delivery, price and technology. After the weight of each supplier is determined, in the second step, a multi-objective mathematical model is provided to determine the economic purchase quantity from each supplier. The objective functions considered in this step include: minimizing costs, minimizing the time of the delivery, minimizing the defective product purchase quantity, and maximizing purchase quantity from suppliers with higher weights. In the problem provided by him, only the capacity limitation of suppliers and the limitation related to the supply of customer demand are considered.

Sharma and Balan (2013) carried out a study on “The development of an integrated model for supplier selection using Taguchi's loss function[4], TOPSIS[5], and multi-criteria ideal planning“. The approach presented by them is divided into three phases. In the first phase, the loss function is calculated using the Taguchi, and in the second phase, after identifying the factors, the TOPSIS technique is used to determine the weight of each of them. The hierarchy analysis process is used to calculate the factors in the TOPSIS. Finally, in the third phase, using an ideal planning model was used to calculate the performance of each supplier and the suppliers will be ranked according to their performance. The criteria used in this study include:

[3] In inventory management, **economic order quantity** (**EOQ**) is the order quantity that minimizes the total holding costs and ordering costs. It is one of the oldest classical production scheduling models. The model was developed by Ford W. Harris in 1913, but R. H. Wilson, a consultant who applied it extensively, and K. Andler are given credit for their in-depth analysis.

[4] The Taguchi loss function is graphical depiction of loss developed by the Japanese business statistician Genichi Taguchi to describe a phenomenon affecting the value of products produced by a company.

[5] The **Technique for Order of Preference by Similarity to Ideal Solution** (**TOPSIS**) is a multi-criteria decision analysis method, which was originally developed by Hwang and Yoon in 1981with further developments by Yoon in 1987, and Hwang, Lai and Liu in 1993. TOPSIS is based on the concept that the chosen alternative should have the shortest geometric distance from the positive ideal solution (PIS) and the longest geometric distance from the negative ideal solution (NIS).

product quality, price, timely delivery, service desirability, and service warranty. At the end, in order to evaluate the validity of the proposed model, it will be compared with the data envelopment analysis model[6]. According to the results, the effectiveness and validity of their model is confirmed.

ArabZaded et al. (2017) have provided a multi-criteria and multi-objective decision making-based hybrid approach to select suppliers and allocate order quantity to them, like other two-stage papers examined, with the difference that the strategy management based on Strength, Weakness, Opportunity and Threat (SWOT)[7] is also considered in the approach presented by them. In the first phase, after determining the list of eligible suppliers, the SWOT strategy-based criteria were extracted. In the present study, 9 criteria of price, quality, timely delivery, after-sales service, validity and position in the industry, the ability for design, financial strength, capacity and equipment and geographical location are used to evaluate the performance of suppliers. After determining the criteria, the weight of the criteria is obtained using the linguistic variables and then the suppliers were evaluated by Fuzzy TOPSIS. The calculated values for suppliers in this phase are used as inputs of the linear mathematical model. In the model introduced by them, only two capacity limitations of suppliers and limitation for meeting the demand are considered. They implemented their proposed approach in Gas Souzan Company to demonstrate the efficiency of their approach, according to the results, the model introduced vy them had a good performance and effectiveness.

Pahlavani Qomi and Amiri in 2016 provided a two-level model for pricing and order planning in the three-level supply chain. In the present study, by understanding the importance of the subject, through providing a method for modeling and solving the pricing and inventory management problem in three-level supply chains of manufacturers, wholesalers and retailers, first, response level and simulation of cost objective functions at the level of wholesaler and profit at the level of retailers was evaluated by using test methodological pilot projects and then the nonlinear model based is solved based on the two-level planning by the genetic algorithm.

[6] **Data Envelopment Analysis** (**DEA**) is a decision making tool based on linear programming for measuring the relative efficiency of a set of comparable units. ... The effect of **model** orientation (input or output) on the efficiency frontier and the effect of the convexity requirements on returns to scale are examined.

[7] **SWOT analysis** (or **SWOT matrix**) is a strategic planning technique used to help a person or organization identify strengths, weaknesses, opportunities, and threats related to business competition or project planning. It is intended to specify the objectives of the business venture or project and identify the internal and external factors that are favorable and unfavorable to achieving those objectives. Users of a SWOT analysis often ask and answer questions to generate meaningful information for each category to make the tool useful and identify their competitive advantage. SWOT has been described as the tried-and-true tool of strategic analysis.

The performance of the proposed method in solving a case study problem confirms achieving the simultaneous results of the price of sales and economic order planning with historical data.

Zabihi and Khakzar during a study determined the *economic order quantity* and single-period pricing, by considering discounts and multi-variable demand. The present study has investigated a single-period inventory model where product demand is decisive and a multivariable function of price, time, and inventory level. Modeling for a time period has been done with the price reduction, so that the order quantity, product price, discount time, and discount price are considered as the decision variables. Given that there are four decision variables in this model, it is difficult to prove that the objective function is concave. Therefore, a Genetic Metaheuristic algorithm has been used for solving the problem, and Economic value has been obtained for problem-solving variables. After adjusting the parameters of the algorithm, sensitivity analysis is performed on the model parameters.

In 2015, Nasiri and Pourmohammadzia provided an integrated model for suppliers' selection and order allocation in the supply chain. Suppliers play an important role in the proper performance of a supply chain, and the right selection for them is very important. This study has provided an integrated model or project using the multi- criteria decision making and mathematical planning for the supplier selection and order allocation in the supply chain. The proposed structure consists of two qualitative and quantitative sub-models. A qualitative sub-module evaluates the suppliers qualitatively using a prioritization technique based on the similarity to ideal solution (TOPSIS). Then, in the quantitative sub-model, the volume of ordering to the suppliers is determined based on the priorities defined at the qualitative stage.

The solution method in this study is a multi-objective fuzzy approach, which is widely used in solving multi-objective problems due to the ability to calculate the degree of supply of the various objective functions in the model. Some of the most important features of this model includes: paying attention to different quality levels and relevant failure rate, as well as the assumption that the supplier will change partially. At the end, some examples will be presented and solved to show the model performance and efficiency of the solution method.

3. Materials and methods

This study is considered as an applied research in terms of objective because it tries to provide an appropriate solution for suppliers' selection in oil projects. Also, in terms of the method used, the present study is considered as a descriptive research, since it attempts to expand knowledge and provide new results using existing methods. The statistical population of this study includes managers and experts involved with the categories of contracts and the suppliers' selection. Given that multi-criteria decision-making methods are used in this study, therefore, the collection of comments from 10 to 12 experts in this field is sufficient.

In the present study, according to the nature, the most important tool for data collection has been a questionnaire. Two types of questionnaires were used in this study. The first questionnaire is developed to identify the evaluation criteria using the Delphi method. In this questionnaire, the criteria introduced in the study carried out by Fallahpour et al. (2017) and Rodriguez et al. (2016) have been used. The second questionnaire is a pairwise comparison questionnaire that compares the significance of the criteria under study in pair. The data analysis methods are described in the following:

Fuzzy Delphi

Achieving the most trusted group agreement among experts on a particular topic is considered as the objective of the fuzzy Delphi approach, which is done by using the questionnaire and survey of experts frequently, according to the feedback received from them. In fact, this method investigates the experts' opinions completely and has three main characteristics: the ***unbiased*** response to the questionnaire questions, the frequency of sending questions to the questionnaire and receiving feedback from them, and statistical analysis of answering questions in a group. In the Delphi method, the subjective data of experts is converted into objective data using statistical analysis. This method leads to consensus in decision making. The Delphi method has been widely used in different fields of prediction and decision making.

Some of its most important applications include: technology foresight, governmental services analysis, educational innovations, design and planning, forecasting the orientation of organizations and segmentation of customers, and identifying the most appropriate group for planning. The fuzzy Delphi method was developed by *Kaufmann*, A. and *Gupta*, M.M. (1988).

This method can be used to make decision and consensus on issues with unspecified goals and parameters which leads to very valuable results. The feature of this method is to provide a flexible framework that covers many barriers to inaccuracy and clarity. Many of the problems in decision making are related to incomplete and inaccurate information. Also, the decisions made by the experts are based on their individual competence and are highly subjective. Therefore, it is better to show the data in form of fuzzy numbers instead of the definite numbers and fuzzy sets to analyze the opinions of the experts to be used. The Delphi method can be implemented in fact a combination of implementing the Delphi method and performing analyzes on the information using the definitions of the fuzzy sets theory. Fig 1 shows the algorithm for implementing the fuzzy Delphi method. Usually, the experts provide their views in the form of the minimum value, the most possible value (triangular fuzzy numbers), then the average expert opinion and the amount of disagreement of each individual expert from the average of the sum is calculated. Then this information is sent to get new comments. In the next step, any expert, will present a new comment based on the information obtained from the previous step, or modify his previous opinion based on that. This process continues until the average of fuzzy numbers will be stable sufficiently (Tavakkoli et al., 2013: 40).

Table 1
Trapezoidal numbers equivalent to linguistic variables

Linguistic variables	Equivalent fuzzy number
little	(0 0 2 4)
medium	(7 6 4 3)
very	(6 8 10 10)

Source: Tavakoli et al., 2013: 39

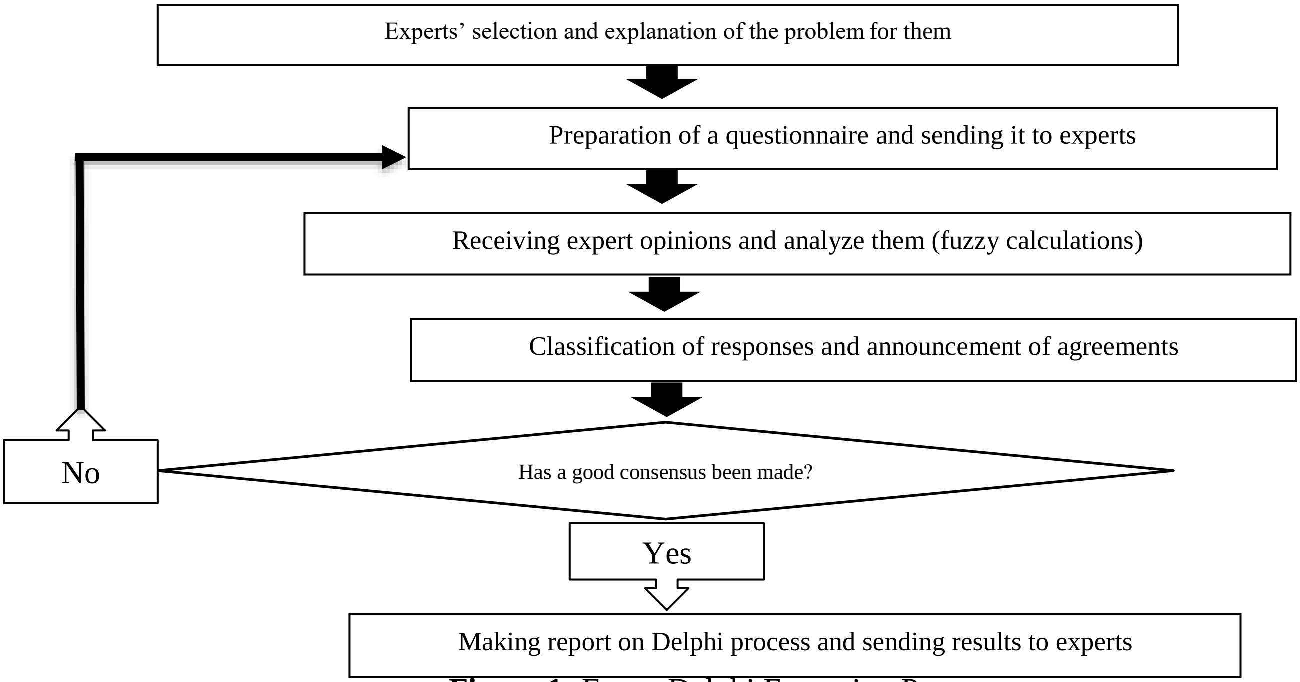

Figure 1: Fuzzy Delphi Execution Process

The fuzzy *analytic hierarchy process* (*ahp*)

Step 1: Modeling

In this step, the problem and the objective of decision making are explained hierarchically derived from the elements of decision-making that there is a significant relationship between them. Decision elements include "decision indicators" and "decision options." (Saati 1, 1980)

Step 2: Measurement of the related values

In fact, a paired comparison questionnaire is developed in such a way that decision-making elements are defined as a paired comparison of evaluation items in a hierarchical framework. Each evaluation is to express the relative importance of the two criteria by a 9-step scale. Paired comparison scores are collected and then paired comparisons matrix will be made for each K evaluator.

Step 3: Making a Judgment Matrix

Paired comparisons scores are converted to linguistic variables, and each of them is shown by a number. A paired comparison matrix can be displayed as follows:

$$R^K = [r_{ij}]^k$$

Where, R^K is a judgment matrix for Kth estimator, r_{ij} is the evaluation of the K th estimator between ith and jth criterion, and n is the number of related criteria at that decision level.

$$r_{ij} = 1 , \forall i = j ; \qquad \text{and } r_{ij} = {}^{1}/_{r_{ij}} \quad \forall i, j = 1,2, \dots , n$$

Table 2

Verbal variables and Equivalent fuzzy number

Linguistic variables	Numbers with the same value
Equal importance	(1,1,1)
Slightly more important	(2,3,4)
More importantly	(4,5,6)
Much more important	(6,7,8)
Infinitely more important	(8.8.9)

Step 4: Compatibility Test

The compatibility index is calculated to determine any incompatibility in the paired comparison matrix as follows: (same source)

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Where, λ_{max} is the maximum characteristic value and n is the matrix dimension size.

Accordingly, the ***compatibility*** rate (CR) is calculated from the following formula:

$$CR = \frac{CI}{RI}$$

If the calculations for each of the paired comparison matrices are less than 0.1, the degree of compatibility of the judgment can be acceptable. Additionally, if compatibility is not acceptable, then the paired comparison values in the original matrix should be re-investigated by the evaluator.

Calculation of total true value:

In this section, the ***arithmetic*** mean is used to calculate the total amount:

$$r_{ij}^{*} = \frac{(r_{ij}^{*1} + r_{ij}^{*2} + r_{ij}^{*3} + \cdots + r_{ij}^{*k})}{k}$$

Where, $r_{ij}^{*}$is the true value of evaluation of K evaluators between criteria i and j.

Step 6: Making General Judgment Matrix:

The actual general judgment matrix R^{*}can be written as follows:

$$R^{*} = [r_{ij}^{*}]$$

Where, R^{*} is a general judgment matrix of K evaluators, and $r_{ij}^{*}$is a combination of K evaluators between the criteria i and j.

Step 7: Calculating the weight of the criteria and obtaining the final ranking

The weight vector $W^{*} = (w_i^{*}), i = 1,2, \ldots, n$ for the judgment matrix $R^{*}$is calculated using the following formula, and then the criteria are ranked using the weights obtained.

$$w_i = \frac{\left(\prod_{j=1}^{n} a_{ij}\right)^{\frac{1}{n}}}{\sum_{j=1}^{n}\left(\prod_{j=1}^{n} a_{ij}\right)^{\frac{1}{n}}} \quad i, j = 1,2, \ldots, n$$

Where, a_{ij} represents the relative importance of the i-th criterion to the j-th criterion. (Ibid)

The relative weight of each criterion is calculated by designing paired comparison questionnaires and using the above-mentioned procedure. In this study, the hierarchical analysis method was used to calculate the weight of the indices, which the EXPERT CHOICE software was used to extract more accurate results.

4. Results and discussion

In the following, the results of analyzing data using fuzzy Delphi and hierarchical analysis methods are presented. Delphi fuzzy has been implemented in two phases and given that the disagreement between experts in two phases is less than 0.3, the results are predictable and the final criteria are determined. Those criteria are selected that the average expert opinion on them is ≥ [3 4 6 7] (average value). 30 criteria were identified of the 46 criteria collected from the literature. The final criteria acceptable from the perspective of oil company experts are listed in table 4.

The hierarchical structure for the identified criteria is plotted with regard to the categories in the next stage, and the significance of the criteria will be determined using the hierarchical analysis process and the paired comparison questionnaires. The hierarchical structure is shown in Fig 2

Table 3

Average experts opinions (the following numbers are trapezoidal fuzzy numbers)

No	Metrics	Average expert opinions (first phase)				Average expert opinions (Second phase)			
1.	Cost of materials	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
2.	Shipping cost	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
3.	After-sales service cost	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
4.	Bargaining power	5.8	4.3	2.3	1.8	1.8	2.3	4.3	5.8
5.	Power Financial	8.5	8.0	6.0	4.5	4.5	6.0	8.0	8.5
6.	Payment conditions	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
7.	Competitive Price	6.5	5.3	3.3	2.5	2.5	3.3	5.3	6.5
8.	Rate of product exclusion	6.5	5.3	3.3	2.5	2.5	3.3	5.3	6.5
9.	Technical structure and unique competencies	7.5	6.7	4.7	3.5	3.5	4.7	6.7	7.5
10.	Commitment to quality improvement and after-sales guarantee	8.0	7.3	5.3	4.0	4.0	5.3	7.3	8.0
11.	Ability to handle abnormal qualities	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
12.	A process for inspecting the quality of the material inside	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
13.	Flexibility of the waiting time	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
14.	After-sales service	6.5	5.3	3.3	2.5	2.5	3.3	5.3	6.5
15.	Time to solve problems	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
16.	Service reliability	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
17.	Responding to changing demand and speed of problem solving	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
18.	Technical knowledge and ability to solve the problem	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3
19.	Geographic proximity	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3

20.	Timely delivery	8.3	7.7	5.7	4.3	4.3	5.7	7.7	8.3
21.	Flexibility in the granting of discounts	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
22.	Flexibility in delivery time	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
23	Flexibility in ordering	7.5	6.7	4.7	3.5	3.5	4.7	6.7	7.5
24	Employee contract	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3
25.	Employment Insurance	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
26	Compensation for employment	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
27	Standard working hours	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3
28	Pay for overtime work	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
29	Medical insurance at work	5.8	4.3	2.3	1.8	1.8	2.3	4.3	5.8
30	Training for safety at work	6.5	5.3	3.3	2.5	2.5	3.3	5.3	6.5
31	Providing the right equipment at work	7.5	6.7	4.7	3.5	3.5	4.7	6.7	7.5
32	Discrimination	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3
33	Grow at work	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
34	Wage	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3
35	Education Staff	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
36	Research and development capabilities	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
37	Ability By Research And Development	6.0	4.7	2.7	2.0	2.0	2.7	4.7	6.0
38	Reputation	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
39	Strategic position in the market	7.5	6.7	4.7	3.5	3.5	4.7	6.7	7.5
40	Communication with foreign logistics service providers	7.3	6.3	4.3	3.3	3.3	4.3	6.3	7.3
41	Ease of communication	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
42	Communication channels and information systems and structures for sharing information	7.0	6.0	4.0	3.0	3.0	4.0	6.0	7.0
43	Relations with the government	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
44	Senior management support and strategic orientation	7.8	7.0	5.0	3.8	3.8	5.0	7.0	7.8
45	Honesty	6.8	5.7	3.7	2.8	2.8	3.7	5.7	6.8
46	Organizational culture and ability to collaborate	6.5	5.3	3.3	2.5	2.5	3.3	5.3	6.5

Table 4
Acceptable final criteria from the perspective of oil company experts

No	Major Criteria	Subcategories
1	Financial	After-sales service cost
2		Affordability
3		Conditions of the payment
4	Quality and reliability	Technical structure and unique competencies
5		Commitment to quality improvement and after-sales guarantee
6		Ability to handle abnormal qualities
7		Service reliability
7	Flexibility and timely responsiveness	Flexibility of the waiting time
8		Responding to changing demand and speed of problem solving
9		Technical knowledge and ability to solve the problem
10		Flexibility in the granting of discounts
		Flexibility in ordering
		Time to solve problems
14	Distance	Geographic proximity
15		Timely delivery
16	Employee Conditions	Employee contract
17		Employment Insurance
18		Standard working hours
19		Pay for overtime work
20		Providing the right equipment at work
21		Discrimination
22		Wage
23		Education Staff
24		Attention to religious and cultural issues at work
25	Relationship with external factors	Strategic position in the market
26		Communication with foreign logistics service providers
27		Ease of communication
28		Communication channels and information systems and structures for sharing information
29		Relationships with government
30		Senior management support and strategic orientation

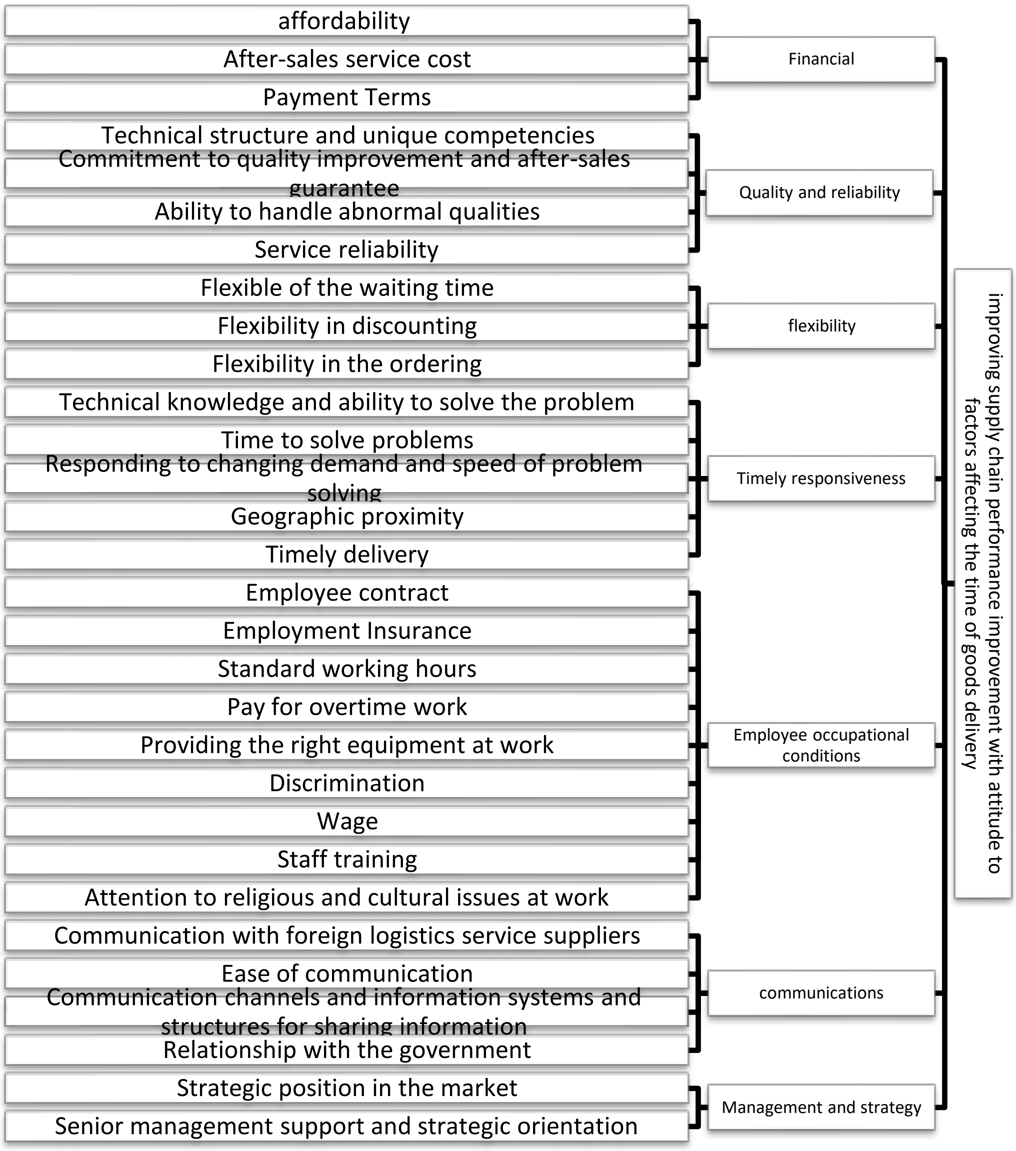

Figure 2: Hierarchical structure of the criteria affecting the supplier selection in the oil company

The results of the fuzzy AHP analysis are presented in the following. The significance of each of the main criteria is shown in the bar chart in Fig. 3, and Figure 4 shows the significance of each of the sub- criteria.

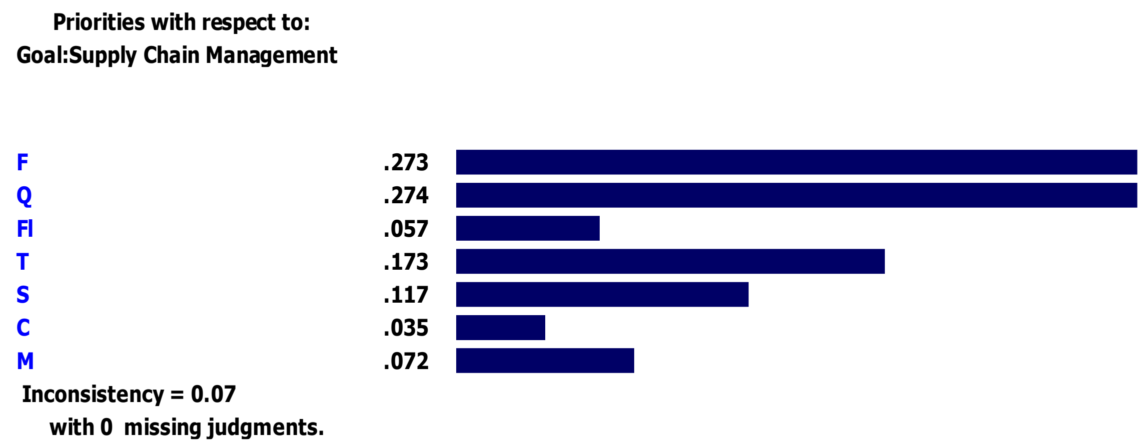

Figure 3: Bar chart of the weight of the main criteria

As shown in the existing bar chart, the significance of quality and financial factors is much higher than the rest of the criteria.

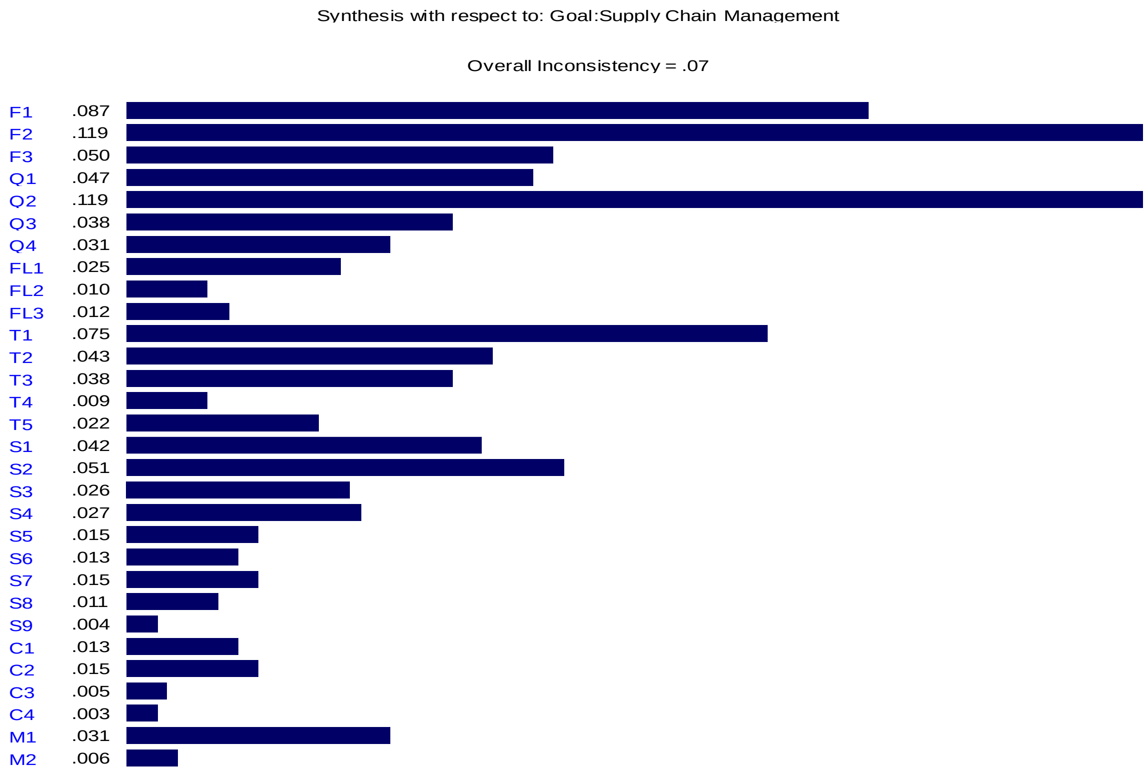

Figure 4: Bar chart on the weight of sub-criteria

According to the results, the commitment to improving the quality and after-sales guarantee, after-sales service costs, and affordability are the most important criteria for supplier selection in the company.

5. Conclusion and recommendations

Choosing the right supplier and allocating order to them is considered as one of the most important strategic activities of supply chain management and is done in the development stege. Supplier selection process includes determining, evaluating and concluding a contract with suppliers and a large amount of funding is allocated to the supply chain. Nowadays, nearly half of the supply chain revenue is spent on the purchase of services, raw materials and components.

The supply chain refers to a coordination system of suppliers, manufacturers, carriers, retailers and customers. The issue of choosing the best supplier as a member of the supply chain has a significant effect on overall profitability and supply chain success. Therefore, optimization of this commercial process and reducing the overhead costs imposed by this process on the supply chain is considered as a major issue in today's business conditions.

On the other hand, the emergence of new computational methods such as *pervasive* computing, new tools and methods make possible performing business processes in a more efficient manner. Systems are implemented in an environment that is always changing. Therefore creating systems that adapt itself to the environment automatically will be very effective and leads to increase total business profitability.

According to the results obtained from this study, it is recommended that the Procurement Commodity Management of the National Iranian South Oil Company (NISOC) considers the following items to make decisions on the supplier selection area in order to obtain better results:

- The criteria identified in this study and the importance of each of them to be used in making decisions in the suppliers' selection in different fields of the company (Considering the huge scope of oil company activity and diverse needs).
- Identified criteria and their importance to be explained for experts and decision makers and be included in company training programs so that experts have enough knowledge of the priorities of the company in choosing their suppliers.
- Identified criteria and their importance to be considered in developing supplier selection and prioritization programs, and suppliers that meet the required criteria in a better way to be selected.

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