HOLOS
ISSN 1807 - 1600

THE COMBINATION OF DEA AND AHP APPROACH IN THE SELECTION OF CONTRACTORS PARTICIPATING IN TENDERS

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Artigo submetido em 28/06/2017 e aceito em 17/12/2019
DOI: 10.15628/holos.2019.6065

ABSTRACT

Nowadays, the problem of contractor selection is one of the important activities in companies so that various methods in this area have been proposed up to now. One of the most popular and practical methods in this area is analytical hierarchy process, if in the case of the matter under surveying, the alternatives increased, this method will lose its efficiency and pair-wise comparison will become practically impossible by this method. In this paper with regard to many participant computer companies in service contracts, the method using combination of data envelopment analysis and analytical hierarchy process is proposed. In this research for ranking participant computer companies in service contracts, first, required criteria in contractor selection was determined then the weights of criteria using AHP Group method was determined. In this method, the linguistic terms are utilized to assess alternatives with respect to each criterion by using data envelopment analysis and Simple-Additive-Weighting method, contractor assessment was done, Finally, among the companies that with regard to last section had outrank, the shortlist was made and using AHP Group the weights of criteria with tendered price was calculated and the most appropriate contractors aim computer servicing was determined. Results indicate good past performance criterion have the biggest weight in the most appropriate contractor selection also in finally contractor selection criterions with tendered price must be assessment until the contractor that altogether outrank as contract winner will determined.

KEYWORDS: Contractor Selection, Analytical Hierarchy Process Group, Linguistic, Data envelopment Analysis, Simple-Additive-Weighting Method.

COMBINAÇÃO DAS ABORDAGENS DE ANÁLISE POR ENVOLTÓRIA DE DADOS (DEA) E PROCESSO ANALÍTICO HIERÁRQUICO (AHP) NA SELEÇÃO E CONTRATOS DE EMPRESAS

RESUMO

Atualmente, a questão da seleção e contrato é uma das atividades importantes realizadas por empresas e para este fim, são propostos e utilizados variados métodos. Neste contexto, um dos métodos mais populares e práticos é o Processo Analítico Hierárquico (AHP). Mas, diante de uma realidade de múltiplas alternativas, este método pode potencialmente perder sua eficiência ou mesmo tornar-se inviável. Neste artigo enfatizaremos o caso de contratos de serviços de múltiplas empresas de informática utilizando-se o método combinação de Análise por Envoltória de Dados (DEA) e Processo Analítico Hierárquico. Na referida pesquisa com o intuito de se classificar as empresas de informática participantes nos contratos de serviço, foram utilizados primeiramente critérios medidos por peso com uso do método AHP. Nesse método, os termos linguísticos são utilizados para se avaliar alternativas em relação a cada critério, utilizando-se o método DEA e o método de Ponderação aditiva simples, finalizando a avaliação do contratante. Por fim, foi compilada uma lista classificando todas as empresas com uso do método AHP juntamente com a indicação dos pesos e critérios. Em seguida, o preço ofertado foi calculado e foram determinadas as contratações de empresas de informáticas que se alinhavam aos critérios estabelecidos. Os resultados indicam que um bom critério de desempenho anterior tem o maior peso na seleção. Adicionalmente, na seleção e contratação final o preço proposto deve estar explícito para que seja possível compilar uma lista dos indicados e determinar o vencedor da concorrência.

PALAVRAS-CHAVE: Seleção de contratados, Grupo de processos de hierarquia analítica, Linguística, Análise de Envoltória de Dados, Método de ponderação aditiva simples.

1 INTRODUCTION

One of the most important characteristics of human is decision-making; everyone makes several decisions during the day. Some of these decisions are very important and because accurate and timely decisions in these cases are very important, therefore, there is a powerful technique that can help the people in this area is essential.

In today's world, the most important issue with regard to the age of information explosion, select the most appropriate option in different situations. Today, most projects deposit through tenders to contractors and due to the importance of computers in today's world, many of the tasks performed by computer and The majority of company information today is stored on the computer and There are many computer service projects in all companies, Thus, selecting competent contractors for these projects is very important to be able to provide proper services to protect company information and activities to help do good. The current method of assessment computer service contractors In gas refinery is based on experience, financial strength, good past experience and equipment Resources of contractors. Finally, between counterparties competent contractor has provided the most appropriate bid price will be announced as the winning contractor. In this paper, qualification criteria of contractors were evaluated then using the AHP and DEA model approach was provided an appropriate model for evaluating Computer Service Contractors.

2 PROBLEM STATEMENT

The most important problems in many projects is Problems in the running that Including costs, delays in delivery and poor quality, some of the problems are the weakness contractors. Choosing a qualified contractor can reduce a major part of the problems. Therefore, one of the most important issues in the implementation of projects is selection of the fittest contractor. This ensures that selection of the fittest contractor is minimized the risk of waste of resources, both in terms of cost and time. The project, implemented with the highest quality and safety during the run or after it. Contractor selection method available in many cases, the actual selection of the fittest contractor does not lead. This makes that motivated many contractors among them also a significant number of competent and capable contractor for participating in tenders for the project down. In this issue of the paper due to the importance of computers in today's world and the need for computer services in all companies, firstly factors influencing the selection of computer service contractors were studied then a model for evaluating computer companies participating in the alliance of the services provided.

3 THE IMPORTANCE OF RESEARCH

The decision- making is the concern of every manager in professional activities.

A correct decision to reduce many of the costs. The cost for poor quality or increasing the final price of the project is a huge blow to the national capital of the country. Selection of the fittest

contractor somewhat reduced Loss of national capitals. In consequence of this subject, destructive effects of inflation and other problems will be less.

The main purpose of this paper is a systematic process for evaluating the computer company is participating in the service contract. Using a mathematical model leads to better use of experts and More reasonable results can be achieved.

4 THE OBJECTIVES OF THE STUDY

The purpose of this research is developing a model for evaluating computer companies participating in contracts using a combination of Data Envelopment Analysis and Analytical Hierarchy Process.

The application purpose, using the proposed model for evaluating computer companies participating in the contract service in gas refinery.

5 A REVIEW OF THE LITERATURE

Evaluation and selection of contractors

So far ,in evaluation and contractor selection many works has been done:

Russel and Skibniewski stated that in the past the actual process of prequalification of contractors is given little consideration. They tried to contractor prequalification process using a strategy decision and factors that affect on the process explain. They issued five ways that the prequalification of contractors used: Dimensionality weight, pre-qualification, the wide range of strategies, prequalification formulation and subjective judgment. (Russel & Skibniewski, 1988, 148-164)

Ellis and Herbsman for determining the winner of a tender suggested building the highway approach to time / cost. By this method, the cost of road use, including the time contract was expressed by each bidder. So in this case, a measure proposed is the price and time of the contract. (Ellis & Herbsman, 1991, 89-94)

Herbsman and Ellis proposed a multi-parameter bidding system to evaluate the tender and The primary and secondary criteria in the tender as follows: The main criteria of the tender amount, time and quality of previous work In addition to the three main criteria of cost, time and quality The following secondary measures for safety, durability, security and maintenance. (Herbsman & Ellis, 1992, 142-150)

Hatush and Skitmore Stated that the failure and success of any project influenced major decisions made by the customer. The decisions taken at various stages of project development including feasibility studies, planning, design, contractor selection and risk assessment and maintenance project. Therefore, selection of qualified contractor that could do well is very important. They assess recent measures by the owners and representatives for choosing a bidder for competitive bidding system the state of their Kingdom. A series of interviews with eight public and one private customer representative in the prequalification and bid evaluation was conducted in the North West of England. They contractor prequalification criteria, including project

management structure, ability to deliver and experienced contractor and industrial relations and financial evaluation is assessed. The results show that the main criteria used. (Hatush & Skitmore, 1997, 19-38)

Fong and Choi applied a multi-criteria method for the selection of contractor, They examined analytical hierarchy process to select the contractor. It concluded that this method will be useful for identifying contractors with the greatest potential.(Fong & Choi, 2000, 547-557)

Al-Subhi used the AHP as a decision-making method for project management. In this paper, AHP is used to pre-qualify contractors. By AHP criteria for prequalification ranked and a list of contractors to be built descending to select the best contractor for the project and sensitivity analysis is performed to sensitivity to small changes in the judge's final decision Checks. In this article is used the group Analytic Hierarchy Process. For the implementation of the AHP is used expert choice software. (Al-Subhi, 2001, 19-27)

Wong and Holt introduced a model that can be classified the contractors to the weak and strong that employers before the final decision to select contractors, be aware of their possible performance. With the development of model intended to provide variables to separate the best contractor of groups. (Wong & Holt, 2003, 5-20)

Eddie et al conducted Contractor selection with network analysis systematic approach. They stated that although the Analytical Hierarchy Process is used in decision making contractor selection but to complicate matters, most recommended ANP because the ANP will allow the dependence on models. (Eddie et al., 2004, 1021-1032)

Topcu suggested a decision model to select the construction contractor in Turkey. This is a multi-criteria decision-making models for the selection of the contractor in the Turkish public. Three basic concepts for election are: cost, time and quality. Expression model of evaluation criteria related to these concepts uses a process which consists of two main steps: Contractor prequalification and selection of the preferred bidder among qualified contractors. This model can be used as a decision support system by project owners. (Topcu, 2004, 469-481)

Darvish et al. used graph theory and matrix methods for ranking contractors. In the proposed model, they first have to identify the criteria for the selection of contractors.

Then, the selected contractor determined and The relationship between them was displayed as a directed graph, In the next stage of the contractors decision-making matrix based on the graphs were created, Then calculates the constant matrix and different contractors were prioritized based on a fixed amount. They suggested that this method can be used as a decision support system by the project owner By which to identify qualified contractors and In this way contracts are awarded. (Darvish et al.,2009,610-619)

5.1 DEA-AHP integrative approach

The DEA and AHP integrative approach has been used in many applications that continue studies as the most important issues will be discussed:

Bowen compared to DEA and AHP methods for the problem of site selection and on the structural similarities of the two and their results discussed. A two-step process in choosing the location for their integration offered. The first step was to apply DEA to identify inefficient areas and in the second stage AHP applied to prioritize DEA efficient units. He claimed that this combination a number of paired comparisons needed deciding receiver reduce and provide powerful means for separating efficient units. (Bowen, 1990, 133-144)

Shang and Sueyoshi stated an integrated framework for the selection of appropriate flexible manufacturing system for a manufacturing organization. In which the AHP will be used to determine the intangible benefits associated with corporate goals and long-term goals. The simulation model to analyze the intangible benefits and the accounting process to determine the inputs needed such resources and costs to recognize the benefits of potential and DEA to determine the most efficient method is used. (Shang & Sueyoshi, 1995, 297-315)

Seifert and Zhu searched, Excess and deficiency in China's industrial output for 1953 and 1990 by the DEA combination with other management approaches, such as the Delphi, AHP and techniques ensure the area. Collective model DEA, the collective model with constant returns to scale was changed in which the weights with experts ideas and with the help of Delphi and AHP was obtained. In this study, different sets of inputs were chosen to overall performance of industrial development and efficiency according to China's industrial production study. The results of their research show that the DEA can be combined with other methods to bear more reliable results. (Seifert & Zhu, 1998, 279-296)

Zhang and Cui was created a project evaluation system for China's information center to invest in different parts (subsystems) to manage Information System of China's economy. In the decision support system, DEA method to evaluate relative efficiency of these subsystems, economic information systems, and determination of their weight for efficiency rate and supply factors used and AHP to determine the allocation rate of rational investment and weight of subsystems for local restrictions factors and strategies used. (Zhang & Cui, 1999, 441-452)

Sinuany-Stern et al. applied method of AHP / DEA for Full Ranking multi-input multi-output Decision Making Units. Their method involves a two-step process. In the first stage DEA method was implemented separately for each couple to create a matrix of paired comparisons and in the second phase matrix of paired comparisons made in the first stage to be used to prioritize the decision-making units using AHP. The advantage of AHP / DEA was The AHP paired comparisons in mathematics from input / output pair by DEA models derived and in this method there is no subjective evaluation. (Sinuany-Stern et al., 2000, 109-124)

Yang and Kue used the method of AHP / DEA to solve the problem of designing the plant layout. They attempted to locating 10 departments in a factory, Quantitative data were obtained from the placement, including the cost of material flow, proximity scores and shape criteria. Then the AHP were used to collect qualitative criteria data and The DEA to solve the problem of designing the plant layout, taking into account qualitative and quantitative data were used. (Yang & Kue, 2003, 128-136)

Takamura and Tone conducted Evaluation of place compared to replace government agencies outside Tokyo. In their study, AHP method to determine the weights of the criteria used

by the reliability of the DEA model. It is claimed that the results of the assurance region model of DEA for candidates and assessors shows this method has merit. (Takamura & Tone, 2003, 85-102)

Saen et al assess the relative efficiency of their units are slightly incongruous, They studied the relative efficiency of 18 Iranian Research Organization. In this article some of the DMU are lack of some inputs or outputs. To determine the relative weight of each DMU in inputs or outputs that there is no value for them, AHP and interpolation technique used. Finally The DEA technique demonstrated efficient units. (Saen et al., 2005, 313-328)

Liu and Hie offered group AHP method for supplier selection. Group AHP acquire criteria weight not to help paired comparisons but to help voting. DEA for the integrity of the vote of any criteria has been ranked in various locations used to obtain the final score for each criterion. Finally, the overall score for each criterion after being normalized relative weight of the criteria to be considered. (Liu & Hie, 2005, 308-317)

Ramanathan used the DEA method to calculate the local weight of elections in the paired comparison judgment matrix using in AHP. In this method, the problem has been structured in a hierarchical model then paired comparisons done and Judgment matrix earns and using to calculate the local weights and adjustment comparisons and the calculation of the total weight of the DEA. (Ramanathan, 2006, 1289-1307)

Korpela et al. Used the DEA and AHP composition for the design of a company's warehouse. According to maximize the productivity , seven criteria to determine and put in to groups including Reliability and flexibility. For the final evaluation of Options was used the DEA. The amount of direct and indirect costs as inputs to the DEA model And data of output variables were obtained using Analytic Hierarchy Process. As well as the analytical hierarchy process to determine the relative importance of the criteria was used. (Korpela et al. , 2007, 135-142)

Jyoti et al. used DEA and AHP integrative approach to assess the performance of the research and development organizations of the Indian state. They are used to the annual budget as input and Six output variables used in the evaluation of research and development organization. Each of the outputs divided into sub criteria and Weight and importance of each output is determined by AHP and Weight obtained from AHP used in combination of criteria. They calculate Once their efficiency by DEA and once with Hybrid Model of DEA and AHP and to compare the results of their calculations. (Jyoti et al, 2008, 370-388)

Wang et al. used the combined method of data envelopment analysis and analytical hierarchy process to assess the bridge risks. In this paper, the DEA- AHP method to assess the bridge risks hundreds of bridge structure due to the importance of keeping are presented. The AHP to determine the weight of the criteria and the linguistic terms used to assess the bridge risks under criteria. Finally, SAW method used to determine the weight of each of the bridge. (Wang et al., 2008, 513-525)

Wang et al. stated a DEA Model with the assurance region to divert prioritization in AHP that as a model of DEA / AR has been proposed. The new model DEA may be overcome the weakness of the DEA and AHP, which includes production weights of local irrational for matrices of paired comparisons inconsistent, insensitive to the change of the matrix of paired comparisons

incompatible, in terms of failure to overcome some of the information in a paired comparison matrix and provide the better decision results. (Wang et al., 2008, 913-921)

Wang and Chin used a new data envelopment analysis to determine priorities in AHP. It spread to the position of Group Analytical Hierarchy Process. This method produces accurate weight for paired comparisons matrices compatible and the best prioritize that are Logical and consistent with the subjective judgment of the decision maker for the matrices of paired comparisons incompatible. In this method, SAW weighting method is used for the community the best of local priority without normalization. (Wang & Chin, 2009, 239-250)

6 INTRODUCTION OF THE THEME

In this article combination of DEA and AHP method is used in the selection of the contractor in the field of computer services. Case Study on Gas Refinery ever mathematical models for the selection of the contractor was not provided. In this study, using data envelopment analysis and analytical hierarchy process model for the selection of the fittest Contractor is provided.

7 INTRODUCTION OF RESEARCH METHODOLOGY

The research method used is descriptive using mathematical modeling has been done and including a case study and the purpose is Practical. To collect information through library and field method is used. Data were collected by questionnaire and also refer to the valid documents.

8 CASE STUDY

Case Study is on Gas Refinery. Now all activities such as providing food service employees, creation and maintenance of green spaces, cleaning and pantry, security and other services by the contractor performing in many tasks. Also in the development and implementation through various technical tasks, projects of the company are done. The section of Contracts in the form of laws and regulations relating to tenders, bidding procedures, contractor selection and contracting will act. Accuracy action of the contract section in selection of suitable contractor on the quality and quantity of produced gas has a direct impact.

9 CONDUCTING RESEARCH (RUN THE MODEL)

The method steps are summarized as follows:

Step one: Select the appropriate decision criteria:

6 criteria using library studies and confirmed by experts to assess the competence of contractors were used. These criteria include: experience, financial strength, reputation labor, equipment Resources, experience in local area, same past works

The second step: forming a hierarchical structure for decision making

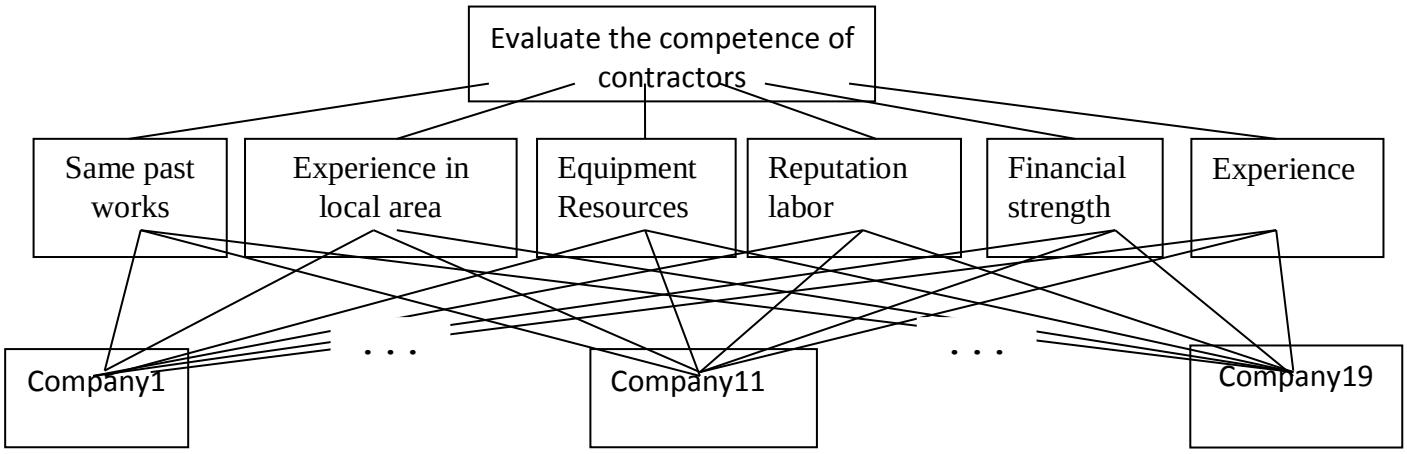

Figure1: Hierarchical Contractor selection of the fittest

The third step: determine the weight of each criterion by Analytic Hierarchy Process: The weight of each criterion is achieved through Expert Choice software.

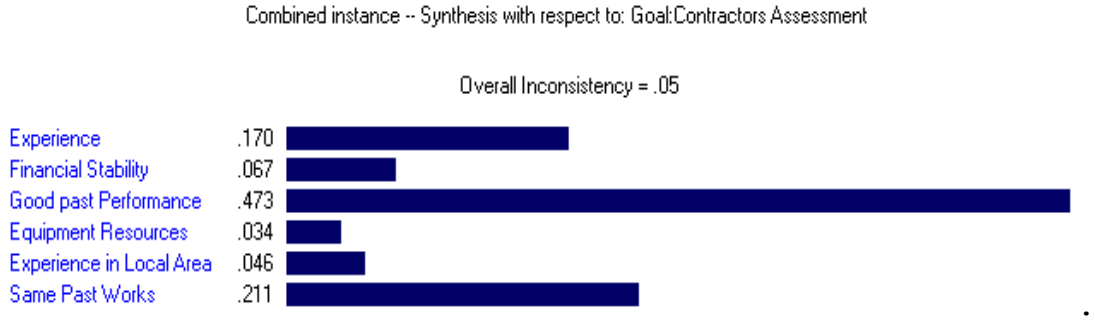

Figure 2: weight of criteria by combination of comments total experts

Note that the weight criteria, experience, financial strength, reputation labor, equipment Resources, experience in local area and same past works were 0.170, 0.067, 0.473, 0.034, 0.046, 0.211, respectively, which shows that the good reputation of the experts have the highest importance weight and the weight of equipment resources have the least important.

Step Four: For each criterion defined assessment class and evaluation matrix has been formed with the help of experts. In this study, 19 contractor intended and to assess the choices of Decision-making criteria to evaluate options to experience, financial strength, good past performance, equipment resources, experience in local area, same past works has been used. Experts in the evaluation of decision options with respect to each criterion are shown in Table1 the Linguistic of excellent, good, fair, poor and very poor respectively abbreviated as H, G, M, L and W is shown.

Table 1: Information on evaluating 19 contractors

options	Experience	Financial strength	good past performance	Equipment Resources	Experience in local area	Same past works
	H G M L W	H G M L W	H G M L W	H G M L W	H G M L W	H G M L W
Company1	2 8	2 8	2 8	10	8 2	6 4
Company2	10	9 1	1 9	6 4	6 4	2 8
Company3	5 5	1 9	1 3 6	2 8	7 3	4 2 4
Company4	1 9	1 9	5 5	1 9	7 3	5 5
Company5	7 3	10	10	8 2	10	1 5 4
Company6	6 4	10	10	5 5	10	2 4 4
Company7	1 9	1 9	2 1 7	3 7	7 3	2 3 5
Company8	1 9	2 8	1 1 8	6 4	2 8	8 2
Company9	1 2 7	1 9	3 7	7 3	5 5	4 2 4
Company10	1 1 8	1 1 8	2 1 7	8 2	6 4	3 2 5
Company11	9 1	1 9	2 8	6 4	10	3 7
Company12	2 5 3	10	1 9	10	1 9	2 3 5
Company13	3 5 2	1 9	10	5 5	2 8	3 3 4
Company14	8 2	10	6 4	3 6 1	3 7	5 5
Company15	3 7	2 8	1 9	1 8 1	1 9	1 9
Company16	5 5	10	4 6	3 7	2 8	2 5 3
Company17	2 5 3	10	2 8	1 9	1 9	1 5 4
Company18	6 4	1 9	6 4	2 7 1	2 8	1 3 6
Company19	4 6	2 8	10	1 9	7 3	3 7

Step Five : Using data envelopment analysis to produce local weights of decisions options with respect to each criterion **.**

$$\boldsymbol{Maximize}\ \ \boldsymbol{\alpha}$$

$$\boldsymbol{Subject\ to:}\quad \boldsymbol{\alpha} \le \boldsymbol{v_{ij}} = \sum_{k=1}^{k_j} \boldsymbol{s(H_{jk})NE_{ijk}} \le \boldsymbol{1} \qquad \boldsymbol{i = 1, \dots, n}$$

$$\boldsymbol{s(H_{j1}) \ge 2s(H_{j2}) \ge \cdots \ge K_j s(H_{jk}) \ge 0}$$

In the criteria, model to run and the following results were obtained:

Experience criteria:

S*(H) =0.1, S*(G) =0.05, S*(M) =0.033, S*(L) =0.025, S*(W) =0.02 and α=0.235

Financial strength criteria:

S*(H) =0.1, S*(G) =0.05, S*(M) =0.033, S*(L) =0.025, S*(W) =0.02 and α=0.2

good past performance criteria:

S*(H) =0.1, S*(G) =0.05, S*(M) =0.033, S*(L) =0, S*(W) =0 and α=0.467

Equipment Resources criteria:

S*(H) =0.1, S*(G) =0.05, S*(M) =0.033, S*(L) =0.025, S*(W) =0.02 and α=0.2

Experience in local area criteria:

S*(H) =0.1, S*(G) =0.05, S*(M) =0.033, S*(L) =0.025, S*(W) =0 and α=0.267

Same past works criteria:

S*(H) =0.111, S*(G) =0.056, S*(M) =0.037, S*(L) =0.028, S*(W) =0.022 and α=0.272

Step Six: Calculate the local weight of each option under each criterion to assist following models:

$$v_{\mathrm{ij}} = \sum_{\mathrm{k=1}}^{\mathrm{k_j}} \mathrm{s}\left(\mathrm{H_{jk}}\right)\mathrm{NE_{ijk}} \qquad \mathrm{i} = 1, \dots, \mathrm{n}; \mathrm{j} = 1, \dots, \mathrm{m}$$

Step Seven : Total local weight of each criterion and the establishment of total weight of each alternative by method of SAW

$$V(A_i) = \sum_{j=1}^{m} w_j v_{ij}^{*} = \sum_{j=1}^{m} w_j \left(\sum_{k=1}^{k_j} s^{*}\left(H_{jk}\right) NE_{ijk} \right), \qquad i = 1, \dots, n$$

Table 2: Global and Local weights 19 contractor

Contractors	Experience	Financial strength	good past performance	Equipment Resources	Experience in local area	Same past works	General weight of contractor	Ranking contractors
	0.17	0.067	0.473	0.034	0.046	0.211		
Company1	0.466	0.9	0.9	0.2	0.266	0.7	0.748836	9
Company2	1	0.483	0.95	0.398	0.7	0.9	0.908443	2
Company3	0.415	0.95	0.783	0.9	0.274	0.632	0.696307	14
Company4	0.322	0.95	0.75	0.95	0.274	0.415	0.616159	17
Company5	0.381	1	1	0.6	1	0.683	0.831741	5
Company6	0.398	1	1	0.75	1	0.666	0.835722	4
Company7	0.483	0.95	0.816	0.85	0.274	0.716	0.741399	10
Company8	0.245	0.9	0.883	0.398	0.466	0.253	0.617455	16
Company9	0.883	0.95	0.799	0.65	0.29	0.632	0.767171	8

Company10	0.883	0.883	0.816	0.266	0.282	0.699	0.781413	7
Company11	0.347	0.95	0.9	0.7	1	0.449	0.724273	12
Company12	0.616	1	0.95	1	0.95	0.716	0.866937	3
Company13	0.549	0.95	1	0.415	0.466	0.649	0.818079	6
Company14	0.6	1	0.7	0.323	0.449	0.75	0.707921	13
Company15	0.235	0.314	0.449	0.533	0.483	0.215	0.387601	19
Company16	0.415	0.2	0.8	0.85	0.466	0.616	0.657643	15
Company17	0.616	0.2	0.466	0.95	0.483	0.683	0.553627	18
Company18	0.7	0.95	0.7	0.331	0.466	0.783	0.730221	11
Company19	0.8	0.9	1	0.95	0.274	0.85	0.913599	1

Step Eight: Ranking the options using the total weights of each option (the highest Weight is the highest rank and the lowest weight is the lowest rank.): company 19,2,12,6,5,13 in order from left to right are the first to sixth priority and company 6 for final selection of the fittest contractor are evaluated.

Step Nine: Finally, using the group analytical hierarchy process between companies that have been rated at the highest level. With regard to the proposed criteria, including the cost, the best contractors will be introduced.

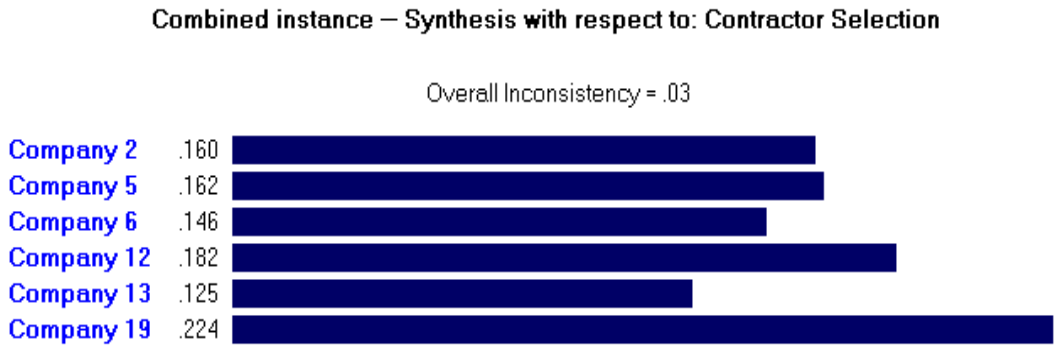

Figure 3: Final priority of contractors based on the Ideal synthesis

According to calculations by the Group Analytical Hierarchy Process, company 19 with a final weight of 0.224 is the highest priority and the winning company will be introduced.

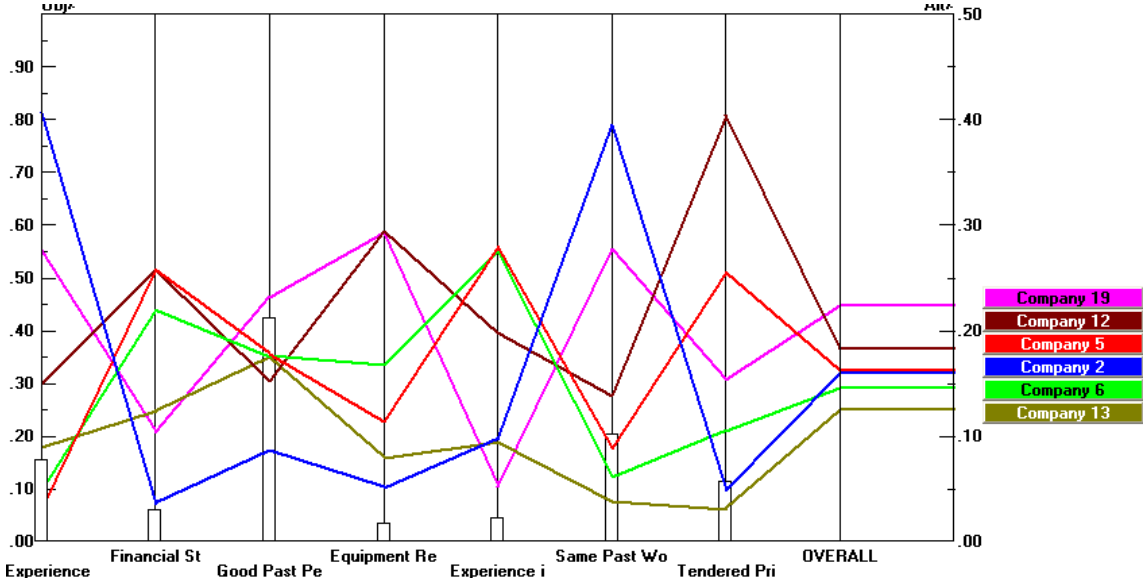

Figure 4: Sensitivity Efficiency analysis

According to sensitivity analysis efficiency is obvious that the company 2 in terms of experience has the highest priority, now company 19 in terms of good past performance has the highest priority and company 12 in terms of offered in the tendered price has the highest priority. In general, the company 19 is the highest priority.

10 CONCLUSION

According to research carried out effective indicators to assess the competence of contractors participating in the computer service project include: experience, financial strength, good past performance, the equipment resources, the experience in local area, works the same as the previous comparable contractor that among these criteria are the good past performance have the highest importance weight with 0.473 weight and equipment resources with a weight of 0.034 have the least important weight.

Then contractors based on these criteria using AHP and DEA were prioritized and One-third of those with the highest priority among contractors have been selected. Finally, using the AHP group were prioritized.

Good past performance, same past works and experience of the contractor has the highest importance weight according to experts.

Tendered Price that are present in most cases as the most important parameters considered in the final selection, It is not the most important indicators. But its importance is less than a number of other indicators, because the difference in price of contractor compared with the possible damage caused by incorrect selection of the contractor may price on the basis of lack of experience is poor, it is worth.

Good past experience indicator has the greatest significance weight and its importance in relation to the final selection of the fittest contractors from all other indices is higher.

Therefore, the need to revise the current method of contractor selection and greater attention to human resources parameters emphasized.

Also have seen the company 19 that have a good past performance and the other its criteria such as experience and same past works have a great importance were the tender introduction of the company, and company 12 with that precious little had offered because it was less important in terms of experience and same pas works was not announced as the winner.

So you see that standard prices along with other measures should be considered because the company which is the highest priority of all is to be selected as the winner.

11 OFFERS

Due to the importance of choosing the contractor in computer projects to improve the current situation of contractor selection given following the recommended:

- Reform of the fittest contractor selection based on the model provided.

- Consideration of all factors affecting as on the price in the final selection of contractors.

- Correction of indicator weight based on the weight and priority obtained.

- prevent Non-Specialized judgment in the determination of the winning tender.

12 SUGGESTIONS FOR FUTURE RESEARCH

According to research done to improve model the following suggestions for future research are presented:

- The use of fuzzy data in combination DEA and AHP for evaluating and selecting contractors and comparing the results with the proposed model.

- Use a combination of DEA and ANP to evaluate and select contractors and comparing the results with the proposed model.

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