Solving the Chief Executive Officer Selection Problem Using the Fuzzy Decision Support System

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Contribution to the state of the art

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Abstract: Chief Executive Officer (CEO) selection as a subset of personnel selection asks for different characteristic compared to a selection of other personnel. The reason for this is the polymorphic nature of the CEO role. The complexity and importance of the selection problem, call for analytical methods rather than decisions based on intuition. The multi-criteria nature and the presence of both qualitative and quantitative factors make the entire selection more complex. As such, the CEO selection is a multi-criteria decision making problem decision making problem, affected by several qualitative and quantitative, often conflicting criteria which are usually uncertain. This paper proposes a CEO selection approach based on the fuzzy decision support system developed by using JAVA technology and extent analysis method. This system is applied in a real-life case study to evaluate the most suitable person for a CEO position in information and communication (ICT) company dealing with the rating of both qualitative and quantitative criteria, and testing appropriate consistency to ensure quality of selection.

Keywords: CEO selection, fuzzy numbers, extent analysis method, decision support system.

Introduction

A chief executive officer (CEO) describes the position of the most senior corporate officer, executive, or administrator in charge of managing a non-profit or profit organization. The CEO of a corporation or company typically reports to the board of directors and is charged with maximizing the value of entity.

The responsibilities of an organization's CEO are set by the organization's board of directors or other authority, depending on the organization's legal structure. They can be far-reaching or quite limited and are typically enshrined in a formal delegation of authority.

Typically, the CEO has responsibilities as a director, decision maker, leader, manager and executor. The communicator role can involve the press and other people, as well as the organization's management and employees; the decision-making role involves high-level decisions about policy and strategy. As a leader of the company, the CEO advises the board of directors, motivates employees, and drives change within the organization. As a manager, the CEO presides over the organization's day-to-day operations.The term refers to the person who takes all the decisions regarding the upliftment of the company, which includes all sectors and fields of the business like operations, marketing, business development, finance, human resources, etc. The CEO of a company is not necessarily the owner of the company.

CEOs perform key activities related to managerial and executive positions. They establish rules, define the order of performance of business activities, control and monitor executive bodies. They perform their business activities in companies that deal with services, trade or manufacture, in pre-school and

other educational institutions, medical institutions etc. Depending on the area in which they operate they asign duties, coordinate tasks, and perform the control of results. In order for them to be able to define employees' duties effectively, it is necessary that they first draft short-term and long-term plans with a clear and precise list of tasks and finally distribute tasks effectively among the employees. Task monitoring is necessary and an integral part of their work. If they notice any irregularities on time the right measures can be taken to correct the flaws.

In order to notice irregularities and establish rules, CEOs have to be familiar with the rules and regulations within the area of business they operate in, as well as tasks with tasks, necessary to work and achieve positive results. If CEOs perform their activities within service, trade or manufacturing companies it is necessary they should keep up with the market movements, the development of technology, their competition from the same or similar area of business, the development of business tools used in the given area of business and all other factors that could influence the development of the company, in a positive or negative way.

In order to be a successful CEO, one needs to possess an array of skills. It should be someone with a vision, or to be long-sighted, to possess the ability to think a few steps ahead, which helps lead their teams into a guaranteed sucess. They can very often see through people, understand what kind of a person is standing opposite them, what are that person's capacities, motivations, wishes, etc. This is extremely important not only for new business projects, but also for appointing people within a team to work at appropriate job positions and delegating tasks suitable for them. What also characterizes them is optimism and the possibility to trust others. Why is this imporant? Mainly because, their position requires productivity and capability to lead people which means deep motivation and faith in success. They are also prone to action and constructively decisive. These are some of the characteristic that are also very useful for someone who holds a managerial position. Regardless of the vision, long-sightedness and other characteristics they possess, leaders will not be successful directors unless they are ready to adopt a solid stance at a crucial moment and take concrete actions. It is something that will distinguish successful CEOs from the ones who will not excell at this position and thus not lead the company into success.

Because of aforementioned reasons, the CEO selection is a very important activity for Human Resources Management (HRM) and requires adequate selection criteria. When applying for CEO positions in a company, the basic purpose of candidates selection is to single out those with necessary up-to-date knowledge, business experience, and language skills. The CEO selection process includes many different factors such as candidates for CEO position, criteria for selection and Human Resources Commission (HRC). It is not easy for the HRC to select appropriate CEOs who satisfy all the requirements among various criteria. As such, the CEO selection is a multi-criteria decision making problem which is affected by several qualitative and quantitative, often conflicting criteria which are usually uncertain. For this reason, CEO selection can be treated as a selection under uncertain conditions. The problem of uncertainty emerges from errors in measuring, vagueness and ambiguity in natural languages, social intercourse, etc., and dealing with it is essential to human beings on all levels of their interaction with the world [2, 22]. The turning point in the uncertainty evaluating is introducing fuzzy logic [28] and fuzzy sets [29].

As in many decision problems, the CEO selection problem is too complicated in real life; humans generally fail to make a good prediction for quantitative problems, while having a good guess in qualitative forecasting [10]. In many situations of human resources selection, individuals from the HRC prefer to express their feelings with verbally. Fuzzy linguistic models permit the translation of verbal expressions into numerical values [10]. For that reason, these models can help to HRC in solving CEO selection problem when this problem is treated as a specific kind of personnel selection.

This paper describes a specific fuzzy decision system which is developed by using fuzzy extent analysis method proposed by Chang [4]. The method is known as an extended analytical method. The fuzzy

decision support system is used for CEO selection problem solving. The rest of the paper is structured as follows: the second section describes the main characteristics of CEO and its importance in organization. In third section an introduction of fuzzy sets and fuzzy numbers is given. The fourth section explains the steps of extent analysis method. The fifth section analyses the real-life problem of selecting CEO by using fuzzy decision support system. The obtained results are discussed in the sixth section. Finally, the paper concludes with the seventh section where the conclusive considerations and discussion of future work are presented.

The Main Characteristics and Importance of Ceo Selection

The job of CEO is one of the most important leadership positions in society, and a better understanding of the job is vital for a better functioning economy. Chief Executive Officer (CEO) is the highest ranking executive manager in a corporation or organization. A CEO is responsible for overall success of the entire organization. He or she has the ultimate authority to make final decisions for an organization.

A CEO has specific responsibilities depending on the needs of his or her organization. The job description of a CEO varies by organization.

A CEO has overall responsibility for creating, planning, implementing, and integrating the strategic direction of an organization. This includes responsibility for all components and departments of a business.

A CEO assures that the organization's leadership maintains constant awareness of both the external and internal competitive landscape, opportunities for expansion, customers, markets, new industry developments and standards, and so forth.

Because the CEO role bears significant responsibility, accountability, and authority within an organization, a CEO also has additional responsibilities as he or she leads the business.

The responsibilities of a CEO include [31]:

- Creating, communicating, and implementing the organization's vision, mission, and overall direction. Leading the development and implementation of the overall organization's strategy.
- Leading, guiding, directing, and evaluating the work of other executive leaders including presidents, vice presidents, and directors, depending on the organization's reporting structure.
- Soliciting advice and guidance, when appropriate, from a Board of Directors.
- Formulating and implementing the strategic plan that guides the direction of the business or organization.
- Overseeing the complete operation of an organization in accordance with the direction established in the strategic plans.
- Evaluating the success of the organization.
- Maintaining awareness of both the external and internal competitive landscape, opportunities for expansion, customers, markets, new industry developments and standards, and so forth.
- Representing the organization for civic and professional association responsibilities and activities in the local community, the state, and at the national level. (Other executive leaders bear responsibility for these ventures as interested or assigned as well.)
- Demonstrating the leadership necessary to make the organization's mission a success. This leadership includes providing leadership vision, leadership that attracts followers, and all other aspects of successful leadership.

An organization's CEO is a key player in whether and how well an organization will succeed. If they carry out these job responsibilities effectively, it will magnify the probability of the organization's success.

A high degree of organization is expected from a CEO, as well as the ability for quick and analytical decision making, and intuitive reasoning in reaching important decisions for which we do not have specific information. Timely planning and organization of work is cruicial, equally as good coordination

and the ability to work in large teams. A great CEO carefully listens to others, has the ability to negotiate and is tactful.

Among personal qualities, directors should possess perseverance, confidence, ability to manage the work of others and set high goals in order to achieve better results. Verbal capacities of a CEO are very important, considering possible direct communication with representatives of other companies. In addittion, knowledge of several languages is seen as an advantage, since it enables cooperation with foreign companies and possible customers.

The CEO position requires a university degree in the relevant field. Also, years of experience are a prerequisite, as well as attendance on various seminars and lectures that aim to enhance the work of the CEO. The demand for employees within this profile is significant, but the turnout is rather weak, given the stringent requirements of the competition, and the not so vast number of highly skilled people available. It is very important to possess a high level of qualifications, and more importantly a long professional experience and passed professional exams. In addition, the organizational, leadership and analytical skills are highlighted, as well as the ability for communication, planning and multitasking, knowledge of language and computer skills.

The mentioned responsibilities and described CEO tasks are main reasons why the company needs to make a good CEO choice because, if company selects a bad CEO, in that case the results of the company's effort to make success in business will be missed.

Fuzzy Set Theory and Fuzzy Numbers

In many situations decision makers have imprecise/vague information about alternatives with respect to attributes. It is well known that the conventional decision making analysis using different techniques and tools has been found to be inadequate to handle the uncertainty of fuzzy data. To overcome this problem, the concept of fuzzy approach has been used in the evaluation of decision making systems [24].

One of the methods which describe imprecise cases is the fuzzy set introduced by Zadeh [28] as an efficient way to mathematically represent uncertain and imprecise human assessments which are generally characterized for its linguistic terms that are based on words such as "equally", "moderately", "strong", "very strong" and "exceptional" [28, 30].

Therefore, the application of fuzzy theory by decision-makers enables them to successfully deal with uncertainties. Furthermore, fuzzy logic can be the basis for numerous methods through which qualitative assessments can be expressed through quantitative data [20]. Fuzzy sets generally employ triangular, trapezoidal and Gaussian fuzzy numbers, converting uncertain numbers into fuzzy numbers.

To solve the problem of CEO selection, in this paper triangular fuzzy numbers will be used according to following definition:

Definition 1. A triangular fuzzy number is denoted simply by a triplet *(l|m, m|u)* or *(l, m, u)*. The parameters *l, m* and *u*, respectively, define the smallest possible value, the most promising value and the largest possible value that describes a fuzzy event. The triangular type membership function of $\tilde{M}$ fuzzy number can be described as Eq. (1) [7, 17]:

$$\mu(x|\tilde{M}) = \begin{cases} 0, & x < l \\ \dfrac{x-l}{m-l}, & l \le x \le m \\ \dfrac{u-x}{u-m}, & m \le x \le u \\ 0, & x > u \end{cases} \quad (1)$$

Definition 2. The operational laws of two triangular fuzzy numbers $\tilde{M}_1 = (l_1, m_1, u_1)$ and $\tilde{M}_2 = (l_2, m_2, u_2)$, as follows:

$$\tilde{M}_1 + \tilde{M}_2 = (l_1 + l_2, m_1 + m_2, u_1 + u_2),$$

$$\tilde{M}_1 - \tilde{M}_2 = (l_1 - l_2, m_1 - m_2, u_1 - u_2),$$

$$\tilde{M}_1 x \tilde{M}_2 = (l_1 x\, l_2, m_1 x\, m_2, u_1 x\, u_2),$$

$$\tilde{M}_1 / \tilde{M}_2 = (l_1 / u_2, m_1 / m_2, u_1 / l_2),$$

$$(\tilde{M}_1)^{-1} = (1 / u_1, 1 / m_1, 1 / l_1).$$

Commonly triangular fuzzy numbers are displayed with the usage of the linguistically significance scale, shown in Table 1 [3, 16].

Table 1. Linguistic scale of importance.

Linguistic scale of importance	Triangular fuzzy scale	Triangular fuzzy reciprocal scale
Equal	(1,1,1)	(1,1,1)
Weak	(1/2,1,3/2)	(2/3,1,2)
Fairly strong	(3/2,2,5/2)	(2/5,1/2,2/3)
Very strong	(5/2,3,7/2)	(2/7,1/3,2/5)
Absolute	(7/2,4,9/2)	(2/9,1/4,2/7)

Available reading and texts offer numerous methods of gradation by means of fuzzy numbers. Such methods may yield different gradation results and require complex mathematical calculations.

One of the useful methods which use to solve multi-criteria decision-making problems based on fuzzy numbers is an extent analysis method. This method is used to consider the extent of an object to be satisfied for the goal, that is, satisfied extent. In the method, the "extent" is quantified by using a fuzzy number.

Methodology of the Extent Analysis Method

Let $X = \{x_1, x_2, ..., x_n\}$ be an object set and $G = \{g_1, g_2, ..., g_m\}$ be a goal set. According to the method of Chang extent analysis [3], each object is taken and extensive analysis for each goal g_i is performed, respectively. Therefore, m extent analysis values for each object can be obtained as $M_{g_i}^1, M_{g_i}^2, ..., M_{g_i}^m$, $i=1,2,..n$. All of the $M_{g_i}^j$, $j=1,2,..,m$ are the triangular fuzzy number. The steps of Chang's extent analysis are:

Step 1: The value of fuzzy synthetic extent with respect to the i^{th} object is defined as Eq. (2):

$$S_i = \sum_{j=1}^{n} M_{g_i}^j \otimes \left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^j\right]^{-1} \quad (2)$$

To obtain $\sum_{j=1}^{n} M_{g_i}^j$ it is necessary to perform the fuzzy addition of numbers in the matrix such that $\sum_{j=1}^{n} M_{g_i}^j = \left(\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j\right)$ and to obtain $\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^j\right]^{-1}$ which is performed by using the operation of fuzzy addition of all values such that $M_{g_i}^j$, $j=1,2,..,m$

$$\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^j = \left(\sum_{i=1}^{n} l_i, \sum_{i=1}^{n} m_i, \sum_{i=1}^{n} u_i\right) \quad (3)$$

The vector from Eq. (2) is determined in Eq. (4):

$$\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^j\right]^{-1} = \left(\frac{1}{\sum_{i=1}^{n} u_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} l_i}\right) \quad (4)$$

Step 2: The degree of possibility of $M_2 = (l_2, m_2, u_2)$ and $M_1 = (l_1, m_1, u_1)$ is defined in Eq. (5):

$$V(M_2 \geq M_1) = y \geq x\left[\min\left(\mu_{M_1}(x), \mu_{M_2}(y)\right)\right] \quad (5)$$

and can be equivalently expressed as follows Eq. (6):

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d) = \begin{cases} 1, & if \quad m_2 \geq m_1 \\ 0, & if \quad l_1 \geq u_2 \\ \dfrac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)} & other \end{cases} \quad (6)$$

where d is the ordinate of the highest intersection point D between μ_{M1} and μ_{M2}. To compare M_1 and M_2, we need both the values of $V(M_1 \geq M_2)$ and $V(M_2 \geq M_1)$.

Step 3: The degree of possibility for a convex fuzzy number to be greater than k convex fuzzy numbers M_i, $i=1,2,..,k$ can be defined by Eq. (7):

$$V(M \geq M_1, M_2, ..., M_k) = \min V(M \geq M_i),\ i=1,2,..,k \quad (7)$$

Assume that $d'(A_i) = V(S_i \geq S_k)\ k \neq i,\ k=1,2,..,n$ (8)

and then the weight vector is given as

$$W' = \left(d'(A_1), d'(A_2), ..., d'(A_n)\right)^T \quad (9)$$

where A_i, $i=1,2,..,n$ is a matrix with n elements.

Step 4: Via normalization, the normalized weight vectors is given by Eq. (10):

$$W = \left(d(A_1), d(A_2), ..., d(A_n)\right)^T \quad (10)$$

where W is a non-fuzzy number [15].

Calculation of the Consistency Ratio

When we have a selection which is based on described methodology, we need to ensure a decision's quality, and in for this purpose, the consistency of the evaluation has to be analyzed. For testing consistency, there is a need to calculate Consistency Ratio (CR). In his study, Saaty proposed utilizing consistency index (CI) and consistency ratio (CR) to verify the consistency of the comparison matrix [6, 26]. CI and RI can be defined as follows:

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{11}$$

$$CR = \frac{CI}{RI} \tag{12}$$

where *RI* is a random index, which depends on *n* criteria [9, 14] as given in Table 2.

Table 2. A random index of random matrix [9]

n	3	4	5	6	7	8	9
RI	0.58	0.9	1.12	1.24	1.32	1.41	1.45

If the *CR* of a comparison matrix is equal to or less than 0.1, it may be acceptable. When the *CR* is unacceptable, the decision-maker is encouraged to repeat the pairwise comparisons [9].

In order to calculate value of λ_{max} from Eq. (11), there is a need to perform an operation of converting a fuzzy number into a crisp number. This operation usually called "defuzzification". Various defuzzication methods are available in the literature. At this place, we mention some significant methods for defuzzification, for example, the weighted distance method of Saneifard [25], the simple centroid method of Chang and Wang [5] to get the best non-fuzzy performance value, the method for converting of fuzzy data into crisp scores which is defined by Opricovic and Tzeng [23], the fuzzy mathematical programming method introduced by Mikhailov [21] and the lambda-max method proposed by Csutora and Buckley [8]. The defuzzification method which is adopted in this article was derived from Hus and Nian [12], as well as Lious and Wang [19].

Let $\tilde{\alpha}_{ij} = (l_{ij}, m_{ij}, u_{ij})$ is a triangular fuzzy number. This number can be converted to a crisp number using Eq. (13) as follows:

$$a_{ij} = \left[\lambda * l_{ij}^{\alpha} + (1-\lambda) * u_{ij}^{\alpha}\right] 0 \le \lambda \le 1, 0 \le \alpha \le 1 \tag{13}$$

where are:

- α is exhibited preferences of the decision makers;
- λ is risk tolerance of the decision makers;
- l_{ij}^{α} is the left-end value of α-cup for α_{ij} which is calculated as follows $l_{ij}^{\acute{a}} = (m_{ij} - l_j) * \acute{a} + l_j$
- $u_{ij}^{\acute{a}}$ is the right-end value of α-cup for a_{ij} which is calculated as follows $u_{ij}^{\acute{a}} = u_{ij} - (u_j - m_j) * \acute{a}$

At this point, we should mention that α can be viewed as a stable or a fluctuating condition [13]. The range of uncertainty is the greatest when α = 0. Meanwhile, the decision making environment stabilizes when increasing α while, simultaneously, the variance for decision making decreases [6]. Additionally, λ can be considered as the degree of a decision-maker's optimism and its range is between 0 and 1 [9]. When λ=0, the decision maker is highly optimistic. When λ=1, the decision maker is pessimistic [9]. In this paper, we use value α=0.5 to denote that environmental uncertainty is steady, while λ=0.5 denotes that the future attitude is fair. When we made conversation fuzzy numbers to crisp numbers using to describe methodology, we can determine value of λ_{max} from Eq. (11) where

$$A * W = \lambda_{max} * W, \tag{14}$$

$$[A - \lambda_{max}] * W. \tag{15}$$

where *w* denotes eigenvector of the matrix *A*.

Application of Fuzzy Decision System for CEO Selection

Using the described steps of extent analysis method and using JAVA technology, a fuzzy decision support system based on fuzzy triangular numbers is developed.

Figure 1 shows a UML class diagram of developed fuzzy DSS. Basic elements of this module are classes *Criteria* and *Alternative*. They are generalized from abstract class Element. Class *FuzzyNumber* represent a triangular fuzzy number. Classes Degree, *SyntheticExtent, Result* and *FinalResult* help classes for calculation of fuzzy AHP. *Calculate* is an abstract class

which represents the template method software pattern. It is generalized to classes *FuzzyAHP* and *ChangFuzzyAHP*. Because of this template method, this software module can be extended with new methods, not only fuzzy AHP's, but methods like fuzzy TOPSIS or any other method that requires pairwise comparison of each pair of factors in the same hierarchy level. *Util* class is a singleton that provides a single point of access to this module [1].

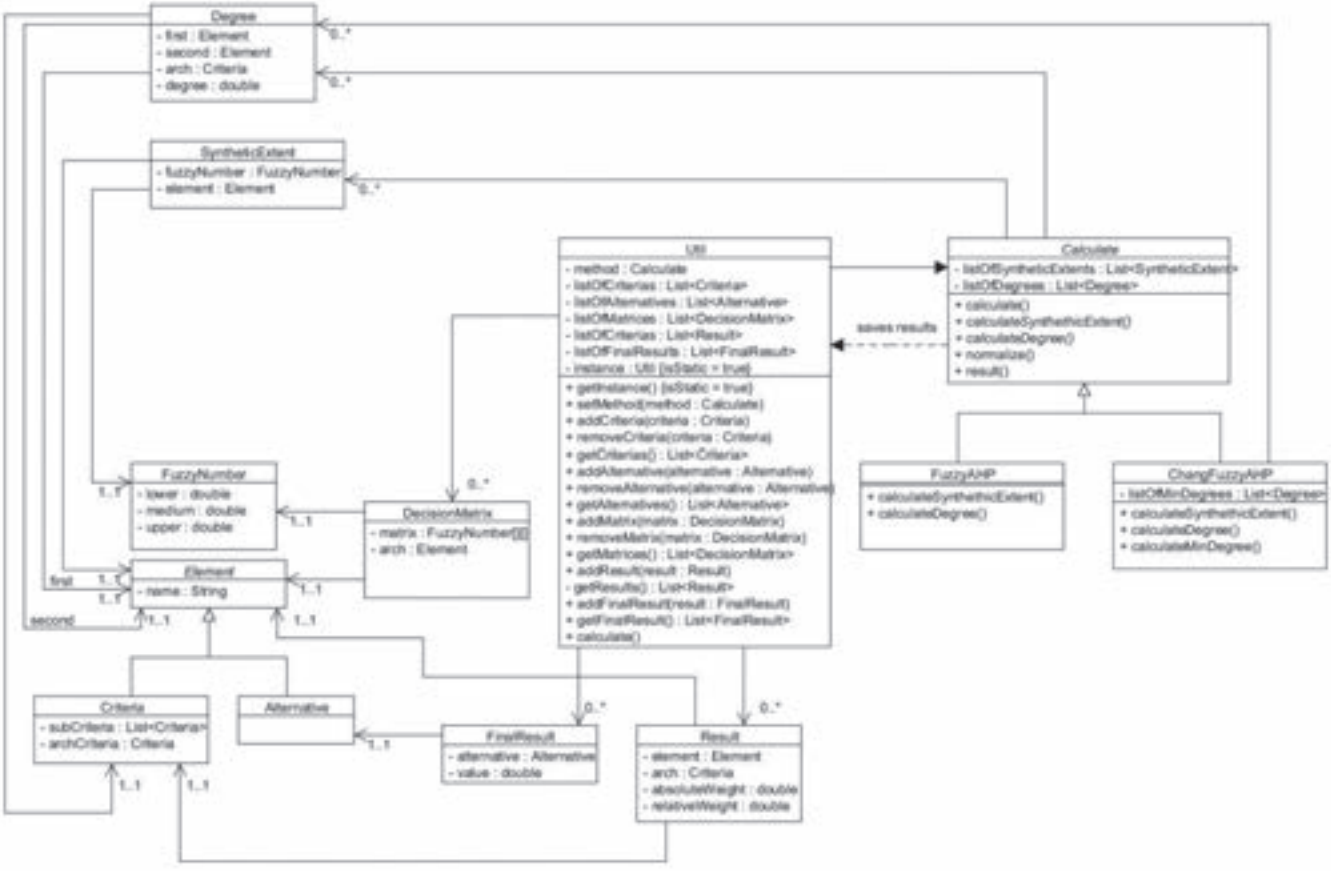

Figure 1. The class diagram of fuzzy decision support system.

This fuzzy decision support system is created to help HRD make quick and good decision for personnel selection in the recruitment process.

Selecting a suitable CEO is a success critical factor in every company. The importance of CEO role is described in previous section 2.

In this case study, an ICT company needs to hire a person for CEO position. After preliminary screening, three candidates, namely CEO1, CEO2 and CEO3 remain for further evaluation. A company's owner takes participation in conducting the interview and in selection of the most suitable candidate. In this selection, company's owner considers selection criteria according to his requirements and relates to the specific job description. The criteria are: Personnel Characteristics (PC), Foreign Language (FL), Education Background (EB), Business Experience (BE), Leadership (LS), Team Working (TW) and Project Management Knowledge (PMK). The hierarchical tree is given in Figure 2.

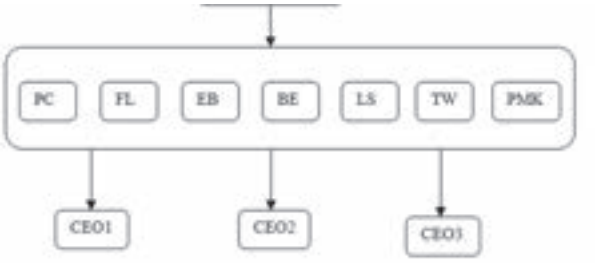

Figure 2. The hierarchical tree of CEO selection problem

The ratings of three CEOs by the company's owner (expressed in fuzzy numbers) under all criteria are given in Table 3.

Table 3. The ratings of three CEOs by company's owner under all criteria (in linguistic variables)

Decision maker	criteria	PC	FL	EB	BE	LS	TW	PMK
Company's owner	PC	equal	Weak	Weak	Fairly strong	Weak	Fairly strong	Very strong
	FL	Weak	equal	Fairly strong	Fairly strong	Very strong	Weak	Fairly strong
	EB	Weak	Fairly strong	equal	Fairly strong	weak	Fairly strong	weak
	BE	Fairly strong	Fairly strong	Fairly strong	equal	Fairly strong	Fairly strong	weak
	LS	Weak	Very strong	Weak	Fairly strong	equal	Fairly strong	Fairly strong
	TW	Fairly strong	Weak	Weak	Fairly strong	Fairly strong	equal	Fairly strong
	PMK	Very strong	Fairly strong	Weak	weak	Fairly strong	Fairly strong	equal

The ratings of three CEOs from Table 3 can be converted to triangular fuzzy numbers which is given in Figure 3.

Figure 3. Creation of fuzzy matrix of criteria comparison

When the DM's from HRD committee created the fuzzy matrix of criteria comparison, the fuzzy decision support system automatically calculates the Consistency Ratio (CR) to ensure a decision's quality. In this case, CR is under 0,1 and quality of decision matrix is excellent.

In order to calculate local weights of alternatives (CEOs) with respect to all criteria, the fuzzy decision support system gives possibilities for creating the singular fuzzy matrix for every criterion (see Figure 4 for PC criterion, for example).

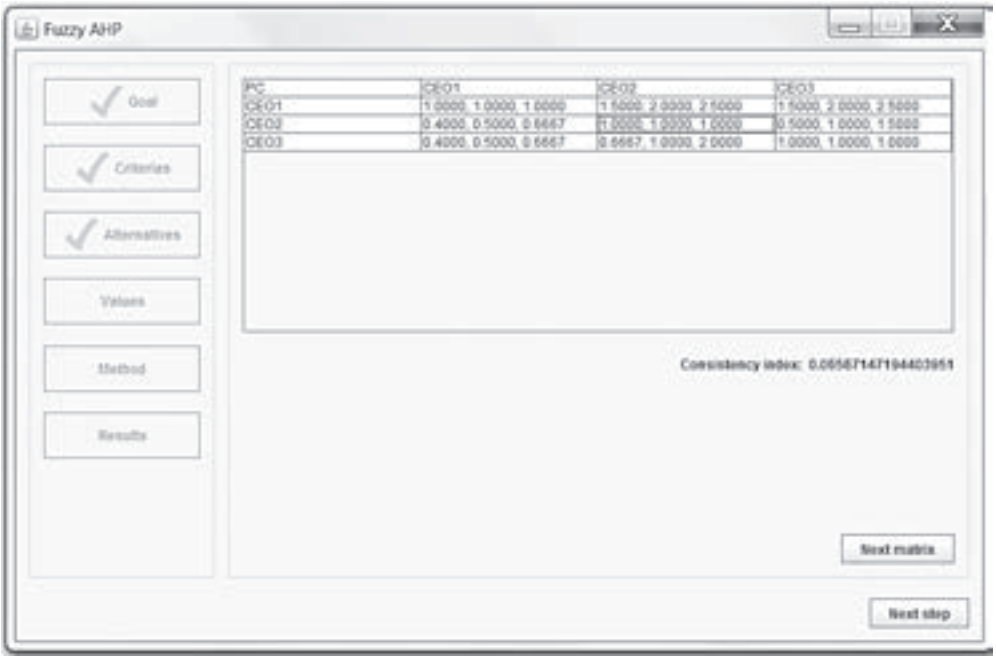

Figure 4. The singular fuzzy matrix for calculating the local weights of alternatives with respect to the criteria

After entering all data for all criteria using singular matrices which are similar to matrix from Figure 4 but with different values, the fuzzy decision support system gives possibilities for selecting the method of calculation (see Figure 5).

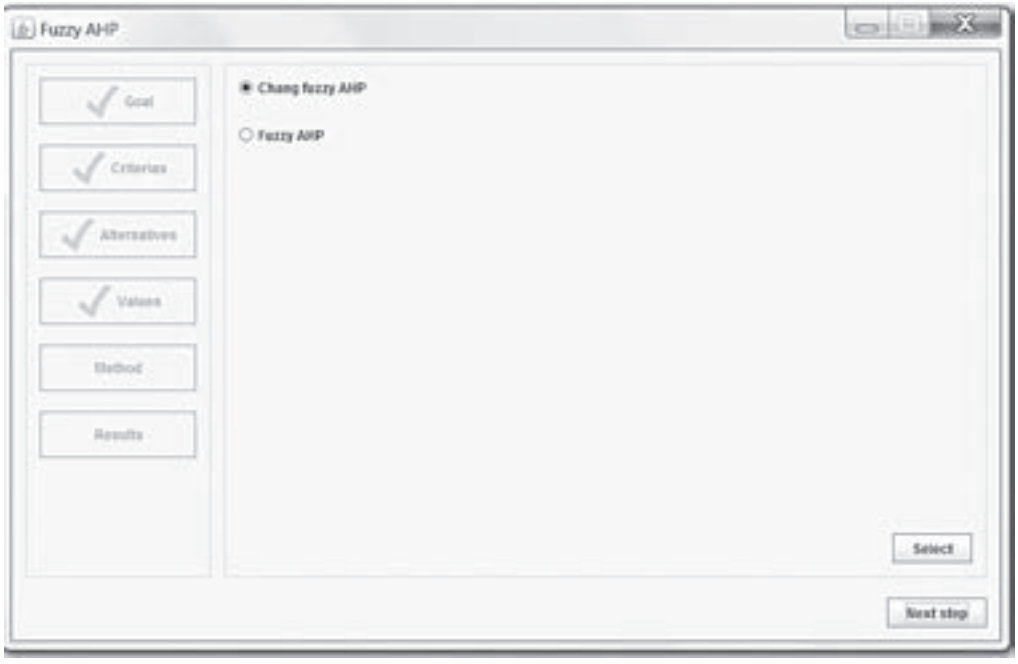

Figure 5. The selection of calculation method

For the purpose of this paper, we select Chang Fuzzy AHP option from Figure 5. After finishing this selection, the fuzzy decision support system automatically creates final results (see Figure 6).

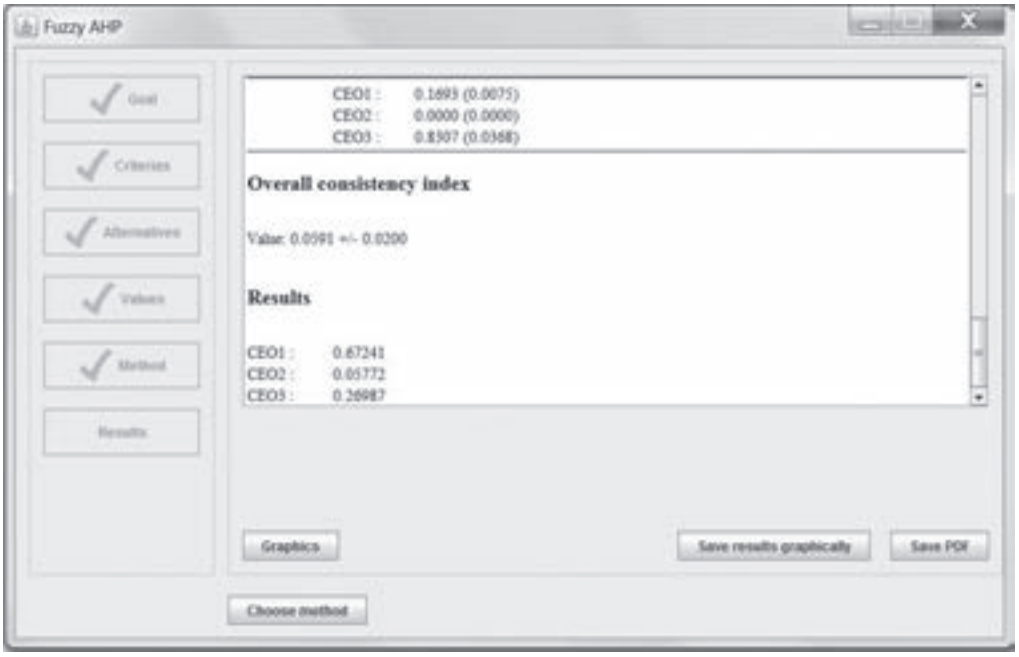

Figure 6. The results of CEO selection

The fuzzy decision support system gives possibilities to show results graphically when decision maker selects options ''*Graphics*" from Figure 6. In this case, the final results are shown in Figure 7.

Figure 7. The results from fuzzy decision support system: Weights of criteria

Figure 8. The results from fuzzy decision support system: Rank of CEO candidates

The Analysis of Obtained Results

It has been determined that the CEOs weights are (0.672, 0.270 and 0.058). According to the final result, the most suitable candidate for CEO is CEO with the highest priority weight. If we consider obtained results from Figure 6, we can conclude the following: for company's owner very important criterion for CEO selection is Business Experience in CEO area with priority weight 0.249. It is a logical fact, because CEO should be an ''experienced person" who is responsible for company development and success. For that reason, the CEO1 has got very high weights for BE criterion from company's owner. At the same time, the CEO1 has a good leadership characteristics which in combination with Business Experience guarantees that the company's owner made the best choice. Based on data from Figure 5, we can conclude that this CEO selection is very good because obtained CR for criteria and alternatives is under 0.1 which indicates good decision quality. Such obtained results suggest that the CEO selection problem is extremely complex in real life because humans generally fail to make a good prediction for quantitative problems, in contrast, they may make accurate guesses in qualitative forecasting [14]. The CEO selection problem generally concerns with important and complex issues such as [18]:

- How to properly set the importance weights of criteria to reflect the situations in which not all personnel attributes/characteristics are equally important?
- How to use linguistic and/or numerical scales to evaluate the applicants under multiple criteria?
- How to aggregate the evaluation results and then rank the applicants? The inherent importance and complexity of the CEO selection problem as a subset of personnel selection problem requires effective analytical methods to provide an operational/tactical decision framework.

In order to give a solution for previous issues, we have applied here a specific kind of decision support system based on the fuzzy extent analysis method. This method gives possibilities to include qualitative criteria in the CEO selection process. It allows mathematical calculation criteria weights which leads to the reduction of subjective judgments in the process of distinguishing between an appropriate and inappropriate employee for a job position. For this reason, many decision makers from HRD in Serbian companies are very satisfied with the applied method.

Conclusion

Selecting the most suitable CEO person is a key success factor for an organization. The complexity and importance of the problem, call for analytical methods rather than intuitive decisions. The specificity of this problem consists in dealing with imprecise data, difficulties in retrieving information and expressing an explicit opinion. CEO selection is a process that also contains uncertainties. The decision - makers face rising and complex environments today, and also decision makers are often uncertain in assigning the evaluation scores in crisp value. This problem can be overcome by using fuzzy numbers and linguistic variables to achieve accuracy and consistency. Fuzzy logic is considered ideal to deal with this type of problems. In this paper, we applied the fuzzy extent analysis method in the process of selecting the most suitable CEO. Unlike other decision methods, the described method can adaptively find a suitable CEO for the required job. For making uniform consensus of the decision makers, we converted all pair-wise comparisons into triangular fuzzy numbers to adjust fuzzy rating and fuzzy attributes weight, and used fuzzy operators in order to select the best alternative. In the future research, the authors suggest developing electronic fuzzy decision support system in which we will include other multicriteria decision technique as TOPSIS or Interpolative Boolean Algebra. It will be subject of the future works of authors.

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