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Role of Competencies in Employee Selection Function: A Fuzzy Analytical Hierarchy Process Approach

İşgören Seçimi Fonksiyonunda Yetkinliklerin Rolü: Bir Bulanık Analitik Hiyerarşi Süreci Yaklaşımı

Evrim MAYATÜRK AKYOL[1], Mehmet Emre GÜLER[2]

ABSTRACT

To focus not only on "what it is done" but also on "how it is done" has become the essential point of new HRM functions. The point which is called as "competency" defines the characteristics distinguishing an excellent employee from an average employee. In the study, the employee selection which is one of the functions of HRM is discussed in terms of a competency approach, and two-hierarchical model consisting of competency-based human resources criteria and total sub-criteria is used. The aim of the study is to help decision makers to choose the optimum alternative among all potential project manager alternatives with prioritization based upon their competence.

The essential criteria which have higher priority weights are Achievement and Action and The Impact and Influence. The four alternatives were ranked using the priority weights of the criteria and sub-criteria. As a result, list of alternative project managers ranked by their competences was suggested.

Keywords: Employee Selection, Competency Based Employee Selection, Fuzzy Analytical Hierarchy Process

ÖZET

Yeni İKY fonksiyonlarında, yalnızca "ne yapıldığına" değil; aynı zamanda "nasıl yapıldığına" da odaklanılması, temel husus haline gelmiştir. "Yetkinlik" olarak adlandırılan bu nokta, mükemmel bir çalışanı ortalama bir çalışandan ayırt eden özellikleri tanımlamaktadır. Çalışmada, İKY fonksiyonlarından biri olan işgören seçimi; yetkinlik yaklaşımı açısından tartışılmakta ve yetkinliğe dayalı insan kaynakları kriterlerini ve bunların toplam alt kriterlerini içeren iki-hiyerarşili model kullanılmaktadır. Çalışmanın amacı, yetkinliğe dayalı önceliklendirme aracılığı ile tüm olası proje yöneticisi alternatifleri arasında en uygun olanının seçiminde karar vericilere yardımcı olmaktır. Daha yüksek öncelik derecesine sahip temel kriterler, Başarı ve Çalışma ile Etki yetkinlikleridir. Dört alternatif, kriterlere ve alt kriterlere ilişkin öncelik dereceleri kullanarak sıralanmıştır. Sonuç olarak, yetkinliklerine göre sıralanan alternatif proje yöneticilerine ilişkin liste ortaya konmuştur.

Anahtar Kelimeler: İşgören Seçimi, Yetkinliğe Dayalı İşgören Seçimi, Bulanık Analitik Hiyerarşi Süreci

1. INTRODUCTION

Recent developments within organizations and business environments have brought new challenges for employee selection. Specifically, technological changes, globalization, social trends, and changes in the organization of work require that organizations reconsider the methods of their employee selection procedures (Lievens et al., 2002, p. 580). In this context, one of these methods in the field of both HRM and employee selection function can be stated as Competency Based Approach which enables competitive advantage in the applications.

Organizations can use competencies in order to develop different human resource functions. For example, rapid technological changes, particularly in service and knowledge-based sectors, require organizations to adopt competency-based training and development function (Sandberg, 2000). Furthermore, performance management and compensation management functions are suitable for competency-based approaches because performance management becomes stronger if the criteria of objectives and behaviors are both used in employee evaluation (Özçelik and Ferman, 2006). Efficiency of compensation management may increase if compensation levels and differences are structurally based on competencies (Zaim, 2007). In addition to this, competency-based employee selection practices shed light on other functions.

[1]**Yrd. Doç. Dr. İzmir Katip Çelebi Üniversitesi İkitsadi ve İdari Bilimler Fakültesi, evrimmayaturk@gmail.com**
[2]**Doç. Dr. İzmir Katip Çelebi Üniversitesi İkitsadi ve İdari Bilimler Fakültesi, Turizm Fakültesi memre.guler@ikc.edu.tr**

In the study, a basic competency model and an employee selection process based on the model are elaborated. Within the context of the study, studies carried out with F-AHP within a decision making technique in employee selection is mentioned, and the technique is examined firstly. Next, competency hierarchy model and its creation process, sector in which the model is applied, and calculations are stated. In the conclusion part of the study, discussions related to results are presented, and contributions are emphasized.

2. LITERATURE REVIEW

Factors such as downsizing, reduction in the share of profits, increase in market volatility in many industries, and development of behavioral research have played important roles in the use of competencies in HRM programs (Rothwell and Lindholm, 1999). In this context, many researchers have emphasized the advantages of "competency approach" in HRM literature, as well. For example, McLagan (1980), who states the functions in which competency models can be used, is one of these researchers.

However, the most-widely known studies about CBHRM belong to McClelland (1973), Boyatzis (1982) and Spencer and Spencer (1993). McClelland's article (1973) titled "Testing for Competence Rather Than Intelligence" is regarded as the starting point in the CBHRM field. In other words, the competency approach was started by McClelland (Athey and Orth, 1999) as an alternative theory to feature approaches to intelligence based on measurement and the estimation of human performance.

Boyatzis (1982), who focused on the importance of manager competencies, tried to determine the characteristics of people having superior performance, and to increase the effectiveness of organizations through selection, development and rewarding the right people (Özçelik and Ferman, 2006). According to "Effective Work Performance Model" of Boyatzis (1982), the interaction between the individual and the environment results in a particular action or behavior. The competence of individuals, however, has a direct impact on the actions performed. In the same way, work requests also play important roles in actions, and how they are performed. Especially the management requests can be expressed in terms of the managers' tasks and roles. Organizational and cultural environments constitute a milestone on the appropriate actions, and also play a role in individual actions by affecting the functional and situational requests.

Spencer and Spencer (1993) contributed to the field by elaborating the factors such as motive, trait, self-concept, knowledge and skill which are related to the concept of competency. Furthermore, one of the important contributions to the literature by Spencer and Spencer (1993) is the "Iceberg Model."

2.1. Competency Groups

Competencies which are common for different career groups may be differentiated in terms of their importance (Boyatzis, 1982). Competency classifications suggested by different researchers are summarized in Table 1.

Table 1: Competency Groups Suggested by Different Researchers

Sparrow and Hiltrop (1994)	Behavioral competencies Managerial competencies Core competencies
Carroll and McCrackin (1998)	Key competencies Team competencies Leadership and management competencies Functional competencies
Devish (1998)	Core competencies Functional competencies Specific competencies
Nordhaug (1998)	Meta-competence Intra organizational competencies General industry competencies
Garavan and McGuire (2001)	General working competencies Learning competencies Career related competencies

Additionally, Boyatzis (1982) aimed to list each competency related to effectiveness of a manager regardless of a specific job or organization. Competencies in this list were grouped under six main clusters. Spencer and Spencer (1993) reconsidered the competencies based on competency model study of Boyatzis (1982). The new list created in conjunction with some name changes suggested by Spencer and Spencer forms the basis for the study. This grouping is seen in Table 2.

Table 2: Competency Grouping of Boyatzis (1982) and Spencer and Spencer (1993)

Achievement and Action *(C1)*	Achievement Orientation *(SC11)* Concern for Order, Quality, and Accuracy *(SC12)* Initiative *(SC13)* Information Seeking *(SC14)*
Helping and Human Service *(C2)*	Interpersonal Understanding *(SC21)* Customer Service Orientation *(SC22)*
The Impact and Influence *(C3)*	Impact and Influence *(SC31)* Organizational Awareness *(SC32)* Relationship Building *(SC33)*
Managerial *(C4)*	Developing Others *(SC41)* Directiveness: Assertiveness and Use of Positional Power *(SC42)* Teamwork and Cooperation *(SC43)* Team Leadership *(SC44)*
Cognitive (C5)	Analytical Thinking *(SC51)* Conceptual Thinking *(SC52)* Technical/ Professional/ Managerial Expertise *(SC53)*
Personal Effectiveness (C6)	Self-Control *(SC61)* Self Confidence *(SC62)* Flexibility *(SC63)* Organizational Commitment *(SC64)*

2.2. Competency-Based Employee Selection

Employee selection, which provides a means for sourcing talent with the aim of achieving organizational objectives, is evaluated in two categories by Dubois et al. (2004). The first is the traditional selection process, which includes 10 steps (Dubois et al., 2004):

1. Clarify the selection process.
2. Clarify the selection methods.
3. Shorten the list of potential candidates by comparing the applicants to the selection criteria.
4. Establish a list of finalists for the targeted jobs.
5. Conduct a detailed examination of the finalists to identify the best candidates for the targeted job.
6. Make the selection.
7. Negotiate a competitive compensation and benefits package with the successful candidate.
8. Extend an offer to the successful candidate.
9. Confirm that all requirements are met.
10. Confirm that the selection decision was correct.

The second is the competency-based selection process, which has arisen from organizational, social, technological, and legal changes. This process is so important that it requires people to be selected not only for a specific job, but also for organizational membership. The process includes deciding whether candidates will adapt to the organizational environment and its policies (Lawler, 1994). Therefore, the success of a competency-based approach depends on explicit and up-to-date performance requirements (Dubois et al., 2004). In other words, successful job-person matching depends on (1) accurate assessment of individual competencies, (2) competency models of jobs and (3) a method of assessing the "goodness of fit" between a person and a job (Spencer and Spencer, 1993).

A competency-based selection process includes 8 steps and these steps show differences from the traditional one in some aspects (Dubois et al., 2004):

1. Planning is equally essential for the competency-based selection, and the goal of both processes is to make the best match between the person and the work.
2. HR practitioners clarify selection methods for making a decision. Competency-based categories are used in selection methods to assess the individual's ability to perform the work.
3. HR practitioners work with managers to compare evidence of competencies with selection criteria, and to shorten the list of applicants.
4. When finalists are chosen, the goal of competency-based selection is to discover real evidence of ability to perform based on interview questions exploring actual experience or work samples. The traditional approach is to rely on superficial evidence of ability such as academic degrees and salary history.
5. Competency-based process relies on carefully planned behavioral event interviews.
6. This step is related to compensation and benefits and it is similar to Step 7 in traditional process.
7. Verification applies to the successful candidate's competency in a technical or professional area.
8. HR practitioners work with the new employees' managers to determine whether or not performance matches up to expectations and requirements.

In summary, approaches and policies are formed, evolved and performed based on employee competencies in order to support the integration of human resource management in CBHRM, while in classically managed organizations, the emphasis is not on projects but instead on routine products and services where the job requirements are well defined and stable (Gilan et. al., 2012).

Finally, determining the selection method is the critical step (Spencer and Spencer, 1993). Because the contemporary employee selection is a complex decision making process that is expected to be capable of placing the right employees in the right jobs at the right time (Gilan et al., 2012). In this context, competency assessment can involve a variety of methods such as behavioral event interviews, tests, assessment center simulations, bio-data, review of performance appraisal reports, and rating methods. Ratings by managers, peers, subordinates, customers and experts are a popular method of measuring competencies (Spencer and Spencer, 1993). Additionally, one of the most desirable methods is interviews conducted by trained professionals. These interviews solicit information about competencies linked to successful or exemplary performance (Dubois et al., 2004). In fact, interviews and ratings by experts through these methods were used in the research component of the study. In other words, candidates were evaluated through interviews by experts within the framework of the main model, and the evaluation results were data for the Analytic Hierarchy Process (AHP).

Because the competency-based selection process has a multi-hierarchical structure (Shahhosseini and Sebt, 2011; Göleç and Kahya, 2007), AHP is used in this study. Additionally, multi-hierarchical decision-making techniques make it possible to reduce subjectivity in employee selection. For instance, Lazarevic's (2001) model attempted to minimize subjective judgment in the process of distinguishing between an appropriate and an inappropriate candidate for a position. Also, Fuzzy AHP provides employee selection processes with time and cost benefits, and it eliminates the conflicts related to the process (Göleç and Kahya, 2007; Shahhosseini and Sebt, 2011). Consequently, employee selection problems have been solved with fuzzy sets and logic over the last twenty five years, and a number of studies have presented fuzzy adaptive decision making models for the selection of employees (Lazarevic, 2001; Polychroniou and Giannikos, 2009; Liang and Wang, 1992; Alliger et al., 1993; Capaldo and Zollo, 2001; Güngör et al., 2009; Göleç and Kahya, 2007; Shahhosseini and Sebt, 2011; Özdağoğlu, 2013).

3. METHOD

Analytic hierarchy process (AHP) was first introduced by Saaty in the early 1980s (Saaty, 1977; Saaty, 1980), and many researchers have used this technique in several areas from operations research to social sciences. AHP actually has been thought of helping decision makers dealing with multi-criteria decision making problems. Saaty, 1980; Zahedi, 1996; Vaidya and Kumar, 2006 are made reference by many researchers that interested in multi-criteria decision making problems.

A numerical value such as a_{ij} results in pair-wise comparison representing the coefficient between the weights of the two criteria defined by *i* and *j*. AHP method employs crisp values from Saaty's static nine-point fundamental scale. On the other hand, if the judgments of decision makers are uncertain, obtaining such precise crisp values may be very difficult. Therefore, static crisp values may lack the ability to capture the decision makers' blurred preferences. Overcoming this limitation requires a logical approach that identifies the comparison coefficients as being fuzzy numbers (Güler, 2012).

The theory of fuzzy sets data is similar to the human brain that exhibits logical behavior when faced with uncertainties. This thought is due to instinctive response characteristic of the human brain towards obscurity in the decision process. Many fuzzy additions of operational research methods, a fuzzy AHP version was developed by Van Laarhoven and Pedrycz (1983), who studied triangular membership functions, and compared underlying fuzzy ratios. After the development of this method, many authors have contributed to both the conceptual and implementation sides of fuzzy AHP. Theoretical sources comprise studies on employee selection with AHP and fuzzy AHP (Mohanty and Deshmukh, 1997; Göleç and Kahya, 2007; Güngör et al., 2009; Shahhosseini and Sebt, 2011), organizational performance and human resources implementation with data envelopment analysis combined with AHP (Tseng and Lee, 2009), and fuzzy AHP applications for the determining competency of CEOs in the hospitality industry (Shyan et al., 2011).

The fuzzy set is the *F* which is the triangular fuzzy number and the $\mu_F(x)$ $\mu_F(x)$ is the membership function of triangular fuzzy number (*F*) which is a piece-wise linear function having the properties listed below (Cakir and Canbolat, 2008):

F is a particular subset of $\Re$.

$\mu_F(x)$ is a continuous mapping from $\Re$ to the dosed interval [0,1].

$\mu_F(x) = 0$ $\mu_F(x) = 0$ for all $x \in (-\infty, l_F] \cup [u_F, +\infty)$ $x \in (-\infty, l_F] \cup [u_F, +\infty)$ and $l_F, m_F, u_F \in \Re$ $l_F, m_F, u_F \in \Re$, l_F and u_F are the lower and upper limits and m_F is the most likely value of *F*, respectively, when $\mu_F(x) = 1$ $\mu_F(x) = 0$ $\mu_F(x) = 1$ for $x = m_F$. $x = m_F$

$\mu_F(x)$ $\mu_F(x)$ is monotonically increasing when $x \in [l_F, m_F]$ and monotonically decreasing $x \in [m_F, u_F]$.

In the study, comparison coefficients between *i* and *j* have been defined using triangular fuzzy numbers which denoted the judgment as $\tilde{a}_{ij}$ that described first a_{ij}. Therefore, the heuristic decisions have identified matching with the pair-wise comparison. The matrix to be created for making comparison between the criteria is shown as follows:

$$\tilde{A} = \begin{bmatrix} 1 & \tilde{a}_{12} & \cdots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \cdots & \tilde{a}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \cdots & 1 \end{bmatrix} \tilde{A} = \begin{bmatrix} 1 & \tilde{a}_{12} & \cdots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \cdots & \tilde{a}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \cdots & 1 \end{bmatrix} \quad (1)$$

Next, values of fuzzy linguistic variables have been identified, followed by the fuzzy numbers assigned for evaluating the criteria. Fuzzy linguistic variables are an assertion for natural or artificial language that defines a value compilation (Zadeh, 1975). According to the aim of the study, the fuzzy linguistic variables are employed for helping the decision makers with their subjective judgment between each factor as to their relative importance. The five fuzzy linguistic variables are equally important, moderately important, more important, strongly important and extremely important. These variables are illustrated in the following Table 3, where underlying triangular fuzzy numbers and their definitions were summarized as lower, and most likely and upper values.

Table 3: Fuzzy Linguistic Variable Set and Their Underlying Fuzzy Numbers

Linguistic Variable	Fuzzy Number	Membership Function	Definition
Equally important (EQ)	1	(1, 1, 2)	Practical knowledge and experience assert that factor *i* is equally important when compared to factor *j*.
Moderately important (MDI)	3	(2, 3, 4)	Practical knowledge and experience assert that factor *i* seems moderately more important when compared to factor *j*.
More important (MRI)	5	(4, 5, 6)	Practical knowledge and experience assert that factor *i* is more important when compared to factor *j*.
Strongly important (STI)	7	(6, 7, 8)	Practical knowledge and experience assert that factor *i* is strongly important when compared to factor *j*.
Extremely important (EXI)	9	(8, 9, 9)	Practical knowledge and experience assert that factor *i* is extremely important when compared to factor *j*, and totally outweighs it.

(Çakır and Canbolat, 2008)

Use of fuzzy linguistic variables provides the use verbal terms instead of numbers for decision makers, and according to their attributes they are able to enclose the tentative. Therefore, they eliminate the disadvantage of the static form of the basic scale as pair-wise comparisons of AHP for eliminating the uncertainty (Özdağoğlu, 2016; Güler, 2012). The prioritization procedure is the fundamental step in Fuzzy AHP methodology. Defined prioritization problem derives the unknown priority column vector;

$$P = [p_i]T; i = 1, ..., n \tag{2}$$

from the judgment set;

$$\tilde{A} = [\tilde{a}_{ij}]; i, j = 1, ..., n \tag{3}$$

where the pair-wise comparisons are given by $\tilde{a}_{ij} = (l_{ij}, m_{ij}, u_{ij})$ as fuzzy numbers and the priority of factor *i* is denoted by p_i. Theoretical sources suggest several approaches for derivation of priorities from fuzzy pair-wise comparison matrices. The logarithmic least squares method (Van Laarhoven and Pedrycz, 1983), geometric mean method (Buckley, 1985), interval arithmetic (Cheng and Mon, 1994), synthetic extent analysis (Chang, 1996), fuzzy least squares method (Xu, 2000), and fuzzy preference programming (Mikhailov, 2003) are some techniques of prioritization worthy of consideration. In this study, Chang (1996)'s synthetic extent analysis approach, which is well suited for studying with triangular fuzzy numbers, was selected for prioritization problem.

One of the most popular fuzzy prioritization methods is synthetic extent analysis. It is very similar to conventional AHP because of the permutation of the decision elements. Also, the implementation steps are almost equivalent in both methods. In the first step, using triangular fuzzy numbers, determined pair-wise comparisons are conducted. Then, S_i as the synthetic extent value is found for each element. In the next step, the non-normalized weights are determined by fuzzy number comparison approach (Chang, 1996). Normalization of the weights is determined for each decision element in the last step. In these sequences, the synthetic extent analysis procedure is concisely summarized. Consideration of objects and goals are made reference to respectively as *n* and *m*; also their indices are *i* and *j*. As result, we have *m* extent analysis values e_j^i, $i = 1,...,n; j = 1,...,m$ where each e_i^j e_j^i value is characterized by three parameters (l_{ij}, m_{ij}, u_{ij}) as a triangular fuzzy number. Then, regarding to the i^{th} objective, the synthetic extent value is given by:

$$S_i = \sum_{j=1}^{m} e_i^j \otimes \left(\sum_{i=1}^{n} \sum_{j=1}^{m} e_i^j \right)^{-1} \tag{4}$$

The fuzzy multiplication operator is shown as ⊗ ⊗ and additions are performed using the fuzzy addition operator. Therefore, for the first term in the above formula, we have

$$\sum_{j=1}^{m} e_i^j = \left(\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j \right), \forall_i = 1, \cdots, n \quad (5)$$

and for the second term, we have

$$\left(\sum_{i=1}^{n} \sum_{j=1}^{m} e_i^j \right)^{-1} = 1 \Big/ \sum_{i=1}^{n} \sum_{j=1}^{m} u_i, 1 \Big/ \sum_{i=1}^{n} \sum_{j=1}^{m} m_i, 1 \Big/ \sum_{i=1}^{n} \sum_{j=1}^{m} l_i \quad (6)$$

These calculations are the natural outcomes of fuzzy operational laws, and are quite different from regular additions and multiplications (see Kaufmann and Gupta, 1991).

Two fuzzy numbers as $F_1 = (l_1, m_1, u_1)$ and $F_2 = (l_2, m_2, u_{2\,\alpha})$ are considered for the next step. Both the possibility degree that F_1 is either bigger than or equal to F_2 and the possibility degree that F_1 is either smaller than or equal to F_2 have to be investigated for a sensible comparison between these two fuzzy numbers. Let $D(F_1 \geq F_2)$ denote the possibility degree that F_1 is either bigger than or equal to F_2. Three possible cases for $D(F_1 \geq F_2)$ are listed below:

Case 1: If $u_1 \leq l_2, \Rightarrow D(F_1 \geq F_2) = 0$.

Case 2: If $m_1 \geq m_2, \Rightarrow D(F_1 \geq F_2) = 1$.

Case 3: For all other possible cases, the corresponding degree of possibility is given by

$$D(F_1 \geq F_2) = l_2 - u_1 / (m_1 - u_1) - (m_2 - l_2) \quad (7)$$

Chang (1996) uses the degree of possibility that a fuzzy number F_i is greater than k fuzzy numbers for a logical comparison. This expression can be shown as below:

$$D(F_i \geq F_1, \ldots, F_k) = (D(F_i \geq F_1) \wedge D(F_i \geq F_2) \wedge \ldots \wedge D(F_i \geq F_k)) \quad (8)$$

The fundamental comparison of fuzzy number (Chang, 1996) determines that possibility degree of a fuzzy number F_i is either greater than or equal to a set of fuzzy numbers which equal to the minimum degree of possibility among these values. For this reason, this term is shown as below:

$$D(F_i \geq F_1, \ldots, F_k) = min(D(F_i \geq F_j \mid j=1, \ldots, k) \quad (9)$$

After stating the fuzzy number comparison principles, an $(n \times n)$ fuzzy comparison matrix defined the prioritization problem for the study. Take into consideration S_i that the synthetic extent values found out using the equation (4). Let $h_i = \min(D(S_i \geq S_j \| j = 1, \ldots, n; j \neq i)$ and note that with this equation the non-normalized priority vector is provided where h is top intercept point on the number axis where two membership functions are. Then, non-normalized priority vector for n elements are calculated as below:

$$P' = [h_1, \ldots, h_n]^T \quad (10)$$

Thus, using $p_i = h_i \mid \sum h_i$ which is the vector that normalizing the components is shown below:

$$P = [p_1, \ldots, p_n]^T \quad (11)$$

3.1. Model for prioritization of competency based human resources factors and employee selection

The model used for employee selection using fuzzy AHP is formed by three fundamental steps, namely, (1) determining the criteria which are used in the process of the model, (2) calculating of fuzzy AHP according to hierarchies, and (3) evaluating the alternatives using priority coefficient and selecting the optimal alternative.

In the first step, the hierarchical model is formed by using the competency-based human resources management models suggested by Boyatzis (1982) and Spencer and Spencer (1993), which are the essential for the study, and are shown in Table 2. According to the model, the objective of employee selection has developed the first hierarchy; and the second hierarchy has six competency criteria. In the third hierarchy, there are 20 sub-criteria, which contain a specialty for each competency criterion in the second hierarchy. Considering the two hierarchical models, the alternatives have been denoted and shown in Figure 1.

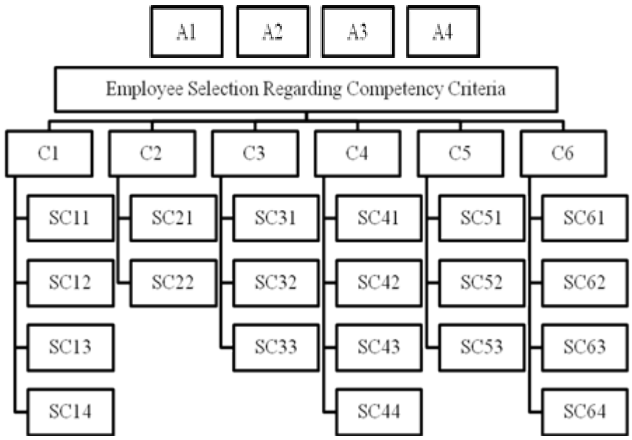

Figure 1: Hierarchical Model Based on Competency Criteria for Effective Manager

The second step after forming the hierarchical model is to prepare comparison matrices for determining weights of criteria. The decision making experts evaluate the prepared comparison matrices using the scale shown in Table 3. The result of this evaluation, the elements of comparison matrices, is valued with linguistic variables. The weights of criteria are also calculated according to the linguistic values of the membership function. To perform the calculation, the competency criteria were evaluated first leading to the second hierarchy. Then, considering each competency criteria, the evaluation of the sub-criteria in third hierarchy was made. After the calculation of the sub-criteria, the alternatives have processed an evaluation in respect of sub-criteria. As a result, the weights of each criterion, sub-criterion and alternative have been established.

In the selection stage of the alternative, (e.g., for alternative $A_{i)}$, the weights of A_i to sub-criterion SC_i and sub-criterion SC_i to criterion C_i and criterion C_i in Competency Criteria are multiplied. This process has implemented A_i to for all sub-criteria and their criteria; then the all of the multiplied results are totaled. This total gives the priority for alternative A_i. This calculation step has been made for other alternatives so that the alternative which has the highest priority has been selected. Figure 2 briefly shows this step.

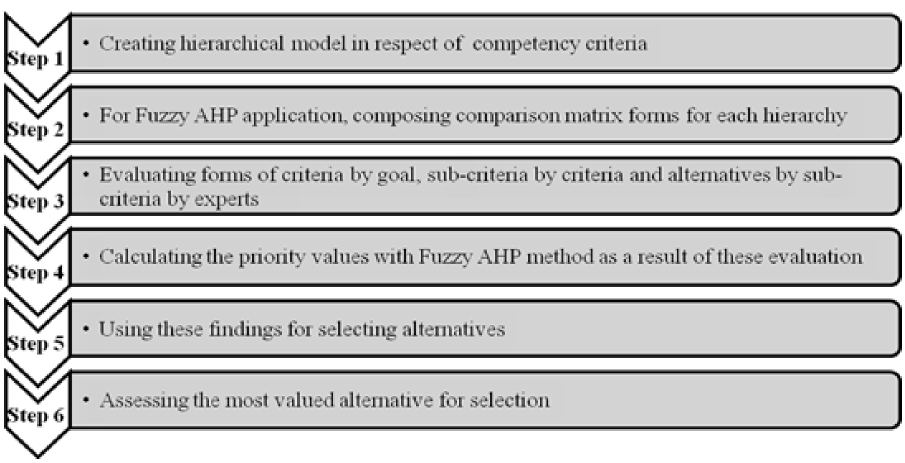

Figure 2: Steps for Employee Selection Process

4. A NUMERICAL APPLICATION OF THE COMPETENCY-BASED EMPLOYEE SELECTION MODEL

The proposed model has been applied for a real problem in a firm that manufactures white goods and electronics. The aim of the study is to help decision makers to choose the optimum alternative among all potential project manager alternatives with prioritization based upon their competence. There is intensive competition with in the white goods and electronics sectors. New product projects from the beginning of the designing stage to the final product stage have to manage in accordance with time, budget, and cost parameters. Therefore, correct project manager selection is critical. In other words, an effective project team, starting with its manager, is a critical factor for project success (Shahhosseini and Sebt, 2011). Nevertheless, the alternative has to fit into both the sector in which the firms operate and the managerial activity and atmosphere while choosing the project manager among the alternatives. Determining the attribution of alternatives as to whether familiar in sector or not is stated precisely. Furthermore, other managerial attributes and a determination of competency are identified with some tests by experts.

In the study, the comparison matrices forms of competency-based employee selection which are used for the evaluation by the human resource experts and developers have been prepared as deemed suitable for the firm's structure. Criteria used in the model have been determined taking into account the model shown in Figure 1 by the evaluation team. In respect of linguistic pair-wise comparison matrices, priority weights and the consistency index (C.I.) of each criterion and sub-criterion are calculated. The results are shown in Table 4.

Table 4: Priority and Consistency Index of Criteria and Sub-Criteria

Criterion	Priority of Criterion	C.I. of Criteria	Sub-Criterion	Priority of Sub-Criterion	Final Priority of Sub-Criterion	C.I. of Sub-Criteria
C1	0,414211	*0,0980276*	***SC11***	0,2820810	0,116841053	*0,0760371*
			SC12	0,0915151	0,037906561	
			SC13	0,5740720	0,237786937	
			SC14	0,0523314	0,021676242	
C2	0,0959719		***SC21***	0,25	0,023992975	*0*
			SC22	0,75	0,071978925	
C3	0,490523		***SC31***	0,6175040	0,302899915	*0,0678054*
			SC32	0,0856307	0,042003828	
			SC33	0,2968650	0,145619110	
C4	0,166249		***SC41***	0,2497640	0,041523015	*0,136633*
			SC42	0,0376632	0,006261469	
			SC43	0,5698960	0,094744640	
			SC44	0,1426770	0,023719909	
C5	0,0321383		***SC51***	0,1111111	0,003570922	*0*
			SC52	0,1111111	0,003570922	
			SC53	0,7777778	0,024996456	
C6	0,242378		***SC61***	0,0569898	0,013813074	*0,103134*
			SC62	0,4935460	0,119624692	
			SC63	0,1645150	0,039874817	
			SC64	0,2849490	0,069065369	

In Table 4, the essential criteria which have higher priority weights are C1 and C3 can be seen; in these criteria, SC13 is the most important factor in C1, and SC31 is the most important factor in C3. The C.I. of criteria that shows the reliability when the index is lower than 0,15 is consistent can also be seen.

Table 5: Unweighted Evaluation for Alternative Project Managers

Sub-Criterion	Priority of A1	Priority of A2	Priority of A3	Priority of A4	C.I. of Alternatives
SC11	0,4881550	0,0976311	0,3451780	0,0690356	*0,0404401*
SC12	0,4225130	0,0505976	0,4225130	0,1043770	*0,0244890*
SC13	0,0780913	0,5222450	0,1998320	0,1998320	*0,0144978*
SC14	0,25	0,25	0,25	0,25	*0*
SC21	0,6131580	0,1573560	0,0721304	0,1573560	*0,0515003*
SC22	0,4900900	0,1155150	0,2310310	0,1633630	*0,0404401*
SC31	0,0644710	0,2876280	0,1430750	0,5048250	*0,0660226*
SC32	0,0505976	0,4225130	0,1043770	0,4225130	*0,0244890*
SC33	0,1514444	0,1514444	0,0623538	0,6347590	*0,0244890*
SC41	0,5166740	0,0769292	0,2381990	0,1681980	*0,0347189*
SC42	0,1055820	0,3721790	0,3721790	0,1500610	*0,0202157*
SC43	0,625	0,125	0,125	0,125	*0*
SC44	0,5222450	0,0780913	0,1998320	0,1998320	*0,0144978*
SC51	0,5222450	0,0780913	0,1998320	0,1998320	*0,0144978*
SC52	0,5222450	0,0780913	0,1998320	0,1998320	*0,0144978*
SC53	0,6530440	0,0913316	0,0646480	0,1909760	*0,0447163*
SC61	0,3898620	0,0679248	0,1523520	0,3898620	*0,0144978*
SC62	0,25	0,25	0,25	0,25	*0*
SC63	0,5650090	0,1175040	0,0552855	0,2622010	*0,0389941*
SC64	0,3106600	0,1464470	0,1035530	0,4393400	*0,0404401*
Mean	***0,3795540***	***0,1768260***	***0,1895600***	***0,2540600***	

Similar calculation procedures are made for the unweighted evaluation of the alternatives and the result of fuzzy AHP analyses are shown in Table 5. The weighted results are seen in Table 6.

Table 6: Weighted Evaluation for Alternative Project Managers

Sub-Criterion	Final Priority of Sub-Criterion	Weighted Priority of A1	Weighted Priority of A2	Weighted Priority of A3	Weighted Priority of A4
SC11	0,116841053	0,05703654	0,01140732	0,04033096	0,00806619
SC12	0,037906561	0,01601601	0,00191798	0,01601601	0,00395657
SC13	0,237786937	0,01856909	0,12418304	0,04751744	0,04751744
SC14	0,021676242	0,00541906	0,00541906	0,00541906	0,00541906
SC21	0,023992975	0,01471148	0,00377544	0,00173062	0,00377544
SC22	0,071978925	0,03527615	0,00831465	0,01662936	0,01175869
SC31	0,030289992	0,00195283	0,00871225	0,00433374	0,01529114
SC32	0,004200383	0,00021253	0,00177472	0,00043842	0,00177472
SC33	0,014561911	0,00220532	0,00220532	0,00090799	0,0092433
SC41	0,041523015	0,02145386	0,00319433	0,00989074	0,00698409
SC42	0,006261469	0,0006611	0,00233039	0,00233039	0,0009396
SC43	0,09474464	0,0592154	0,01184308	0,01184308	0,01184308
SC44	0,023719909	0,0123876	0,00185232	0,00474	0,00474
SC51	0,003570922	0,0018649	0,00027886	0,00071358	0,00071358
SC52	0,003570922	0,0018649	0,00027886	0,00071358	0,00071358
SC53	0,024996456	0,01632379	0,00228297	0,00161597	0,00477372
SC61	0,013813074	0,00538519	0,00093825	0,00210445	0,00538519
SC62	0,119624692	0,02990617	0,02990617	0,02990617	0,02990617
SC63	0,039874817	0,02252963	0,00468545	0,0022045	0,01045522
SC64	0,069065369	0,02145585	0,01011442	0,00715193	0,03034318
Weighted Results		***0,34444741***	***0,23541486***	***0,20653801***	***0,21359998***

The ranking of alternatives with respect to unweighted evaluation values in descending order are A1, A4, A3 and A2. Weighted evaluation values in descending order are listed as A1, A2, A4 and A3. The second alternative has changed when the weights are taken into account. As to whether the best alternative has changed, the change in rankings has shown that the weight of a criterion has provided an important development in decision-making procedure.

5. CONCLUSION

Boyatzis (1982) suggested that although competencies are very important to all industries and business scales, their weights may differ. Accordingly, people who meet different job opportunities and career ways may develop their competencies more easily (Yeung, 1996). In fact, while businesses can add new competencies to their structures through hiring (Simon, 1991), they lose some competencies due to employees' quitting (Hall, 1992). In other words, business competencies especially depend on individual career behavior (Defillippi and Arthur, 1994).

In this context, there are plenty of critical advantages to select the employee based on their competency. First, competency-based selection makes it result-driven for selection of employee. Second, it makes selection methods more effective.

On the other hand, the process encourages executives to transparent action for desiring results, and also to make decisions on attendants whose competencies are sufficient for the position regardless of demographic variables such as age, race, gender, sexual orientation, ethnic background and religion. Lastly, it can reduce traditional training times by selecting employees who can perform effectively on the job sooner (Dubois et al., 2004).

A competency-based employee selection model using fuzzy AHP method was suggested in the study. While traditional selection procedures contain just candidates' superficial side of ability, competency based selection procedures contain behavioral features at the same time. In parallel to this state, subjectivity degree of judgements related to both technical and behavioral ability of candidates can increased in competency-based selection process. Fuzzy AHP method provides to use subjective data for objective results. In other words it reduces subjectivity of judgments in multi-criteria decision making problems. An employee selection process using comparison matrices regarding to criteria and their sub-criteria denoted in a proposed model for a white goods and electronics manufacturer were employed. The prioritization scheme of model had six main criteria and 20 sub-criteria related to competency-based employee selection.

The method used in this study provides almost objective results for human resources practitioners make better decisions for selecting employees through a process allowing organizational objectives as well as employees' competencies. Additionally, selection of appropriate candidates can be seen as part of an integrated career management system in the organization (Polychroniou and Giannikos, 2009). Although the results of this study use a white goods and electronics product manufacturer as an example, the proposed model can be applied to other settings both in the same sector and in other sectors. For further research, other multi-criteria decision making and optimization techniques can be used and compared for the selection process. These techniques can also be used in combination for increasing output effectiveness.

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