Keywords: Career Orientations, Protean Career, Boundaryless Career, Fuzzy TOPSIS

ABSTRACT

The decline of the traditional organizational career requires new ways of viewing career orientation. The constructs of protean and boundaryless are argued within the careers literature as the modern attitudes toward career orientation. The main purpose of this paper is to present an algorithm to identify and select employees based on their career orientation. In this regard first a common measure for assessing employees' protean and boundaryless career orientation is presented. Then, a multiple criteria decision making method is used in order to rank employees based on the implied criteria. Subjectivity and uncertainty of employee perceptions are considered through fuzzy concept. Implementing this algorithm in a real case (an Iranian company in the field of electric power and energy industry) verifies the applicability of the proposed framework.

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1. Introduction

Several researchers have emphasized the importance of identifying employees’ career orientations in order to customize Human Resource Management (HRM) practices based on these orientations (Lee & Maurer, 1997). Understanding one’s career orientation may help plan one's career path, the design of training and developmental programs, with respect to career orientation, and how one should be treated and led in the organization. Career orientation has been generally defined as one’s career aspiration and preferences in relation to one's self-concept (Igbaria et al, 1991). Over the last decade, Career is shifting in concept from the traditional hierarchical, linear, uni-dimensional, and structured form to that which is more self-managed, transitional, multi-focused, and without boundaries (Baruch, 2006; Bozionelos, 2001). Two new perspectives on careers have emerged and become popular in the organizational literature: the protean career and the boundaryless career attitudes (Briscoe et al, 2006). According to Briscoe and Hall (2006) protean career refers to a career that is driven by the person, not the organization. De Filippi and Arthur (1994) defined boundaryless career as a sequence of job opportunities that goes beyond the boundaries of any single employment settings. According to Briscoe, Hall and DeMuth (2006), self-directed career management and values-driven career orientation are considered as the main criteria representing protean career. Boundaryless career is also identified through two criteria namely organizational mobility preference and boundaryless mindset. Career orientation comprises an individual’s motives, values, talents, and perceived personal constraints. It is the central component of an employee’s subjective self-concept (Van Maanen & Schein). Thus career orientations influence career choices, decisions to relocate, career desires, individual’s view of the future, and employee reactions to work (Chompoor et al, 2004). Considering these relationships, human resource managers might take the wrong decisions about HR functions such selection, training, development or managing careers, if they do not know employees’ career orientations. To avoid these situations, it is necessary to know about the employee career attitudes. However, due to the subjectivity underlying career management processes, managers and employees can have different beliefs, expectations and points-of-view about the same reality. Measures and indicators are useful for human resources decision making because the use of indicators reduces subjectivity and interdependency and it would be useful for considering subjective information in the formal decision making processes. An appropriate approach in this context is the fuzzy set theory and linguistic variables (Zadeh, 1965, 1975). In this regard the main purpose of this paper is to propose an algorithm to rank employees based on the two modern types of career orientation through a fuzzy multiple criteria decision making method. The remainder of this paper is organized as follows. The next section deals with the literature review in the field of career orientation. It is followed by the methodology of the proposed algorithm for ranking the employees as...
alternatives based on measures of protean career and boundaryless career attitudes as criteria. Subsequently, a real case application of the previous methodology is described. The results and conclusions are then presented.

2. Literature Review
2.1. Career Orientation

Since the late 1980s, organizational changes resulted in flattening of organizational hierarchies, thereby reducing opportunities for linear career progression (Gerber et al., 2009). The tall, multilayer and functionally organized characteristics of large companies in the past have changed, and traditional upward hierarchical careers are difficult to attain. Thus there are no longer such traditional careers in many organizations. In this regard career success measures may have shifted from positions in the organizational hierarchy to psychological success (Chompoonkum et al., 2004). While traditional careers are defined in terms of advancement within a limited number of organizations, contemporary careers reflect a new deal in which the psychological contract between employer and employee does not necessarily include the promise of lifetime employment and steady career advancement. In the modern career orientation employees have to engage in a range of career self-management activities to create career options that allow them to realize their personal career targets which ensure their employability (Vos et al., 2008). Careers are defined as a sequence of attitudes, activities or behaviors associated with work roles of individuals during the course of their lifetime (Arthur et al., 1984). Career orientations can be defined as attitudes expressed by superordinate intentions that influence career-related decisions (Maier et al., 1994). Career orientations reflect an individual’s preferences regarding career-related opportunities, circumstances and career types. One key distinction in the related literature is between the traditional and new forms of career (Gerber et al., 2009). The concepts of protean and boundaryless career attitudes offer a valid approach to study contemporary careers. These two concepts and their related measures are described in detail.

2.2. Protean Career Attitudes

The protean career reflects a new psychological contract between employer and employee which is based on the transactional relationship. Also, the protean career attitude reflects the extent to which an individual manages career in the proactive and Self-directed way driven by personal values (Hall, 2002). Briscoe and Hall (2006) have characterized the protean career as involving both values-driven attitudes and self-directed attitudes toward career management. It means that individuals who hold protean career attitudes are intent upon using their own values versus organizational values to guide their career. In addition, they take an independent role in managing their vocational behavior. In contrary, an individual who did not hold protean career attitudes would be more likely to borrow external standards, instead of internally developed ones, and be more likely to seek external direction and assistance in behavioral career management instead of being more proactive and independent. Thus protean career attitudes measure self-directed career management and values-driven predispositions (Briscoe et al., 2006).

2.3. Boundaryless Career Attitudes

Boundaryless career encompasses six different meanings. Movement across the boundaries of several employers; attaining validation and marketability from outside of present employer; sustaining through external networks and information; breaking traditional organizational assumptions about hierarchy and career advancement; rejecting existing career opportunities for personal or family reasons; and finally being based on the interpretations of the career actor who may perceive a boundaryless future regardless of structural constraints. These diverse career forms have one characteristic in common. They all represent the opposite of organizational careers (Lazarov et al., 2009). A person with a boundaryless career attitude navigates the changing work landscape by enacting a career characterized by different levels of physical and psychological movement. Boundaryless career include psychological as well as physical mobility (Sullivan et al., 2006). Briscoe et al. (2006) operationalized the boundaryless career along two dimensions: Organizational mobility preference and boundaryless mindset. Organizational mobility preference is defined as the interest in remaining with a single or multiple employers and boundaryless mindset is conceptualized as one's general attitude to working across organizational boundaries. Therefore, boundaryless career attitudes measure boundaryless mindset and organizational mobility preference.

3. Research Methodology
3.1. Process and Framework

The main purpose of this study is developing an algorithm in order to assess and rank employees based on their protean and boundaryless career orientation. In this regard, first by studying the literature related to career attitudes, two main modern career orientations i.e. protean and boundaryless career orientation were recognized. According to Briscoe et al., (2006), four measures of self-directed career management, values-driven career orientation, boundaryless mindset and organizational mobility preference were set as our criteria in order to rank our alternatives. Each of these criteria has specific number of sub-criteria to measure them. Eight items measured self-directed career management. Six items measured the values-driven career orientation. Eight items measured the boundaryless mindset and five items measured the organizational mobility preference. Finally, the Fuzzy TOPSIS method was applied for the purpose of ranking employees as our alternatives based on these criteria. The hierarchy designed for our analysis illustrated in figure 1.
3.2. Fuzzy sets and Fuzzy Numbers

Fuzzy set theory, which was introduced by Zadeh (1965) to deal with problems in which a source of vagueness is involved, has been utilized for incorporating imprecise data into the decision framework. A fuzzy set $\tilde{A}$ can be defined mathematically by a membership function $\mu_{\tilde{A}}(x)$, which assigns each element $x$ in the universe of discourse $X$ a real number in the interval $[0,1]$. A triangular fuzzy number $\tilde{A}$ can be defined by a triplet $(a, b, c)$ as illustrated in Fig 2.

The membership function $\mu_{\tilde{A}}(X)$ is defined as

$$\mu_{\tilde{A}}(x) = \begin{cases} \frac{x-a}{b-a} & a \leq x \leq b \\ \frac{x-c}{b-c} & b \leq x \leq c \\ 0 & \text{otherwise} \end{cases}$$  \hspace{1cm} (1)$$

Basic arithmetic operations on triangular fuzzy numbers $A_1 = (a_1, b_1, c_1)$, where $a_1 \leq b_1 \leq c_1$, and $A_2 = (a_2, b_2, c_2)$, where $a_2 \leq b_2 \leq c_2$, can be shown as follows:

Addition: $A_1 \oplus A_2 = (a_1 + a_2, b_1 + b_2, c_1 + c_2)$  \hspace{1cm} (2)

Subtraction: $A_1 \ominus A_2 = (a_1 - a_2, b_1 - b_2, c_1 - c_2)$  \hspace{1cm} (3)

Multiplication: if $k$ is a scalar
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(k \otimes A_1 = \left\{ \begin{array}{ll}
(ka_1, kb_1, kc_1), & k > 0 \\
(kc_1, kb_1, ka_1), & k < 0
\end{array} \right.

A_1 \otimes A_2 \approx \left( a_1a_2, b_1b_2, c_1c_2 \right), \text{ if } a_1 \geq 0, a_2 \geq 0

Division: A_1 \bigotimes A_2 \approx \left( \frac{a_1}{c_2}, \frac{b_1}{c_2}, \frac{c_1}{a_2} \right), \text{ if } a_1 \geq 0, a_2 \geq 0

Although multiplication and division operations on triangular fuzzy numbers do not necessarily yield a triangular fuzzy number, triangular fuzzy number approximations can be used for many practical applications (Kaufmann et al., 1988). Triangular fuzzy numbers are appropriate for quantifying the vague information about most decision problems including personnel selection (e.g. rating for creativity, personality, leadership, etc.). The primary reason for using triangular fuzzy numbers can be stated as their intuitive and computational-efficient representation (Karsak, 2002). A linguistic variable is defined as a variable whose values are not numbers, but words or sentences in natural or artificial language. The concept of a linguistic variable appears as a useful means for providing approximate characterization of phenomena that are too complex or ill-defined to be described in conventional quantitative terms (Zadeh, 1975).

3.3. The Fuzzy TOPSIS Method

This study uses this method to select the best adequate person. TOPSIS views a MADM problem with m alternatives as a geometric system with m points in the n-dimensional space. The method is based on the concept that the chosen alternative should have the shortest distance from the positive-ideal solution and the longest distance from the negative-ideal solution. TOPSIS defines an index called similarity to the positive-ideal solution and the remoteness from the negative-ideal solution. Then the method chooses an alternative with the maximum similarity to the positive-ideal solution (Yang et al., 2007). It is often difficult for a decision-maker to assign a precise performance rating to an alternative for the attributes under consideration. The merit of using a fuzzy approach is to assign the relative importance of attributes using fuzzy numbers instead of precise numbers. This method is particularly suitable for solving the group decision-making problem under fuzzy environment. We briefly review the rationale of fuzzy theory before the development of fuzzy TOPSIS. The mathematics concept borrowed from Ashtiani, Haghighirad, Makui, and Montazer (2008), (Büyüközkan et al., 2007) and (Wang et al., 2007).

Step 1: Determine the weighting of evaluation criteria

A systematic approach to extend the TOPSIS is proposed to selecting best person under a fuzzy environment in this section. In this paper the importance weights of various criteria and the ratings of qualitative criteria are considered as linguistic variables (as Table 1) (Chen et al., 2006).

| Table 1. Linguistic scales for the importance of each criterion |
|-------------------|---------------|
| Linguistic variable | Corresponding triangular fuzzy number |
| Very low (VL) | (0.0, 0.1, 0.3) |
| Low (L) | (0.1, 0.3, 0.5) |
| Medium (M) | (0.3, 0.5, 0.7) |
| High (H) | (0.5, 0.7, 0.9) |
| Very high (VH) | (0.7, 0.9, 1.0) |

Step 2: Construct the fuzzy decision matrix and choose the appropriate linguistic variables for the alternatives with respect to criteria

\[ D = \begin{bmatrix}
C_1 & C_2 & \ldots & C_N \\
A_1 & \tilde{x}_{11} & \tilde{x}_{12} & \ldots & \tilde{x}_{1n} \\
A_2 & \tilde{x}_{21} & \tilde{x}_{22} & \ldots & \tilde{x}_{2n} \\
\vdots & \vdots & \vdots & \ddots & \vdots \\
A_m & \tilde{x}_{m1} & \tilde{x}_{m2} & \ldots & \tilde{x}_{mn}
\end{bmatrix}

i=1,2,\ldots,m; j=1,2,\ldots,n

\[ \tilde{x}_{ij} = \frac{1}{k} (\tilde{x}_{ij}^1 + \tilde{x}_{ij}^2 + \ldots + \tilde{x}_{ij}^k ) \]

where \( \tilde{x}_{ij}^k \) is the rating of alternative A_i with respect to criterion C_j, evaluated by expert and

\[ \tilde{x}_{ij}^k = (a_{ij}^k, b_{ij}^k, c_{ij}^k) \]

Step 3: Normalize the fuzzy decision matrix

The normalized fuzzy decision matrix denoted by \( \tilde{R} \) is shown as following formula:
\[ \tilde{R} = [\tilde{r}_{ij}]_{mn}, \quad i = 1,2,\ldots,m; \quad j = 1,2,\ldots,n \]  

(7)

Then the normalization process can be performed by following formula:

\[ \tilde{\tilde{r}}_{ij} = \left( \frac{a_{ij}}{\tilde{c}_{ij}^+}, \frac{b_{ij}}{\tilde{c}_{ij}^-}, \frac{c_{ij}}{\tilde{c}_{ij}^+ - \tilde{c}_{ij}^-} \right) \tilde{c}_{ij}^+ = \max_i c_{ij} \]

The normalized \( \tilde{\tilde{r}}_{ij} \) are still triangular fuzzy numbers. For trapezoidal fuzzy numbers, the normalization process can be conducted in the same way. The weighted fuzzy normalized decision matrix is shown as following matrix \( \tilde{\tilde{P}} \):

\[ \tilde{\tilde{r}}_{ij} = [\tilde{\tilde{r}}_{ij}]_{mn}, \quad i = 1,2,\ldots,m; \quad j = 1,2,\ldots,n \]  

(8)

\[ \tilde{\tilde{v}}_{ij} = \tilde{\tilde{r}}_{ij} \otimes \tilde{w}_j \]  

(9)

Step 4: Determine the fuzzy positive-ideal solution (FPIS) and fuzzy negative-ideal solution (FNIS)

According to the weighted normalized fuzzy decision matrix, we know that the elements \( \tilde{\tilde{r}}_{ij} \) are normalized positive TFNs and their ranges belong to the closed interval \([0, 1]\). Then, we can define the FPIS \( A^+ \) and FNIS \( A^- \) as following formula:

\[ A^+ = (\tilde{\tilde{V}}^+_1, \tilde{\tilde{V}}^+_2, \ldots, \tilde{\tilde{V}}^+_n) \]  

(10)

\[ A^- = (\tilde{\tilde{V}}^-_1, \tilde{\tilde{V}}^-_2, \ldots, \tilde{\tilde{V}}^-_n) \]  

(11)

where \( \tilde{\tilde{V}}^+_j = (1,1,1) \) and \( \tilde{\tilde{V}}^-_j = (0,0,0) \)

Step 5: Calculate the distance of each alternative from FPIS and FNIS

The distances \( d^+_i \) and \( d^-_i \) of each alternative \( A^+ \) from and \( A^- \) can be currently calculated by the area compensation method.

\[ d^+_i = \sum_{j=1}^{n} d(\tilde{\tilde{v}}_{ij}, \tilde{\tilde{V}}^+_j), \quad i = 1,2,\ldots,m \]  

(12)

\[ d^-_i = \sum_{j=1}^{n} d(\tilde{\tilde{v}}_{ij}, \tilde{\tilde{V}}^-_j), \quad i = 1,2,\ldots,m \]  

(13)

Step 6: Obtain the closeness coefficient and rank the order of alternatives

The CC \( \text{CC}_i \) is defined to determine the ranking order of all alternatives once the \( d^+_i \) and \( d^-_i \) of each alternative have been calculated. Calculate similarities to ideal solution. This step solves the similarities to an ideal solution by formula:

\[ \text{CC}_i = \frac{d^-_i}{d^+_i + d^-_i}, \quad i = 1,2,\ldots,m \]  

(14)

According to the CC \( \text{CC}_i \), we can determine the ranking order of all alternatives and select the best one from among a set of feasible alternatives.

4. Empirical Analysis

The case of this study is an Iranian company which is active in the field of electric power and energy. Its mission is managing the assets of the company in the electric power industry, leading activities for the purpose of supplying reliable and economical electricity for all sectors of consumption, management and supervision on installation and operation of facilities and entering into transactions of electricity. The case study company intends to rank their employees based on their protean and boundaryless career orientation by means of the previously proposed model. These ranking could help HR managers in order to develop suitable Human Resources policies in each HR function for employees based on their career orientation and to achieve an effective personnel management. For this purpose, questionnaire comprised of career orientation criteria were distributed among employees to self assess their orientation toward these criteria. Results of ranking four employees working in R&D department are shown in this part. This paper focus on determining the best employee; so, we assume that questionnaire have collected completely and will start with building dataset that are collected. The evaluators have their own range for the linguistic variables employed in this study according to their subjective judgments (Hsieh et al, 2004). For each evaluator with the same importance, this study employs the method of average value to integrate the fuzzy/vague judgment values of different evaluators regarding the same evaluation dimensions. The evaluators then adopted linguistic terms (see Table 2), including “very poor”, “poor”, “fair”, “good” and “very good” to express their opinions about the rating of every person.
Table 2. Linguistic scales for the rating of each cluster policy

<table>
<thead>
<tr>
<th>Linguistic variable</th>
<th>Corresponding triangular fuzzy number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poor (VP)</td>
<td>(0, 1, 3)</td>
</tr>
<tr>
<td>Poor (P)</td>
<td>(1, 3, 5)</td>
</tr>
<tr>
<td>Fair (F)</td>
<td>(3, 5, 7)</td>
</tr>
<tr>
<td>Good (G)</td>
<td>(5, 7, 9)</td>
</tr>
<tr>
<td>Very good (VG)</td>
<td>(7, 9, 10)</td>
</tr>
<tr>
<td>Very poor (VP)</td>
<td>(0, 1, 3)</td>
</tr>
</tbody>
</table>

In Fuzzy TOPSIS method, we establish the fuzzy decision matrix, then by Using of Eq. (7), we can normalize the fuzzy decision matrix. The next step in the analysis is to find the weighted fuzzy decision matrix, and the resulting fuzzy weighted decision matrix is shown as Table 3.

Table 3. Weighted normalized fuzzy decision matrix

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>0.05</td>
<td>0.07</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>0.02</td>
<td>0.05</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>0.01</td>
<td>0.02</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>0.03</td>
<td>0.05</td>
<td>0.07</td>
<td></td>
</tr>
</tbody>
</table>

In order to calculate the closeness coefficients of each of the alternatives $d_+^r$ and $d_-^c$ calculation is used. Once the distances of cluster policy from FPIS and FNIS are determined, the closeness coefficient can be obtained with Eq. (14). From the alternative evaluation results in Table 4, the best employee is A1. According to result, employees are ranked as follow:

Employee 1 > Employee 4 > Employee 3 > Employee 2

Table 4. Closeness coefficients and ranking

<table>
<thead>
<tr>
<th></th>
<th>$d^+$</th>
<th>$d^-$</th>
<th>$CC_i$</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>0.00000</td>
<td>0.53198</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>A2</td>
<td>0.01587</td>
<td>0.09920</td>
<td>0.86</td>
<td>4</td>
</tr>
<tr>
<td>A3</td>
<td>0.00968</td>
<td>0.14043</td>
<td>0.94</td>
<td>3</td>
</tr>
<tr>
<td>A4</td>
<td>0.00555</td>
<td>0.23614</td>
<td>0.98</td>
<td>2</td>
</tr>
</tbody>
</table>

5. Conclusion

The constructs of protean and boundaryless are argued within the careers literature as the modern attitudes toward career orientation. The main purpose of this paper is to present an algorithm to identify and select employees based on their career orientation. In this regard first a common measure for assessing employees' protean and boundaryless career orientation is presented. Then, Fuzzy TOPSIS method is used in order to rank employees based on the implied criteria. Finally, observing all these results, Fuzzy TOPSIS approach propose alternative (A1) as the best choice and A4, A3, A2 are the second, third and fourth choice.

References


