

Using Fuzzy Decision Support Systems in Human Resource Management

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Abstract. Today, the importance and unique roles of human resources have more importance and position than past, so in advanced organizational thought, human is mentioned the main source and property or a main interpretation source of any organization. The human resources are the Key of organizational success or failure. One of the fundamental concerns of human resource managers is hiring employees. Lack of the right choice in selecting people, will damage to the organization a lots. In the past, Organizations tested people based on employment tests to hire a special emphasis such as character test, intelligence test, skills test, etc. But the major problem of this test was the definitive vision on hiring. As you know many of the traits are qualitative, not measured traits for the selection and hiring. According to this, using fuzzy logic approach in human resources management has found a special place. And in today's competitive environment, decisions using of applying information technology are the irrefutable principles of organizations and help to managers in making decisions meaningfully.

Keywords: Fuzzy Decision Support Systems, Human Resource Management, TOPSYS method, Fuzzy logic.

1. Introduction

Decision Support Systems is known a category of the Computer based information systems that support decision-making activities. A Good Decision Support System is an interactive system that helps decider to interpret information that is gotten from raw data, documentation, personal knowledge and business models. Then the issue is made clear and is resolved with correct decisions [1].

Decision Support systems help to various decisions in different forms. These systems, do analyze the issue in semi-structured and structure form. Primary Species of Decision Support System paid attention to a small subset of the available data and were Model - Driven. However with the advances in the field of information processing and technology databases, the definition of these systems has expanded and these systems could put foot to the area of high volume data analysis company and variety of analysis is done [2,3].

2. Types of Decision Support Systems

Although classification for systems Decision Support is very broad, but here we try to present a comprehensive classification of the systems. Main types of systems that can be outlined as follows:

Model - Driven: their emphasis is on the statistical, financial, optimization and simulation models. According to the values that user defines, trying to help the decision. These decision support systems do not require high volume of data. Decodes is an open source of these systems.

Communication - Driven: in this kind of decision support systems, the possibility group activities of a task are identified such as the Microsoft Corp group [4, 5].

Data - Driven: in this kind, the large amount of time series data and mostly domestic and sometimes foreign of companies are used.

Document - Driven: it pays to manage, retrieve and manipulate unstructured data and brings them in the suitable electronic structure [6].

Knowledge - driven: in this kind of decision support systems, problem solving is done in an expert form and it is done in rules, procedures or similar structures. But now we see the growing importance of decision support systems and this is something that is visible in the public and private sector economies. [8]

Fuzzy management Science:

Classic methods of management science, are from mathematics and two-valuable and multi-valuable logic that is more demanding on precise data. In these methods, there is not Vagueness data and human feelings express (linguistic variables) that this causes lack of flexibility and lack of precision in mathematical models.

Today, fuzzy management knowledge using fuzzy theory can be a new approach to solve problems and uncertainties in response to management systems. Theory of fuzzy systems using fuzzy logic theory and Fuzzy measure theory can be imported parameters in models such as knowledge, experience, judgments and decisions, while creating flexibility in the model, it can provide gray image of the world [10]. Theory of fuzzy systems is based on the overall process of information processing in the brain. Overall process of information processing in the brain includes the following steps :(Information recovery - recognizing- Thinking - Judging - evaluated- decision)

Using fuzzy systems theory, the classical management science methods expands to fuzzy environment and it can be used in multiple systems management such as decision making, policy making, planning and modelling.

Fuzzy management Science is response to positions in the dynamic economic and social accountability flexibility. Also, fuzzy management science is able to create models, that almost like humans, may process the quality information in smart method. General features of the fuzzy management knowledge can be stated as follows:

- Coefficients and the actual conditions as intuitive limits are determined.
- Needed Knowledge and skills to manage systems, can be obtained from experts in natural language mode, and using fuzzy inference, computer models and programs are created easily.
- Instead of limiting answers of a question to a number, we can present available answers and with adding experts, managers' opinions, we can provide a more practical solution.

3. Decision-making in Fuzzy environment

Due to factors such as loose and incomplete information, mentality and linguistics degrees or less, in real life, that have a significant role, Decision is a difficult process. These factors show that decision-making process in today's world, takes place in a fuzzy environment [7]. Fuzzy management science methods in accordance with various management systems are shown in the table (1).

4. TOPSYS approach

In 1980 Huang and Yun developed a Technique for Order Preferences by Similarity to Ideal Solution that was called TOPSYS. The space computing of method is multi-dimensional and the ideal solving in it is a virtual point [11].

The serious note in using of TOPSYS method is that we have numeric information about the weight criterions, then we can solve the decision matrix and offer Suggested answers. These steps are:

- create the Decision matrix
- Normalization matrix R_{ij}
- create matrix $V J$
- Determine the ideal solution and negative ideal
- Determine the Euclidean distance (geometry) of any options to ideal and negative ideal
- calculate closed-Index for each options
- An option is bigger that it is better.

Solving with TOPSYS method has a high dependence on how weighting the criterions. In TOPSYS method, each criterion can increase or decrease the desirability to the decision maker in linear form. In Scientific literature of this area, different methods for fuzzy TOPSYS raised by various researchers that the summary of that is in following table:

5. Fuzzy Inference Systems programs for designing content FDSS

Fuzzy inference is a process of formulating the mapping input data to an output using fuzzy logic. Then the mapping provides for us a basis of the decision or what we can decide or what is the model. Fuzzy inference includes all these episodes: membership function, fuzzy logic operators and the if - then rules. There are two types of fuzzy inference system that can be used them in Fuzzy Logic Toolbox, MAMDANI and SUGENO types. These types of inference systems are different in the output.

Fuzzy Inference Systems have successful applications in automatic control, data classification, decision analysis, Expert systems and computer vision. For multi-disciplinary nature of fuzzy inference systems, these systems are known with different names. Like fuzzy ruled based systems that means systems are set based on fuzzy rules. Fuzzy modelling, fuzzy logic controllers, GIRIF decision support systems, simple and vague fuzzy systems ARE other names of systems types [9].

The Mamdani Method for Fuzzy Inference System is seen as general principles of fuzzy methods. The Mamdani method has emerged construction methods in the middle of control systems using fuzzy set theory. The method was proposed by Ebrahim Mamdani in 1975 and was used as a combined effort to control the steam engine and boiler (hot-causing), using a combination of linguistic control rules, which operators in human experience there. Mamdani was done efforts based on an article by Lotfi Zadeh that was written a fuzzy algorithm for the complex systems and decision-making process [9, 10].

6. Summary

In this article, we described the importance of human resource management and said how managing this part of companies could effect on companies performance. Also for assisting to this process, we can use of decision support systems that hat can be used to improve the results section. TOPSYS approach is the concept of these systems that it is very known method. In his article we described the combining of fuzzy and TOPSYS methods. The Fuzzy method has a lot of good features that can be used in human resource management. Using of fuzzy- TOPSYS method makes decision easier for mangers and increases the performance of selecting in employers.

7. References

- [1] Box all, P., & Purcell, J. (2000). Strategic human resource management: Where have we come from and where should we be going?, *International Journal of Management Reviews*, 2 (2), 183-203.
- [2] Kaufman, B. (2001). The theory and practice of strategic HRM and participative management. *Human Resource Management Review*, 11 (4), 505-533.
- [3] Cascio, WF, & Aguinis, H. (2008). Research in Industrial and Organizational Psychology 1963-2007: Changes, Choices, and Trends. *Journal of Applied Psychology*, 93 (5), 1062-1081.
- [4] Guest, Guest's model of HRM, online at http://www.hrmguidance.co.uk/introduction_to_hr/guest-hrrm.htm, available on 22,05,2010.
- [5] Arthur, JB (1994). Effects of human resource systems on manufacturing performance and turnover. *Academy of Management Journal*, 37,670-687.
- [6] Garry, Dessler (1994). *Human resource management*, prentice-hall Inc.
- [7] Drucker, Peter, http://www.brainyquote.com/quotes/authors/p/peter_f_drucker.html, available on 20,05,2010.
- [8] Dulebohn, JH, Ferris, GR, & Stodd, JT (1995). The history and evolution of human resource management. In GR Ferris, SD Rosen, & DT Barnum (Eds.), *Handbook of human resource management* (pp. 18-41). Oxford, UK: Blackwell Publishers.
- [9] Ajzen, I., & Fishbein, M. (1990). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ:

[10] Feredrik, Herzburg, online at http://www.accelteam.com/human-relations/hrels_05_herzberg.html, available on 24,05,2010.

[11] Bennis, warren, (1999). the leadership advantage, leader to leader, No.12 spring.

Table 1. Fuzzy management science methods

<u>Operations</u>		<u>Method</u>
Data gathering and experience		Fuzzy databases, fuzzy knowledge base
Planning	Create model	Fuzzy structural models Fuzzy regression models Group Method Handling in Fuzzy
	Analysis and Evaluation	Theory to describe the object features in Fuzzy integral Fuzzy AHP
	Optimization and Decision Making	Fuzzy mathematical programming Fuzzy multi-objective planning Fuzzy Multiple criteria decision Fuzzy statistical decision
Administrative Management	Administrative Management	Application of Fuzzy Theory in the Behavioral Sciences Application of Fuzzy Theory in Investment Fuzzy Production Management Fuzzy Decision Support System (FDSS) Fuzzy Expert Systems Fuzzy Quality Control (QC)

Table 2. Different methods of topsys fuzzy

Source	Type of weighting	Figure of fuzzy number	Rating Method	Normalization Method
Chen and Hving 1992	Adadfazy	Traps	Average generalized Li and Lai 1998	Linear
Lylg 1992	Fuzzy number	Traps	Chen Rankings 1985	Manhattan
Chen 2000	Fuzzy number	Triangular	Chen 2000 knows the ideal solution (1,1,1) and negative ideal (0,0,0)	Linear
Chen 2002	Fuzzy number	Triangular	with $\alpha = 0.5$	Modified Manhattan
Zhang and Lu 2003	Numerical values	Triangular	knows Ideal solution (1,1,1) and negative ideal (0,0,0)	Manhattan
chovolin 2003	Fuzzy numbers	Triangular	Average harvest methods	Linear