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A life insurance policy selection via hesitant fuzzy linguistic decision making model

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Abstract

The selection of life insurance policy is generally one of the most important and complicate issue in real life. Because there are a lot of alternatives and criteria related to this subject. As in all types of selection problems, to solve of this, any of multi criteria decision making methods (MCDM) can be used. However, since decision maker couldn't decide superiorities of alternatives and criteria, using classical multi criteria decision making methods to solve of this problem, gained results may not be accurate. Because, expert or decision maker may hesitate between different linguistic term and they need richer expression to express their knowledge. Hesitant fuzzy linguistic model which is novel MCDM methods, come into prominence in this way. Hesitant Fuzzy Linguistic Term Set permit decision maker to express their knowledge more correctly. In this paper we propose a hierarchical hesitant fuzzy linguistic model that contains hesitant linguistic evaluations of multiple experts on multiple criteria for life insurance policy alternatives. In this study, choosing one of the three life insurance policy alternatives has been studied. The main criteria of this problem are company reliability, customer relationship, the scope of insurance, insurance price, easiness of give up insurance. Three alternatives were evaluated based on these main criteria and their sub-criteria used HFLTS by two decision makers. As a result of the study the most suitable alternative has been selected on the basis of preferences of decision-makers.

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Keywords: Life Insurance Policy Selection; Multi-Criteria Decision Making; Hesitant Fuzzy Linguistic Term Set

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1. Introduction

To avoid being caught unprepared for bad situations in life, life insurance policies may be tool for people in this circumstances. Because of this reason, life insurance policy selection may be the one of the most critical and important decision. Decision of which life insurance policy is the best one is generally complicate issues in real life. Because there are a lot of companies which serve at this topic and a lot of different criteria related to this decision. Decision maker may be struggle to make a decision which company is the best one. Because of this reason, this topic chosen to investigate in this study. In literature insurance selection problems generally solved by goal programming approaches[1]. But handled problem in this study is not a type of solving by goal programming or another operations research approaches. Decision making has been studied by many researchers using various multi-criteria decision making methods. As in all types of selection problems, any of multi criteria decision making methods (MCDM) can be employed for solve this complicate decision problem. However, since decision maker couldn't decide superiorities of alternatives and criteria, using classical MCDM to solve of this problem, gained results may not be accurate. Because, expert or decision maker may hesitate between different criteria or alternatives about which is better than the other one. They need richer expression to express their knowledge. Because of this reason used for richer expression to express expert's knowledge, Hesitant Fuzzy Linguistic Term Set (HFLTS) come into prominence. HFLTS permit decision maker to express their knowledge more properly than other fuzzy approaches. We have a limited resource about this method, because HFLTS is fairly novel. Rodrigez et al[2]. introduced HFLTS to provide a linguistic and computational basis to increase the richness of linguistic elicitation based on the fuzzy linguistic approach and the use of context-free grammars by using comparative terms[3]. Zhang and Wu studied relationship between hesitant fuzzy linguistic aggregation operators[4]. Yavuz et al. used HFLTS to select fuel vehicles[3]. Liu and Rodrigez presented a new representation of the hesitant fuzzy linguistic term sets by means of a fuzzy envelope to carry out the computing with words processes[5]. Another researcher were used HFLTS and TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method with together for prioritization of urban transformation projects for Istanbul[6]. Fahmi et al.[7] used together ELECTRE I (Elimination and Choice Translating Reality English) and HFLTS to solve supplier selection problem. Liao et al. developed a hesitant fuzzy linguistic VIKOR (HFL-VIKOR) method, which is motivated by the traditional VIKOR (Vise Kriterijumska Optimizacija I Kompromisno Resenje) method[8]. The general procedures for the HFL-VIKOR method are given in this study. The concept of HFLTS is employed to increase richness of linguistic elicitation based on the fuzzy linguistic approach. In our algorithm, linguistic term sets is used together with context free grammar such as ''at most medium importance'', ''between low and high importance'' etc[3]. In this paper a hierarchical hesitant fuzzy linguistic model that contains hesitant linguistic evaluations of multiple experts on multiple criteria for life insurance policy alternatives is proposed. In this study, the problem of choosing one of the three life insurance policy alternatives has been studied. The main criteria of this problem are company reliability, customer relationship, the scope of insurance, insurance price, easiness of give up insurance. Three alternatives are companies which serve about this area in Turkey. Three alternatives were evaluated based on these main criteria and their sub-criteria used HFLTS by two experts. As a result of the study the most suitable alternative has been selected with respect to the goal. Organizing this paper is as follows: in second part steps of HFLTS algorithm is given. In Third part solving of life insurance selection problem using HFLTS is shown. In part four, gained results are discussed.

2. Steps of Algorithm Multi-criteria HFLTS Decision Making Method

In recent years, there has been an increasing interest in Hesitant Fuzzy Linguistic Term Set. While some research has been carried out ™on it, there have been few empirical investigations about related topic. Since this methods is new, we decided to use it to solve our policy selection problem. Following steps are taken directly from Yavuz et al.[3]

Let the number of any criterion be represented by; $z \in \{1, 2, ..., \tau\}$

Step 1: Define the semantics and syntax of the linguistic term set S. S has following element:

"No importance (ni), very low importance(vli), low importance(li), medium importance(mi), high importance(hi), very high(vhi), absolute importance(ai)"