USE OF SELECTED METHODS MULTI-CRITERIA DECISION

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Abstract. The purpose of multi-criteria decision models is to help decision maker to evaluate each alternative and to rank them in descending order of performance. This study analyses the base of concept of Multiple Attribute Decision Making for using in different areas. The aim of this paper is to describe the concept of multiple attribute decision making. Achieving this purpose, TOPSIS technique is used as decision making tools.

Introduction. According to [3] the aim of multi-criteria decision is on a base of chosen criteria to select one variant which shows the best characteristics. However to be successful in this aim needs a huge amount of information which might not be available. Each of methods differs in providing ordinal or cardinal information about the order of each particular variant (the importance of particular criteria) and whether they need ordinal or cardinal information for its use about particular variants towards particular criteria (about the preference of those criteria). According to [5] the ordinal (order) variable takes verbal value. Those are presenting categories. They have relative meaning because we can't the difference between those categories. That is why you use cardinal (interval) variable which, according to [7] makes quantification. Moreover it makes quantification of differences between the categories.

According to [7] the basic advantage of evaluation on a base of more criteria is the fact, that they do not force reducing non - economic criteria to economic criteria at the expense of precarious or sparing operations.

According to [8] the first step is choosing of objects contained in analyze folder which is followed by choosing of concrete method of more criterion evaluation. Next step is a chosing of characteristics (indicator) characterizing a concrete object, which are considered to be important (the importance of each indicator) on a base of subjective preferences of each person individually. The obvious part is the identification of character of each indicator (whether it is the indicator of maximation or the one of minimalization).

The process is divided by [3] of more criterion evaluation into following steps:

a)   Creating of intentional set of criteria for evaluation with the important characteristics.

b)   Making the list of the most important criteria.

c)   The evaluation of results (outcomes, profits, and also lacks),

variants, consisting of partly evaluation and the synthesis of those partly evaluations.

d)   Considering the risk of realization.

e)   Making the order list of variants and choosing the most sufficient one.

Last cited author [6] is describing the two categories of methods of more criteria evaluation of variants:

a)   Methods based on partial evaluations of variants

-       the method of summary (WSA)

-       the method of base variant

b)   Methods based on pairs-comparing of variants

-       the lexicographical method

-       the method AHP (Analytic Hierarchy Process)

- the method TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)

The method of summary is useful when you need to state quantitative criteria. But it expects linear dependence on behalf of criteria (indicators). The principle of base method is stating of the best values and then you are about calculating of each useful function alternative. The lexicographical method consists of the supposal and it is that the biggest influence has the most important criteria. In the case of congruence you observe the second and the next criteria in an order. The method AHP includes all of the factors that influence the result (connection in between and intension of how much they influence each other). The method of TOPSIS is based on choosing a variant which is closest to the one which has been chosen before and also the farthest from the base variant.

Topsis technique. According to [4] the main concept behind TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), as a technique for solving the Multiple Attribute Decision Making problems, is that the chosen alternative should have the shortest distance from the Positive Ideal Solution, and also have the farthest distance from the Negative Ideal Solution. Positive Ideal Solution is the solution that maximises the benefit criteria and minimises the cost criteria, while Negative Ideal Solution is the solution, which maximises the cost criteria and minimises the benefit criteria. Furthermore, TOPSIS alleviates the requirement of paired comparisons, and the capacity limitation may not significantly dominate the process. Hence, it is suitable for cases with a large number of attributes and alternatives, and especially handy for objectives with quantitative data.

„It is a rational and relatively simple method where the underlying concept is that the most preferred alternative should not only have the shortest distance from 'ideal' solution, but also the longest distance from an

'anti-ideal' solution." [9]

The other one characteristic by [1] is: "The basic concepts of TOPSIS are based on the predetermined positive ideal solution and negative ideal solution. The purpose is to find the alternative that is closest to positive ideal solution and farthest from the negative ideal solution. The positive ideal solution is the one with the most benefits and lowest cost of all alternatives, the negative ideal solution is the one with the lowest benefits and highest cost."

Series of stages of TOPSIS technique are described by [4] as follows:

a) Construct normalized decision matrix.
b) Construct the normalized weighted decision matrix.
c) Determine the positive ideal and negative ideal solutions.
d) Calculate the separation measures (distance from PIS and NIS for each alternative).
e) Calculate the relative closeness to ideal solution.
f) Rank the preference order.

Use of topsis technique. Use of the above-described method is different. The area which has been used can be classified:

a) Energy efficiency, supporting renewable energy [3],
b) Competitiveness which determines the complex diverse properties [8],
c) Evaluation for university electronic libraries [2],
d) Evaluation the quality of public transport and new hospital,
e) Electronics industry,
f) Local small and medium scale Enterprises,
g) Knowledge management strategies,
h) And so on.

On this basis, we assume that this method is an appropriate tool for assessing subjects of local government.

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