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IDEAL COOKING OIL SELECTION UNDER ETHICAL CRITERIA WITH HIERARCHICAL WEIGHTING MODEL[1]

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ABSTRACT

Cooking oils, which are used extensively in daily life, are food products of plant and animal origin that affect the taste and quality of the meal. These products may have different chemical characteristics due to the materials and methods used in the production process. These chemical characteristics directly affect human health and natural life. Cooking oils with harmful properties can have very negative consequences for human health. In addition, cooking oils produced without considering environmental conditions can cause great ecological damage both during production and as waste product after consumption. In this study, 9 different cooking oils, which are used extensively in the food sector, were analyzed using a hierarchical weighting model in terms of ethical criteria and an ideal cooking oil brand was tried to be determined among them. Thanks to analysis study, it has been aimed to establish a decision support system for the selection of cooking oil for companies and individuals in the food sector.
Keywords: Cooking Oil, Ethical Rankings, Multi Criteria Decision Making, Hierarchical Weighting Model

1. INTRODUCTION

Oils, which are one of the basic needs of the human body, are supplied from foods of plant and animal origin. Vegetable oils are more preferred by consumers due to their high nutritional value, low levels of saturated fat, and compatibility with the chemical and biological structure of the cells. Vegetable oils are divided into two groups which are liquid oils and saturated fats. Vegetable oils in the food industry are generally used for frying, making salads and cooking (Polat, 2010). The choice of edible oil is of great importance for the protection of human health and natural life. In the literature, there are many studies related to the selection of edible oil, and these studies focus on human health in general. In this study, edible oil brands were evaluated according to the ethical ratio criteria of "The Good Shopping Guide" and it was aimed to determine the ideal cooking oil brand according to these criteria (URL.1). In addition, some of the studies in the literature on the problem are stated below.

Polat evaluated the criteria affecting the selection of edible oil using AHP and Multivariate Analysis methodologies. According to the results of the evaluation, the most important criterion affecting the

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selection of edible oil is the health criterion, and the lowest important criterion is the price factor (Polat, 2010).

Banaeian et al., determined the ideal supplier for oil producers using DELPHI and GDEA methods (Banaeian, Nielsen, Mobli, & Omid, 2014). Erdil and Erbıyık used SWOT analysis and AHP method for strategy selection problem for small business in milk sector (Erdil & Erbıyık 2015). Bayraktar et al., evaluated vegetable oil brands using multidimensional scaling analysis method and tried to determine consumers' perceptions on oil brands (Bayraktar, Akyol & Esen, 2017). Öztekin tried to determine consumer interest and consumer satisfaction in vegetable oil products (Öztekin-Kaplan, 2006). Aslan tried to solve the supplier selection problem for a canned food company with the help of Fuzzy Analytic Hierarchical Process (Aslan, 2009). Eren and Özder used AHP, ANP, PROMETHEE and ELECTRE methods in the problem of selecting suppliers for shrink" and filmler stretch films in a beverage manufacturing company **(**Eren & Özder, 2016). Parcell et al., made a research study on the trends of the global edible vegetable oil market (Parcell, Kojima, Roach & Cain, 2018). Göktaş and Gül, conducted statistical analysis on the cooking oil habits of customers and the cooking oil brands they purchased Göktaş & Gül, 2018). Ali et al. done a study on the criteria affecting the consumption of edible oil in Pakistan (Zaryab, Manan & Shafqat, 2013).

In the second part of the study, the criteria and alternatives affecting the selection of edible oil are defined and the solution methodology used in the third part is explained. In the fourth section, the application study is described. In the fifth and final section, general evaluations about the study were made.

2. PROBLEM

Cooking oils are evaluated for different purposes and there are many criteria that can affect these evaluations. In this study, edible oils are evaluated according to the ethical ratio criteria, and the decision tree for the relevant criteria (Environmental Report (C1), Organic (C2), Nuclear Power (C3), Animal Welfare (C4), Vegetarian (C5), Political Donations (C6), Public Record Criticism (C7), Boycott (C8)) and alternatives (Brand 1,..,9 (B1,..,B9)) is shown in Figure 1 (URL.2).

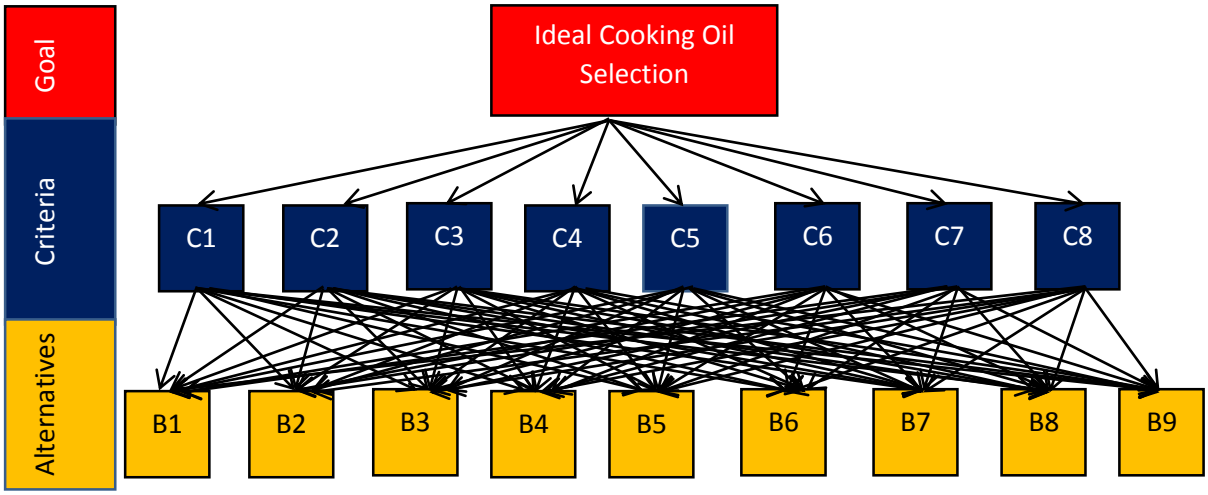

Figure 1. Decision Tree for the Problem.

The criteria and alternatives specified in Figure 1 were analyzed using the AHP method and information on the implementation study is discussed in section 4.

3. METHODOLOGY

Analytical Hierarchical Process method developed by Saaty is one of the multi-criteria decision-making methods that determine the ideal among alternatives based on certain criteria (Saaty,1980). The method has six different steps; these steps are described below (Uçar & İşleyen, 2019).

First of all, a hierarchical decision tree is formed after determining the problem to be analyzed, the criteria to be considered in the problem and the set of alternatives to be selected. In the next steps, paired comparison matrices are formed for the criteria to be considered and their significance levels are

determined. After measuring the consistency value of the matrix used in the comparison of criteria, significance values for alternatives are determined on the basis of each criterion. Finally, the importance of alternatives is determined and the ideal alternative is presented to the user (Uçar & İşleyen, 2019).

4. APPLICATION STUDY

The application study was carried out using the Expert Choice program developed for the AHP method in the program with 4 GB RAM and Intel (R) Core (TM) i5-6200 @ 2.3 GHz processor based on expert opinions. According to the steps of the AHP method, firstly the priority values for the criteria were determined and the results are shown in Figure 2.

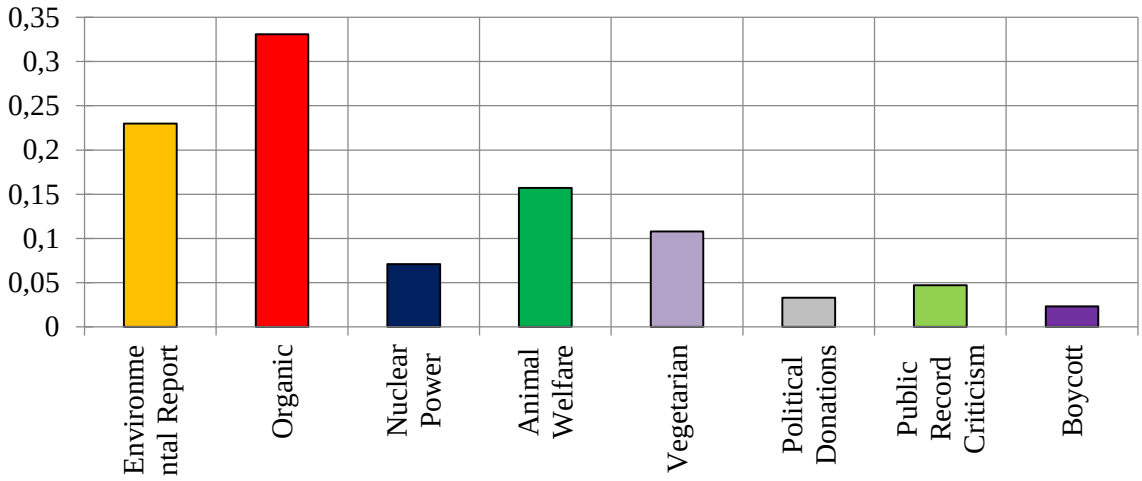

Figure 2. Priority Value of Criteria

According to the results in Figure 2, "Organic" criterion was found to be the most important criterion. This criterion was followed by "Environmental" and "Animal Welfare" criteria. The lowest important criterion was "Boycott" criterion. In addition, the consistency value for comparison of criteria was 0.03. Since this value is less than 0.1, the matrix is found to be consistent. Alternatives importance rankings were calculated by taking into consideration the criterion priorities determined and the results are shown in Figure 3.

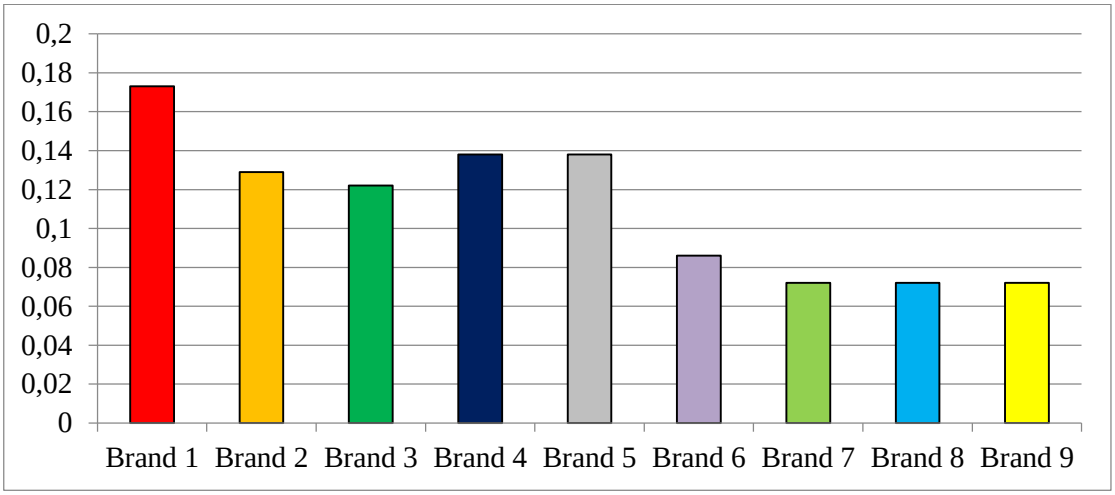

Figure 3. Priority Value of Alternatives

According to the results in Figure 3, the most important alternative is the "SUMA" brand. This alternative was followed by the "Meridian" and "Filippo Merio" alternatives. In addition, the overall consistency value for alternative comparisons was calculated as 0.02. Since this value is less than "0.1", the analysis was found to be consistent.

5. CONCLUSION

Oils are one of the most important nutrients that the body needs to perform vital functions. People meet this substance from plant and animal sources. Vegetable oils are divided into two as liquid and solid. In this study, 9 different cooking oil brands operating in the edible oil sector were analyzed according to 8 different ethical rankings criteria. As a result of the analysis, the most important criterion was Organic and the most important alternative was Suma. The aim of the study was to raise awareness on the production of environmentally friendly, healthy and quality edible oil. In future studies, it is predicted that more effective solutions can be obtained by taking into account different criteria and using alternative solution methodologies.

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URL.1 https://thegoodshoppingguide.com/ethical-cooking-oil

URL.2 https://thegoodshoppingguide.com/ethical-rankings-cooking-oil