

## Prioritization and Evaluation of Environmental Quality Indicators as seen by Tourists in Asara sector, Karaj-Chaloos Road Using MCDM (Multiple-Criteria Decision Making) Techniques

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### Abstract

This study aimed to identify the most important touristic environmental quality indicators of the Asara District from tourists' perspective and emphasize the necessity of identifying the most important influential factors on the desired environmental quality.

This study, according to purpose, is practical and descriptive-analytical research in terms of method. This study has benefitted from the multiple criteria decision-making models such as VIKOR, ELECTRE, SAW, and the Copeland model. The Evaluation and the prioritization showed seven influential factors Evaluating and prioritizing environmental quality. The factor related to the tourist attractions has the most effect on creating and improving environmental quality in the Asara District based on the tourists' point of view.

### Introduction

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Spending leisure time that includes tourism as one of its shapes is dependent on the two variables of Time and Space. The time factor as a variable gives different shapes to leisure time; also, The space factor has great importance in how leisure time is spent in a geographic sense. Consistent with this kind of development, tourism has a considerable impact on societies' environment, economy, and livelihood. In this regard, a proper environment is one of the fundamental factors and criteria in a tourist's destination, which can be explained based on certain parameters. Therefore, nowadays, in planning for rural and other areas, the improvement of the tourism environment quality within the framework of permanent development goals is of utmost importance. On the one hand, this will lay the groundwork for retaining rural populations and, on the other hand, help attract tourism to the rural destinations.

### Materials and Methods

Multiple criteria decision-making methods (MCDM) <sup>2</sup> consist of a wide array of mathematical technics used depending on the study's aims. Nowadays, The ELECTRE<sup>3</sup>, VIKOR<sup>4</sup>, and SAW technics, members of the MCDM family, have a special place in ranking different concepts in different fields of study. The main reasons for this could be the clear mathematical logic and also lack of performance problems.

The chart below contains a summary of the models and technics used in this study.

Title and description	Steps and Formulas
Simple additive weight (SAW): One of the multiple criteria decision making methods. It was first introduced in 1981 by Hwang and Yoon. In this method, also known as a weighted linear combination, after unscaling the decision matrix using the weight coefficient of the criteria, we'll have the unscaled weighted decision matrix, and the score for each choice will be based on this matrix.	<ol style="list-style-type: none"> <li>1. <b>Forming the decision matrix</b></li> <li>2. <b>Unscaling the matrix</b></li> <li>3. <b>Setting weights to the vector of criteria</b></li> <li>4. <b>Making the right choice</b></li> </ol>

<p>ELECTRE: One of the most important prioritization methods and multiple criteria decision-making is used in problem-solving in decision-making.</p>	<ol style="list-style-type: none"> <li>1. Unscaling the decision matrix</li> <li>2. Forming the unscaled weighted matrix with the assumed vector in the algorithm</li> <li>3. Forming symmetric and asymmetric matrices</li> <li>4. Calculating the effective asymmetric matrix with the threshold limit</li> </ol>
<p>VIKOR: A multiple-criteria decision-making method developed to solve decision problems with conflicting and non-commensurable (different units) criteria.</p>	<ol style="list-style-type: none"> <li>1. Forming the decision matrix</li> <li>2. Normalizing the decision matrix</li> <li>3. Weighting the normalized matrix</li> <li>4. Setting the maximum and minimum values of the weighted normalized matrix</li> <li>5. Setting the suitability index (s) and the resistance index (r)</li> <li>6. Calculating the value of Q and the final ranking</li> </ol>

### Discussions and results

This study focuses on the Evaluation and prioritization of tourists' points of view in the Asara District. Since the evaluated factors are based on the environment quality variables, the priorities and requirements of the tourists and environment to improve the environment quality can be identified. Besides the numerous advantages and capacities of this district for tourism development, there are also several obstacles. These obstacles are the incorrect reaction to trends, and the establishment of different activities has resulted in a sensitive and incompatible area full of environmental challenges. The environmental advantages are increasingly decreased, and the area is facing a concerning situation. The incorrect understanding of the nature of the land and a stable development model, and the leadership and controlling methods based on this false understanding are among the area's strategic challenges. The conducted evaluations on the quality of tourism services in the area show an array of problems and difficulties that have made it impossible to utilize the full potential of these tourism resources. A shortage of basic infrastructure (including public restrooms, drinking water, etc.), lack of unified management of the area, especially on holidays, are severely apparent. Lack of sanitary infrastructure and basic facilities has led the tourists to make camps and pitching tents on the margins of the river and road; this could lead to unpleasant consequences like the flooding of the Sijan village in the Asara district in July of 2015. Currently, lack of legal policymaking ( disagreement between political and legal leadership)

resulting in an inability for unified legal planning has made the roadside and riverside into a garbage dump that threatens to pollute the Karaj River, the main source of drinking water for Tehran and Alborz provinces.

### **Conclusions**

This study attempts to use different assessment tools to evaluate and prioritize the indicators. Hence, in terms of factors being assessed, each of 6 sub-factors, sub-parameters, and applying multiple criteria technics to get a practical and real-world assessment of the environmental quality of the district prioritized and evaluated from the tourists' point of view. Given the fact that tourism attraction aspects and the performance-structural criterion are prioritized here, it can be said that the visual and mental fields are of approximately the same importance to the tourists. In other words, environmental quality's impact on tourism development has been evaluated repeatedly, but a comprehensive study on assessment and prioritization of environmental quality criteria has not been conducted; this study has assessed this in a scientific method. As Marin and Taberner (2007)<sup>6</sup> described, attention to the influential factors on environmental quality could reduce the dissatisfaction of tourists and prevent environmental destruction.

### **Keywords**

Prioritization, Environmental Quality, Tourists, MCDM, Asara District