

Identification of the Potentialities of Ecotourism

Mohammad Hadi Khorsand^{1,*}, Mohammad Taghipour²

Abstract

Khalkhal town's climate, geography, topography, ecological conditions, vegetation, and green spaces make it an exceptional tourism destination. Located in the Talesh foothills, Khalkhal enjoys a favorable climate and abundant water resources, attracting nature lovers. To unlock the town's tourism potential, it is crucial to assess its diverse attributes. Information layers such as slope, geographical direction, vegetation, and climate are individually analyzed. The best zones for the development of ecotourism in Khalkhal are then determined by superimposing these layers in a GIS and applying the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The study prioritizes zones for various tourism activities, including ecotourism, skiing, nature tourism, foothill, and mountain climbing. Findings reveal that the region has substantial potential for both ecotourism and geotourism attractions. Realizing this potential requires strategic planning and development, focusing on sustainable tourism practices that preserve the natural environment while highlighting Khalkhal's unique attractions. When managed and promoted well, Khalkhal might become known as a top travel destination for travelers looking for outdoor activities and scenic views. Additionally, the construction of essential infrastructure—like paths, lodging, and educational signage—will improve the visitor experience even more and guarantee that Khalkhal lives up to the expectations of a wide range of travelers. Over time, this all-encompassing strategy will not only support the town's tourism business but also help it flourish, establishing Khalkhal as a top destination for outdoor recreation and stunning scenery.

Keywords: TOPSIS, ecotourism, geotourism, natural environment, sustainable development

INTRODUCTION

Today, tourism around the world is one of the profitable sources and it is also one of the effective factors on cultural exchange among the countries. It may rank among the global service sectors with the largest reach. The global tourism organization has projected that there will be 1.5 billion tourists worldwide by 2020, indicating the importance of tourism. The tourism business accounts for 10% of the economy's liquidity, and tourism profits fund 12% of all expenditures. Ecotourism is developing surprisingly. Ecotourism is ecology-based development index and it is a useful tool to achieve socio-economic improvement for all countries. Ecotourism is a strong tool for natural and cultural heritage protection in the world [1]. Ecotourism can bring more foreign exchanges, and it is an important

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economic source for countries and the values are transferred considerably to ecological resources. The result of this process can encourage the countries to protect the resources. The more emphasis on economic return of ecotourism has created mass tourism and protected regions are threatened. International Union for the Conservation of Nature (IUCN) defines ecotourism as: "Environmentally responsible travel to natural areas, in order to enjoy and appreciate nature that promote conservation, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples" [2]. Ecotourism is different from ordinary tourism as ecotourism

minimizes the environmental effects of tourism and gives profit to the host community and natural environment. Ecotourism is an attractive alternative based on sustainable development instead of mass tourism as it has less negative effect on natural and cultural resources and also it can stimulate more activities for conservation and increase the relevant resources. Tourism is an industry, and its development requires adequate knowledge of effective economic, social and cultural factors [3]. Without being aware of the existing facilities in each region, we cannot have organized prediction. Indeed, the recognition of natural, economic and social potentials in each region enables the planner to identify the development based on the existing condition and potentialities of the region. The identification of the tourism potential of a place can have an effective role in absorbing tourists. The identification of limitations, threats and climatic attractions is of great importance. Based on the distribution of natural attractions of the town, the present study attempts to identify these attractions and by GIS, introduce them based on tourism maps to the visitors. The necessity and importance of tourism marketing planning is so much that it is sometimes mentioned in the field of tourism literature as the main pillar of tourism industry development in tourism destinations. Institutional structure, market segmentation, management, consumer behavior, supply, demand, pricing Strategies, operations, research, advertising, market, audit, forecasting, product development, information technologies, tourism destinations, local communities (hosts), competition and investment are the most important components of tourism industry recovery, and if tourism industry marketing is implemented properly and at an acceptable level, it can improve environmental quality, increase living standards in local communities, and reduce costs.

Evaluation of the ecological potential is a process that tries to provide a development in harmony with nature by regulating the relationship between man and nature. The assessment of the land's ecological potential is regarded as the key component of environmental research. Therefore, before development, it is necessary to determine the ecological potential of the land for different uses. Evaluating the ecological potential of Khalkhal region for the use of tourism is an essential step to achieve sustainable development in this region [4].

PROBLEM STATEMENT

The tourism industry is one of the global phenomena and shows well the combination of economic, social and cultural affairs and is often considered as the largest industry in the world and is a tool to achieve sustainable development, which results in economic, biological opportunities. It provides environmental and socio-cultural benefits to many local communities. By relying on the initial capital of tourist attractions and principled and realistic planning, this industry can become a huge source of income generation at the national and regional levels. In order to attract tourists from different countries and regions with different motivations, it is necessary to have resources and attractions in the destination [5]. By investing in the tourism industry and providing all kinds of transportation and accommodation facilities and other services, without the presence of suitable attractions, one cannot hope for the development of this industry, for this reason, tourism attractions and resources are considered among the main pillars of this industry.

In this sense, adding natural attractions to pinpoint prospective customers might be a useful first step toward a region's sustainable tourism industry [6].

Landscapes have always been an important and vital factor for most tourist destinations around the world. This means that this destination belongs to the country where this destination is located, and they do not have much commercial value in terms of appearance. These destinations are not directly marketed and are sometimes considered as part of a travel package.

Deshgari marketer acquires new concepts about various skills in the field of marketing and communicates more effectively with modern technology through geographic information system. However, traditional marketing methods have never been rejected by tourism marketers who mix traditional and modern methods and call it tourism marketing through geographic information system.

Khalkhal city, being located on the slopes of Talesh mountain, with a suitable climate, extensive water resources and pristine nature, can be a suitable market for tourists who interact with nature. Of course, this work requires identifying the potentials of this city and evaluating them, and in this regard, in this research, considering the distribution of the natural attractions of the city, we decided to identify these attractions and use the geographic information system to map them in the form of maps. We will introduce tourism to the visitors in this section.

NECESSITY OF RESEARCH

Now, the travel and tourism sector stands among the global industry's largest, and its growth trajectory is steadily accelerating toward that goal. At the moment, the third-largest economy in the world is tourism [7]. Due to the fact that it both directly and indirectly generates employment opportunities, this industry is extremely significant economically. In addition, it brings social benefits for the local community and tourists and helps to create a platform for cultural exchange between different communities. In addition to the mentioned cases, tourism has an important effect on the socio-economic sectors in the way that it is a stimulus for the creation and improvement of infrastructures and public services [8].

Tourism is considered as a main indicator that indicates the adequacy of the level of protection by a society and its practical application, because tourism is a key in the use of natural resources and instead of the development of agriculture, mining and other activities. In natural areas, tourism can be chosen as the best solution for economic exploitation.

The growth of tourism has a substantial influence on bolstering the economic bases of communities, as it serves as a novel avenue for job creation, revenue generation, tax collection, attracting foreign investment, and fortifying social sub-organizations. It is necessary to identify the success in this industry's development. and outlining qualities, draws, and possible capacities. A place's ability to draw tourists can be effectively increased by determining its tourism potential. In this way, identifying the limitations, threats, opportunities, strengths and climatic attractions is very important.

A place's ability to draw tourists can be effectively increased by determining its tourism potential. In this way, identifying the limitations and threats and climatic attractions is very important. The main importance and necessity of this research is as follows:

- Investigating tourism capabilities at the city level.
- Examining environmental indicators for measuring potential.
- Identifying the best months for the presence or absence of tourists.

Activities related to tourism and the provision of appropriate services in a region, like many economic sectors, require the necessary background regarding its origin. Therefore, the importance of the tourism industry on one hand and the existence of tourism potentials of Khalkhal city on the other hand, make it necessary to use a suitable procedure for prioritizing the region, for appropriate and efficient planning and prioritization of various investments in these areas.

KHALKHAL TOWN

Khalkhal town is a mountainous region with good nature located in the south of Ardebil province [9]. The city center is Khalkhal town or Heromabad. This town with 85% of forests of Ardebil province is bounded on the north to Kosar, on the east to Gilan province, on south to Zanjan province, on west to Miane town, eastern Azerbaijan. Khalkhal town is located in northern latitude 37° 7' to 37° 56' and 48° 1' to 48° 54' eastern longitude. The sea level is about 1800 m as shown in Table 1. The area of this town is about 3980 km², its length is from the north to the south about 120 km and its width is from 48 to 90 km varied [10].

Now, the access to Khalkhal is via the tourism road of Esalem to Khalkhal from the east (75 km), Khalkhal-Punel road from the southeast (about 75 km) Ardebil to Khalkhal road from the north (115

km) and Sarcham-Khalkhal road (branched from Sarcham-Ardebil Road) with the length of about 120 km in the west. Figure 1. shows ecological indicators for nature tourism activities.

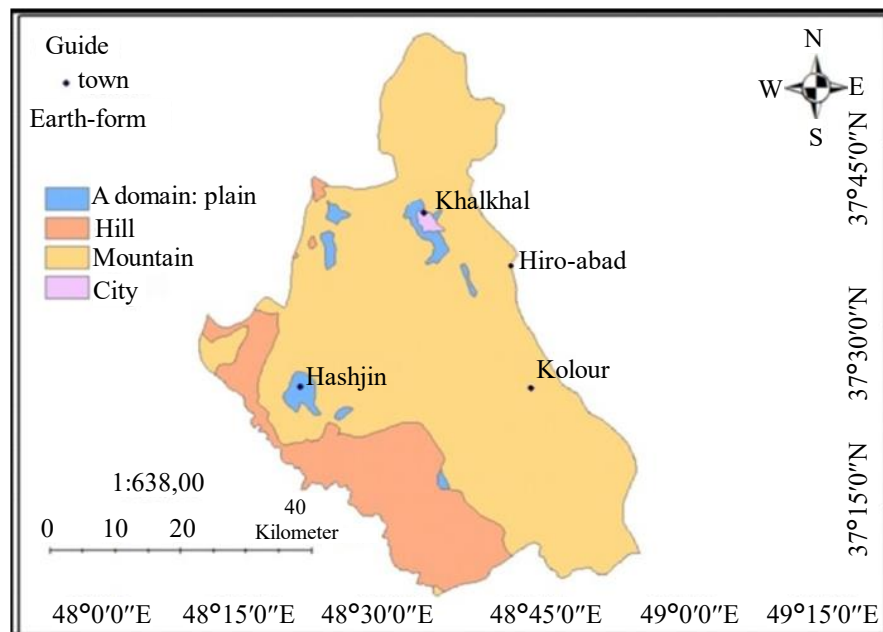


Figure 1. Ecological indices for nature tourism activities.

Table 1. Evaluation of ecotourism indices.

Index activity	Slope	Height	Climate	Vegetation
Ecotourism	2–50%	1200–1800 m	Under any climatic condition	Any field except rock
Foothill climbing	20–70%	800–2500 m	-	Forest, rock
Mountain climbing	Above 2%	Above 1800 m	-	-
Winter sport and ski	30–70%	Above 2300 m	-	-

SCORING THE ECOTOURISM ACTIVITIES BASED ON TOPSIS MODEL

One of the purposes of study is identification of one of the potential regions of ecotourism in Khalkhal town and to introduce the suitable regions for ecotourism activities, TOPSIS model is used for their prioritization.

TOPSIS Technique

One of the most effective and useful multi-criteria decision-making approaches is the TOPSIS approach. This approach uses indicators to assess options. The foundation of TOPSIS is the assumption that the optimal solution is the one that is most distant from the negative ideal (the worst) and least distant from the positive ideal (the best). It is presumed that each index's appropriateness is consistently rising or falling [11, 12].

A problem is solved by the TOPSIS method based on the following steps:

Create the Initial Matrix

According to the opinion of tourism experts based on their answers, the information is shown in Table 2.

Quantification and Scale-less of Decision Matrix (N)

In this step, the existing scales in decision matrix are scale-less. Each of the values are divided by the vector size of the same index, which is shown in Table 3.

Table 2. The opinion of tourism experts.

	Criteria	1	1	1	-1	-1	1	1
Index	-	Climate	Temperature	Vegetation	Rain	Slope	Direction	Height
Mountain climbing		0.484	0.434	0.341	0.500	0.601	0.415	0.552
Ecotourism		0.545	0.558	0.681	0.500	0.301	0.311	0.276
Foothill climbing		0.484	0.434	0.255	0.500	0.301	0.207	0.483
Winter tourism and sport		0.484	0.558	0.596	0.500	0.676	0.830	0.621

Table 3. Quantification and scale-less of decision matrix

	Criteria	1	1	1	-1	-1	1	1
Index	-	Climate	Temperature	Vegetation	Rain	Slope	Direction	Height
Mountain climbing		0.484	0.434	0.341	0.500	0.601	0.415	0.552
Ecotourism		0.545	0.558	0.681	0.500	0.301	0.311	0.276
Foothill climbing		0.484	0.434	0.255	0.500	0.301	0.207	0.483
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Achieving Weighted Scale-less Matrix (V)

Scale-less matrix (N) is multiplied by the diagonal matrix of weights ($W_n \times n$), it means that: $V = N \times W_n \times n$ and the result obtained is shown in Table 4.

Table 4. Unscaled symmetry matrix in the diagonal matrix of weights

	Criteria	1	1	1	-1	-1	1	1
Index	-	Climate	Temperature	Vegetation	Rain	Slope	Direction	Height
Mountain climbing		0.0080	0.0417	0.30219	0.21688	0.33931	0.00179	0.12496
Ecotourism		0.0090	0.0536	0.60437	0.21688	0.16965	0.00134	0.06248
Foothill climbing		0.0080	0.0417	0.22664	0.21688	0.16965	0.00090	0.10934
Winter tourism and sport		0.0080	0.0536	0.52883	0.21688	0.38172	0.00358	0.14058

Determine Positive Ideal Solution and Negative Ideal Solution

Two choices are the best and the worst solutions as shown in the Table 5

Table 5. Positive ideal and negative ideal solutions.

Max	0.0090	0.0536	0.60437	0.21688	0.16965	0.00358	0.14058
Min	0.0080	0.0417	0.22664	0.21688	0.38172	0.00090	0.06248

Obtaining the Distance of Each Option to Positive and Negative Ideals

We measure the distance between each next n option using the Euclidean method, that is, the distance of the option from the ideal options as shown in Table 6.

The distance between any n-D choice is computed based on Euclidian method, The distance of choice i from ideal positive and negative choices can be computed.

Determine the Relative Closeness (CL) of a Choice to the Ideal Solution

In this step, the relative closeness of each option to the ideal solution is calculated as shown in table 7. CL is a number that ranges from 0 to 1. A solution is considered better when it approaches the ideal solution more closely when this value is nearing unity.

$$CL_i = \frac{d_i^-}{d_i^- + d_i^+}$$

Table 6. Euclidean method-the distance between each option.

	d+	1	1	1	-1	-1	1	1	
<i>Index</i>	-	<i>Climate</i>	<i>Temperature</i>	<i>Vegetation</i>	<i>Rain</i>	<i>Slope</i>	<i>Direction</i>	<i>Height</i>	<i>sum</i>
Mountain climbing		1.00372E-06	0.000141713	0.091316433	0	0.028782311	3.20658E-06	0.000243986	0.120488654
Ecotourism		0	0	0	0	0	5.01028E-06	0.006099661	0.006104671
Foothill climbing		1.00372E-06	0.000141713	0.142681926	0	0	7.21481E-06	0.000975946	0.143807804
Winter tourism and sport		1.00372E-06	0	0.005707277	0	0.044972361	0	0	0.050680642

Table 7. Determine the relative closeness (CL).

	d+	0	0	0	0	0	0	0	
<i>Index</i>		<i>Climate</i>	<i>Temperature</i>	<i>Vegetation</i>	<i>Rain</i>	<i>Slope</i>	<i>Direction</i>	<i>Height</i>	<i>sum</i>
Mountain climbing		0	0	0.005707277	0	0.001798894	8.01645E-07	0.003903783	0.011410756
Ecotourism		1.00372E-06	0.000141713	0.142681926	0	0.044972361	2.00411E-07	0	0.187797204
Foothill climbing		0	0	0	0	0.044972361	0	0.002195878	0.047168239
Winter tourism and sport		0	0.000141713	0.091316433	0	0	7.21481E-06	0.006099661	0.097565021

Any choice with bigger CL is better as shown in table 8.

Table 8. Ranking the choices.

	d Value		
<i>Index</i>	-	<i>d+</i>	<i>d-</i>
Mountain climbing		0.3471	0.1068
Ecotourism		0.0781	0.4334
Foothill climbing		0.3792	0.2172
Winter tourism and sport		0.2251	0.3124

RESULT

In this research, activities with high priority were identified using the TOPSIS model, and for this purpose, the necessary indicators were first identified for marketing ranking, and then, using the opinion of experts, the criteria were weighted for each of the nature tourism activities based on Marketing indicators were obtained. With the results obtained from the TOPSIS model and the prioritization of potential tourist areas, it is possible to start marketing activities to attract tourists and plan new destinations to introduce them to the new market.

CONCLUSION

According to the annual TCI index of this city, it indicates that this city has very good conditions for all seasons in terms of tourism climate, so different tourism can be done for all seasons with different attractions and various marketing for the region. defined According to the comfort climate index of the region, the first seven months are the best months of the year for ecotourism activities. The regional TCI index shows that the months: November-December have very good conditions with a score of (75–77) and the months of January-February have good conditions with a score of (67) and finally a score of 84 for the months of March, which indicates very good conditions.

The growth and development of tourism, fair distribution of income, job creation, reduction of unemployment, increase in the standard of living and increase in investment in the private and government sector will cause significant changes in the economic and social sectors of the city.

According to the definitions of broad and concentrated recreation, this area is suitable for both types of activities, but the priority and investments should be on sports and winter tourism, which includes a number of other tourism activities (climbing, mountain climbing, nature tourism).

Considering the high potential of the region in terms of attracting tourists due to the important attractions, we can hope for the prosperity of this important industry and its impossible role in the development of the region. Fairly provided the facilities and increased the degree of benefit of the local community of the city from the benefits of development, and with proper marketing, the attractions can be introduced to the tourists, and along with that, by creating welfare facilities, the minister of construction can attract tourists and create the field for youth employment. A place was provided in tourist places, and it prevented the migration of the residents of the villages.

Author Contributions

Conceptualization, MK and MT; methodology, MK and MT; software, MT and MK; validation, MK and MT; formal analysis, MK and MT; investigation, MT and MK; resources, MK and MT; data curation, MK and MT; writing—original draft preparation, MK and MT; writing—review and editing, MT and MK; visualization, MT and MK; supervision, MK and MT; project administration, MK and MT. All authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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