Journal of Research and Rural Planning
Volume 11, No. 4, Autumn 2022, Serial No. 39, Pp. 73-98
eISSN: 2783-2007 **ISSN: 2783-2791**
http://jrrp.um.ac.ir

Original Article

An Analysis of the Infrastructure for the Development of Rural Ecotourism in Ardabil Province

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Abstract

Purpose- Ecotourism is a foundation of sustainable development of societies and a way for conserving natural landscapes and reservoirs. In this regard, rural tourism, especially rural ecotourism, is a sort of tourism that can be highly effective in the revival of villages considering the natural and cultural capacities of these areas. So, this research analyzes the infrastructure for the development of rural ecotourism in Ardabil province, Iran.

Design/methodology/approach- The research is an applied study in goal and an analytical study in nature. The research realm includes 311 villages with a population of over 500 people in Ardabil province. The research adopted the TOPSIS model. The criteria used to measure the ecotourism potential included healthcare, transportation infrastructure, business and services, information technology, energy, and cultural, sports, and religious infrastructure. Weights were assigned by experts to the criteria based on their importance.

Finding- The results showed that the villages with the highest potential for the development of rural ecotourism in the counties of Ardabil, Bileh Savar, Parsabad, Khalkhal, Sareyn, Kowsar, Germi, Meshgin Shahr, Nir, and Namin included Somarin, Gug Tappeh, Shahrak-e Gharbi, Shal, Ardi Musa, Zarjabad, Qarah Aghaj-e Pain, Alni, Virseq, and Anbaran-e Olya. In this regard, the village of Anbaran-e Olya in Namin exhibits the best performance across the province with a CL score of 1. Out of all studied villages, 86 percent were placed in the moderate and low category, 2 percent in the very high category, 8 percent in the high category, and 4 percent in the very low category.

Research limitations/implications - The main limitation of the research is the lack of access to up-to-date information.

Practical implications- Given the results, it is recommended to invest in villages that have the potential for ecotourism, thereby contributing to attracting tourists and converting them into rural tourism hubs.

Originality/value- The analysis of the potential of Ardabil province, which is a tourist destination, for the development of rural ecotourism can help identify touristy villages to focus on their prosperity.

Keywords- Ecotourism, Village, TOPSIS, Ardabil Province.

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How to cite this article:
Imani, B. & Alavi, S. (2022). An analysis of the infrastructure for the development of rural ecotourism in Ardabil Province. *Journal of Research & Rural Planning, 11*(4), 73-98.
http://dx.doi.org/10.22067/jrrp.v11i4.2207.1053

Date:
Received: 12-07-2022
Revised: 19-09-2022
Accepted: 27-10- 2022
Available Online: 31-12-2022

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1. Introduction

The tourism industry is regarded in all countries as a vital economic factor due to its role in job creation and income generation, so it can be a proper solution for development (Nazmfar et al.,, 2019; Zalaghi et al.,, 2022). However, despite its positive impacts, especially on the economy, it may have negative consequences due to inattention to its likely effects and optimal management (Ghorbani et al.,, 2014: 104). Some negative effects include the commoditization of culture, increased crime, mobilization of agricultural labor to the tourism sector, immigration, changes in social and religious values, and environmental impacts, e.g., water, air, and noise pollution of the host community (Khosrowjerdi & Nouripour, 2017). The concept of sustainable tourism emerged from the negative impacts of tourism (Ocampo et al.,, 2018; Wang et al.,, 2016). It is, therefore, important for tourism activities in the destination to satisfy tourists' needs without harming the natural resources. Among different approaches to sustainable tourism, ecotourism is regarded as the most adaptive sort of tourism (Taghdisi et al.,, 2014) with the biggest potential. Blangy and Wood (1993) express that ecotourism is a responsible trip to natural landscapes, which protects the environment and reinforces local people's welfare. Ecotourism shows great respect for people, tourist destinations, and objects that are visited and puts special emphasis on protecting natural and cultural resources, engaging local people in planning processes, and creating welfare for people (Seydaei et al.,, 2013). Therefore, ecotourism is known as a part of sustainable development in the tourism industry that should be accountable for providing socioeconomic benefits and protecting the environment at the local and global levels (Cobbinah et al.,, 2017). A key goal in organizing ecotourism activities is the all-inclusive protection of the environment with the greatest focus on the development of ecotourism as a factor for regional development with optimal costs. The achievement of this goal calls for detecting regions apt for ecotourism, planning for these regions to attract visitors, and creating infrastructural facilities for them as an approach for the development of the ecotourism industry (Hamzeh, 2018; Zarabi & Safarabadi, 2014). Since rural areas have high potential for tourism in social, cultural, economic, and natural dimensions, they can become tourism hubs in the territorial area. The rural areas are more apt for the development of ecotourism than other tourism types owning to their tourism opportunities, including natural attractions, virgin landscapes, and pleasant weather (Sajasi Qeidari et al.,, 2015). Indeed, given the natural and cultural potentials of rural areas, rural ecotourism can be an invaluable process for reviving the villages and creating employment and income for rural people (Habibi Kaveshkouhi et al.,, 2021) and can be an economic supplement to alleviate poverty and reduce immigration from rural areas to urban areas (Ghanbari et al.,, 2019). It is capable of improving rural people's welfare and can have deep impact on rural people's lives (Navabakhsh & Rafieifar, 2010). In general, the rural economy becomes more dynamic with the development of tourism, and the resulting economic added value can improve rural people's life quality (Najafi Kani & Najafi, 2020). Although rural tourism is not the final solution for all problems of rural areas, one of its main functions is the development of regions that have potential for this industry (Tavallaei et al.,, 2013). Given the significance of ecotourism and the fact that Ardabil province has a lot of unique attractions for the development of ecotourism in Iran and these attractions can provide a basis for the sustainable rural development in this province, the present research aimed to analyze the infrastructure for the development of rural ecotourism in the villages with a population of over 500 people in this province. To achieve this goal, the following questions were compiled:

- Which villages have higher potential for the development of rural ecotourism in Ardabil province?
- What fraction of the studied villages can be candidates for becoming a rural ecotourism hub in Iran?

2. Research Theoretical Literature

The history of ecotourism dates back to 1965. It is formed of two words 'ecology' and 'tourism'. Ecotourism at the international level is a concept that is rooted in the conservation of natural resources and the idea of sustainable development. The International Ecotourism Society defines ecotourism as "*responsible travel to natural areas that conserves the environment and improves the well-being of local people*" (Sultanzadeh, 2006). Ecotourism is an environmental-friendly activity that happens in naturally rich areas and is a sort of sustainable tourism (Swangjang & Kornpiphat, 2021).

Most studies have identified the following essential factors for the ecotourism definition:

- Employment for local communities
- Conservation of natural resources
- Education of the environment
- Sustainability and less environmental degradation
- Protection of endangered species
- Cultural heritage in the world (Santarém et al.,, 2015)

In one of the first definitions of ecotourism, Hetzere used it to describe the interrelationships of tourism, the environment, and cultural features, which should satisfy four criteria of the least negative impact on the natural environment, the maximum responsibility for the culture of the host community, the addition of economic benefits to the host community, and the maximum participation of the local community for increasing the tourists' satisfaction (Popescu & Zamfir, 2011). Despite the growing use of the term *ecotourism*, presently it is rarely used correctly as it is used as an alternative for the term nature tour with a general application in most scientific and non-scientific circles. The profound differences between ecotourism and other terms that refer to the nature tour require us to provide a more precise definition of ecotourism as a much more general approach and term than the nature tour. Ecotourism is a subset of the broader term *nature-tour* that aims to increase the number of tourists who seek a pure experience in nature and tries to reduce economic, sociocultural, and environmental costs and be useful for the environment and local community (Mogheimehfar, 2011). Although there is no single definition of ecotourism, any comprehensive definition should emphasize the followings from scientific, social, and economic perspectives:

Scientific

- Knowing the natural capacities of ecosystems to ensure their conservation, rehabilitation, and sustainable generation
- Protecting the natural, cultural, and religious heritage in the tourism setting
- Increasing the value of heritage by raising awareness, developing culture, and doing continuous training for people, local communities, and tourists

Social

- Identifying and respecting the very important role of people and the local community and involving them in decision-making, planning, and the implementation of projects
- Respecting the social, cultural, and traditional structures, customs, and lifestyle of local people and communities
- Respecting local people and communities' livelihood needs and dependencies on forests, landscapes, and forest resources
- Considering positive cultural exchanges between tourists and local people and promoting the culture of the conservation of natural and cultural heritage among tourists and the host
- Promoting local people and communities' life quality and scientific awareness

Economic

- Generating income for local people and communities and fair distribution of incomes
- Allocating a part of the income to heritage management and conservation
- Economicalizing ecotourism for its organizers and, in the meantime, attention to the projection and support of project implementation (Bostanchi, 2019).

Furthermore, ecotourism pursues various socioeconomic, cultural, and environmental goals. The most important goals are to guide tourists to natural destinations, minimize destructive contact with the environment, promote environmental awareness, provide financial sources for environmental protection, generate income and financial sources to improve local people's life quality and the quality of tourist attractions, respect local culture, support human rights and freedom-seeking movements, reinforce public participation, reduce the consumption of non-renewable sources as a liability, enhance employment by attracting ecotourists and providing relevant services, reinforce the attributes of microcultures, participate in supplying welfare for local communities, take responsibility for the protection of biodiversity, and provide learning and educational opportunities (Kasehgar Mohammadi et al.,, 2016).

2.1. Sustainable ecotourism

Sustainable ecotourism is tourism that is ecologically sustainable; i.e., it responds to the current needs of ecotourists, focuses on protecting and expanding ecotourism opportunities in the future, and attempts to ensure the sustainability of ecology instead of harming it. The main incentive in sustainable ecotourism is to visit the natural attractions of a

region including physical features and indigenous culture. After an ecotourist visits an attraction, she leaves the location without disturbing or damaging it. So, it can be said that ecotourism is an antithesis of tourism that considers short-term benefits (Cobbinah, 2015). In sustainable ecotourism, continuous long-term benefits are in focus. In this regard, an ecotourist is a person who aims to gain sound and authentic experience through mental and physical challenges and is ready to bear the hardships and discomforts of the trip to gain experience and learn. Sustainable ecotourism is a management approach that aims to, directly and indirectly, contribute to protecting nature through the cooperation of local officials and people by enforcing proper regulations considering the socioeconomic and environmental goals (Davari, 2017). Ecotourism expresses sustainable development strategy by five principles: effort to conserve the environment, motivating the participation of local communities, empowering volunteer groups, gaining economic benefits, and finally, protecting local cultures (Asadpourian et al.,, 2020).

2.2. Positive and negative impacts of ecotourism

As with all other activities, ecotourism has its own pros and cons. Obviously, in this tourism branch, the more we act on regulations, the less the damage will be, and the more impetuous the programs are, the more the negative impacts will be. An issue faced by those involved in ecotourism is to persuade people to observe its principles and regulations, which is especially graver when the decline in financial benefits and gains is in question. A unique feature of this specific type of tourism is that it allows different groups to pursue their goals and benefits. However, since the economic benefit is in priority in other branches of tourism, it inevitably affects ecotourism, too. Some positive and negative effects are listed below (Niksirat et al.,, 2015).

2.3. The positive effects of ecotourism

The positive effects of ecotourism can be listed as follows:

- The use of its income for the management of natural landscapes
- Employment creation and income generation for the host community. Informed tourists who are mostly educated and have relatively high incomes will be able to have short-term and long-term positive impacts on the ecotourism regions.
- The promotion of local people's knowledge and awareness of regional nature and its value and consequently, the increase in their sensitivity to the protection of natural resources
- Stimulation of local people to protect farms and wildlife instead of selling their lands. As such, by ecotourism, they can both protect these resources and use them as a source of income for making a living.
- The increase in self-confidence and self-honor of local people due to their awareness of having natural and cultural value
- The decrease in immigration from rural areas to urban areas
- Motivation for the protection of stability and the revival of local architecture, rituals, art, handicraft, and folklore in the host community (Schweinsberg et al.,, 2018).

2.4. The negative effects of ecotourism

The negative effects of ecotourism can be listed as follows:

- Damaging the natural resources
- Unwanted impacts on local culture and traditions
- Souvenir production from scarce plants and animals in some cases, which endangers them
- Not spending tourism income on the management and protection of natural resources
- The introduction of virgin areas on tourism maps, which may attract irresponsible tourists to these regions. Some critics name ecotourism eco-terrorism because they argue that it paves the way for mass tourism.
- Ecotourism allows cannily strategies for profit-seekers who talk about sound treatment with nature and its sustainability. This is sometimes called Eco Façade.
- The natural capitals that once attracted tourists are gradually ruined.
- Watching wildlife beyond its tolerance levels will change its behaviors and disrupt its natural life and reproduction trends (Barkauskiene & Sniesk, 2013).

Two of the most important indirect negative effects are poor management and poor implementation of the regulations. Furthermore, not focusing on establishing a balance between supply and demand due to economic benefits will have consequences. For example, the high demand of tourists for local cheese in some regions has caused an increase in the number of cows. In proportion, the natural habitats have been destructed and other wildlife species have been

jeopardized. These impacts mainly happen due to economic benefits and incorrect management (Ehsani, 2018).

2.5. Benefits of ecotourism for rural communities

The benefits of this industry for local communities in rural areas can be enumerated as follows based on a review of the literature:

- In the economic sense, the interrelationship of development and tourism, especially ecotourism, contributes to the development of economic and social opportunities in rural communities. Ecotourism has the most consistency with development.
- In the financial sense, the effects of ecotourism include the increase in employment and the alleviation of poverty, the increase in land and orchard prices, the improvement of the livelihood of local people and local communities, the optimal use of basic, natural, financial, and human resources to achieve an optimal consumption pattern, and the use of technical facilities and proper structure and organization to meet the needs of the present and future generations.
- In the environmental conservation sense, ecotourism is the most fitted method for local and rural regions and communities and contributes to the protection of nature. This component is ideal for sustainable development, which ecologically reduces the pressure on natural resources (Sepahvand et al.,, 2021)

2.6. Literature Review

Numerous studies in Iran and other parts of the world have investigated our research topic, some of which are reviewed below.

In a systematic study on tourism development in rural areas, Mohammadi et al.,, (2022) divided tourism development factors into economic, managerial, sociocultural, and tourist attraction factors. They focused on factors like investment in the region in the economic category and factors like rural people's participation, security in villages, hospitality, and education in rural areas in the sociocultural category. In the managerial category, the two factors of planning by the government and efficient management were found to be important. Finally, in the category of attractions, natural attractions like natural landscapes, communicational attractions like proximity to urban areas and access to roads, and recreational attractions like residential facilities are very important. Xiang and Yin (2020) evaluated rural ecotourism resources. They state that cultural-human factors and natural conditions are the key elements of rural ecotourism resources and natural landscapes and cultural objects are of higher importance. Their results can provide significant evidence to assess the sources of tourism index and producing remarkable tourism products in future rural ecotourism planning. Kamyabi and Rezaee (2018) conducted a research study to provide an approach for ecotourism development in Chahardangeh District, Sari County in Iran. The total score of the internal and external factors was estimated at 2.51 and 2.57, respectively. This shows that the management of ecotourism activities with respect to internal and external factors is at an optimal level and higher than average. It is also in an aggressive state. However, the figures calculated were very close to other strategies. Lonn et al.,, (2018) explored the effects of community-based ecotourism on the livelihood of rural families and concluded that ecotourism had the greatest impact on the income and economic dimensions of rural families' livelihoods. They provided some approaches and opinions in this context. Salehi et al. (2018) focused on ecotourism development with an emphasis on the cooperation of local communities in Jannat Rudbar village, Ramsar, Iran. The results showed the positive attitude of the local community toward ecotourism. The local community was found to be aware of the social, cultural, economic, and environmental impacts of the rural development projects and it was relatively highly supportive of ecotourism development. In addition, a relationship was found between the local community's support of ecotourism development projects and the socioeconomic components.

Abbasi et al.,, (2022) designed a model for rural ecotourism entrepreneurial development with a qualitative approach in Dezful. The results revealed that a combination of social responsibility, environmental responsibility, growth and development through ecotourism, and ecotourism innovations and creativities would contribute to the development of rural ecotourism entrepreneurship. Furthermore, the structural-infrastructural factor, economic factor, educational factor, institutional factor, environmental factor, sociocultural factor, and personal factor were identified as the most important factors underpinning the development of rural ecotourism entrepreneurship. Omarzdeh et al.,, (2022) studied the development of ecotourism in West Azerbaijan province, Iran. Based on their results,

about 57 percent of the total area of the studied area has a status higher than average, but the remaining parts of the province are poor for tourist attraction due to their residential and commercial land uses. The results of this research are important in identifying natural tourism potential. The researchers drew recommendations from the results for improving the status and increasing the use of environmental potentials without harming it with a foresight view, which can be helpful for planners and decision-makers of natural tourism development. Rezvani et al.,, (2021) assessed the potential of ecotourism development in rural areas of Mazandaran province, Iran. According to their results, the distance from constructed lands and the distance from fault had the highest and lowest weights, respectively. With the increase/decrease in risk-taking degree, the area of high-potential class increases/decreases so that only one percent of the total area in the study site was in the class of very high potential when the risk-taking degree was zero whereas it was increased to 35 percent when the risk-taking degree was one. Data on the proper villages for the development of ecotourism at the risk-taking degree of 0.5 revealed that only 55 villages were classified in the group of regions with very high potential. Among these villages, Aali-kola was found to have the highest potential for the development of ecotourism with a relative distance of 0.8505. Finally, the sensitivity analysis showed the acceptable stability of the model results across different scenarios, reflecting the high reliability of the results.

Rafiee and Majidi (2021) conducted a feasibility study on rural ecotourism in the village of Qaleh Qafeh in Minoodasht, Iran. Analysis by SWOT resulted in providing fourfold strategies. According to these strategies and the matrix of internal and external factors, the studied village is at a strategically low status in the county of Minoodasht. Based on the results, aggressive-developmental strategies are the best method for the management of activities and performance. Using the strategic planning matrix, the best aggressive-developmental strategies were presented as conclusions and practical recommendations.

In an assessment of tourist attractions for the development of ecotourism, Hajinejhad et al.,, (2019) evaluated the awareness of experts and tourists in Ardabil province and revealed significance between the awareness of tourists and experts regarding the development of ecotourism (correlation = 0.45, Sig. < 5%) and the improvement of ecotourism strengths in creating and developing ecotourism opportunities (correlation = 0.46, Sig. < confidence interval). The final examination of the data shows that the opportunities can be grabbed more optimally if strengths are used optimally, or in other words, the efficiency of the strengths is increased. Hajinejhad & Aghaei (2013) studied the optimal ways to develop ecotourism in Ardabil province using the SWOT strategic planning method. Based on the results, SO strategy 4 (creating proper conditions, e.g., reducing tax and granting subsidies, for foreign investment given the potential for ecotourism development) gained the highest score of 24.61 among the aggressive strategies for ecotourism planning in this province. This strategy is important because most attractions are left isolated due to the lack of facilities. So, authorities must facilitate the attraction of investment for the development of ecotourism as its consequences will benefit whole the province. In other words, attention should be paid to the investment in whole the province, not just focusing on a spot like Sareyn. Varesi et al., (2012) conducted a study on the feasibility of expanding ecotourism attractions in Ardabil province and found that the province is capable of becoming a natural tourism hub in Iran given its capabilities in the ecotourism industry. So, it is imperative to develop ecotourism in the province for the sake of its endogenous sustainable development.

Figure 1 displays the benefits and effects of ecotourism for local and rural communities.

Sociocultural	Economic	Environmental
• Increasing awareness and active participation of local people • Contributing to the long-term survival of cultural heritage • Reviving the culture and traditional cultural activities • Motivating native communities to value natural and cultural capitals • Contributing to regional balance and preventing immigration • Sustaining community values • Showing respect • Facilitating the process of natural consensus • Contributing to security and peace • Solving gender inequalities in employment environments	• Economic development and diversity • Diversifying economic growth • Distributing income among local communities • Supplying income for the survival of attractions • Creating job opportunities and income • Developing local infrastructure • Generating foreign exchange • Contributing to local small-scale investment • Attracting money and capital from the center • Developing socio-economic opportunities • Developing people's welfare • Empowering people's livelihood	• An incentive to protect the natural and physical regions • Optimal management of resources • Improving wildlife habitats • Developing regions with tourist attractions • Sound and efficient management of the use of basic and natural resources

Figure 1. The positive effects of ecotourism for rural communities (Sepahvand et al., 2021: 188)

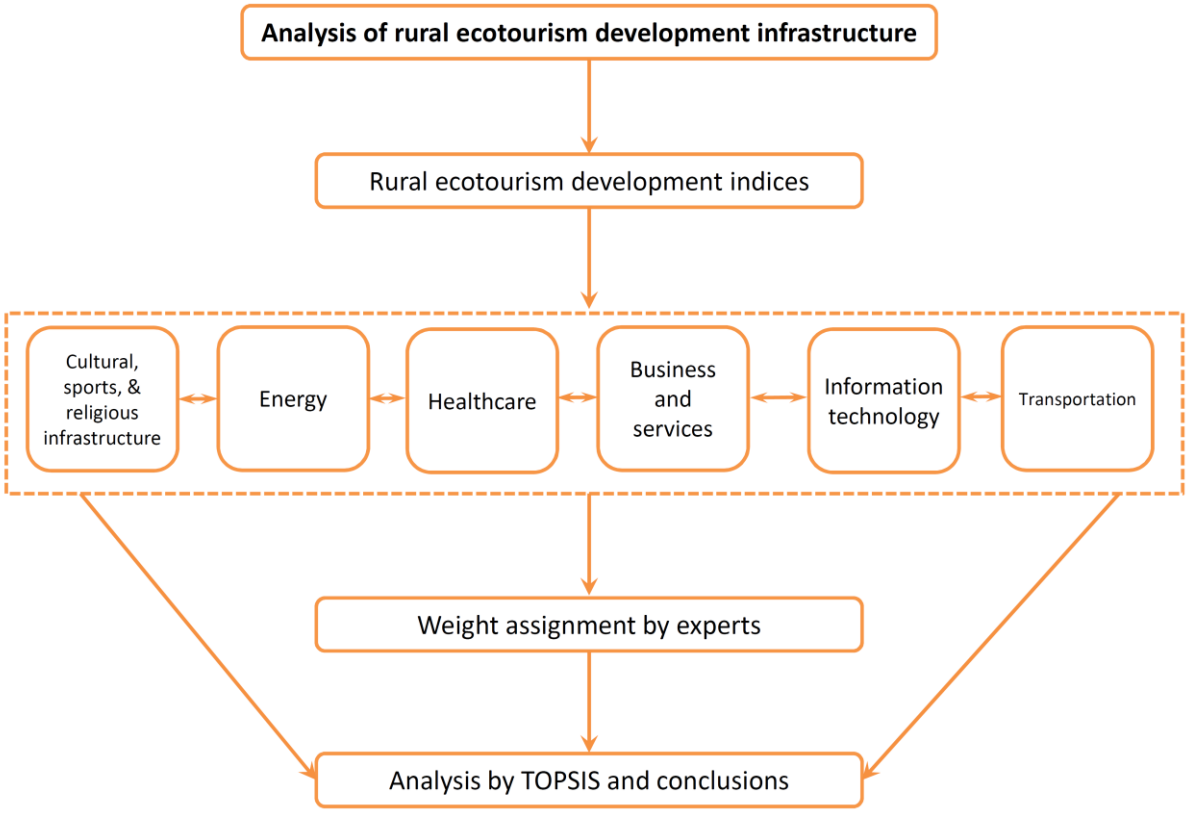

Figure 2. The theoretical framework of the research

3. Research Methodology

Ardabil province in the northwest of Iran is located between the longitudes 47°17' and 48°55' E. and the latitudes 37°06' and 39°42' N. and is delimited by East Azerbaijan province in the west, the Republic of Azerbaijan in the north and northeast, Guilan province in the east and southeast, and Zanjan province in the south. The province has 10 counties, 71 rural districts, and 1855 non-desolated villages (Anonymous, 2016). The research is an applied study in goal and nature, which was conducted by analytical and descriptive methods. Data were collected by the document, library, and field methods. The study was composed of 311 villages with a population of 500 people. The sample size was 50 people composed of tourism students and professors who determined the significance of the indices on a scale from 1 to 5. The quantitative data used in the research were collected from the information in the village ID cards published by the Deputy of Rural and Deprived Regions Development. They were then analyzed by the TOPSIS model, and the villages were divided into five categories based on their scores including very high (0.80-1.00), high (0.60-0.80), moderate (0.40-0.60), low (0.20-0.40), and very low ecotourism potential (0.00-0.20). The research realm included all rural areas with a permanent population of over 500 people across Ardabil province. Based on rural demographics, the counties of Ardabil, Meshgin Shahr, and Parsabad are home to the greatest fraction of the rural population, i.e., over 50 percent. Out of a total of 1855 rural points in this province, 311 villages with a population of over 500 people were selected for the research. The shares of Meshgin Shahr, Ardabil, and Parsabad were 53, 52, and 47 villages, respectively. Nir, Sareyn, Kowsar, and Bileh Savar counties had the fewest number of villages in this selection (Anonymous, 2011b).

Table 1. The criteria used in the research

Criteria	Sub-criteria
Road type	Asphalt road, gravel road, earthen road, dirt road
Rural spatial planning project	Implemented rural spatial planning project, rural spatial planning project under implementation, no rural spatial planning project
Healthcare	Waste collection system, pharmacy, physician, healthcare center, minor health center, major health center, childbirth facility, dentistry, paramedic
Communications and transportation	Public access to the Internet, railway station, public transportation, post office, rural ICT office
Vital infrastructure	Public power grid, access to gas grid, access to water piping grid, water refinery system
Institutional criterion	Rural Islamic council, village head, police station, agriculture service center, agriculture extension agent, conflict settlement council, rural cooperative
Religious places	Mosques, holy shrines, other Islamic monuments, religious monuments of other religions
Cultural-sports places	Rural park, public library, sports field, gym
Business and services	Bank, gas station, non-agricultural machinery service center, supermarket, firefighting station, cooperative store, bakery, butchery

Source: (Anonymous, 2011a)

3.1. TOPSIS model

Human thoughts are mostly subject to uncertainty, and this uncertainty affects decision-making. In these conditions, multi-criteria decision-making methods are useful. One of these methods is TOPSIS, which stands for the Technique for Order Preference by Similarity to Ideal Solution. The method was first used by Hwang and Yoon in 1981 (Mokhtari et al., 2016: 126). These two researchers proposed a technique for the selection of the best suggestion with the method of similarity to the ideal solution in which the alternative that is selected must have the shortest distance from the ideal solution and the longest distance from the constrained ideal solution. This is an advantage of TOPSIS over other multi-criteria methods (Rafeie Darani & Shahnoushi, 2010: 154). The positive criterion is profit and the negative criterion is cost. So, the ideal solution can readily be determined. The alternatives are ranked by the value of CLi, which varies in the range of 0-1 in which the high extreme (1)

represents the highest rank and the low extreme (0) represents the lowest rank (Olson, 2004: 723). The rationale of the method is to find the best-compromised solution out of all probable solutions evaluated by numerous quantitative and qualitative criteria (Erfani & Hemmati, 2014: 68).

4. Research Findings

This section presents the results of using the TOPSIS model to rank the villages in different counties of Ardabil province based on their potential for ecotourism development. The weights were assigned based on the experts' opinions given in Table 2. The criterion of roads and road type was given the highest score in the development of rural ecotourism due to its grave importance. The healthcare criterion was assigned with the lowest weight of 0.05. Based on these criteria, the villages were ranked by the TOPSIS model into five categories of the potential for ecotourism development – very high potential (0.80-1.00), high potential (0.60-0.80), moderate potential (0.40-0.60), low potential (0.20-0.40), and very low potential (0.00-0.20). The results are reported for the counties in the next sections.

Table 2. The weights of the criteria used in the research

Criterion	Weight	Criterion	Weight
Road type	0.19	Institutional criterion	0.10
Rural spatial planning project	0.15	Religious places	0.07
Healthcare	0.05	Cultural-sports places	0.09
Communications and transportation	0.17	Business and services	0.06
Vital infrastructure	0.12		

4.1. Potential of ecotourism development in the villages of Ardabil County

Based on the analysis of the data using the TOPSIS model (Table 3), Somarin in Ardabil County (CL = 0.804) has the highest potential for the development of rural ecotourism among the studied 52 villages. The next ranks are for Aralluy-e Bozorg (CL = 0.702), Pir Aquam (CL = 0.657), and Anzab-e Olya (CL = 0.604), respectively. The lowest ranks are for Sharifabad and Nuran whose CL is <0.200. According to the results, 28 villages are in the category of low potential, and 18 villages in the category of moderate potential. In general, 2, 6, 34, 54, and 4 percent of the villages have very high to very low potential for the development of rural ecotourism.

Table 3. The scores of villages in Ardabil County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Sheykh Ahmad	0.108	0.127	0.542	Aqa Baqer	0.141	0.073	0.342
Gendishmin	0.126	0.099	0.439	Aq Bolagh-e Aqajan Khan	0.100	0.120	0.544
Mijandi	0.150	0.067	0.308	Aq Bolagh-e Rostam Khani	0.139	0.083	0.374
Yengejeh-ye Molla	0.187	0.048	0.203	Pir Aquam	0.088	0.168	0.657
Somarin	0.041	0.168	0.804	Topraqlu	0.112	0.105	0.485
Jabah Dar	0.155	0.063	0.289	Chanzanaq	0.155	0.059	0.277
Masumabad	0.180	0.050	0.218	Kamiabad	0.154	0.066	0.301
Taleb Qeshlaqi	0.154	0.058	0.275	Anzab-e Olya	0.094	0.143	0.604
Hasan Baruq	0.164	0.058	0.262	Tazeh Kand	0.190	0.034	0.153
Hakim Qeshlagi	0.105	0.127	0.548	Samian	0.111	0.126	0.531
Shamasbi	0.108	0.119	0.523	Soltanabad	0.096	0.137	0.587
Nuran	0.190	0.032	0.146	Sowmaeh	0.157	0.070	0.307
Omidcheh	0.138	0.075	0.352	Qarahlar	0.142	0.074	0.344
Barough	0.127	0.103	0.446	Karkaraq	0.101	0.131	0.566
Chanaghrood	0.140	0.073	0.342	Gilandeh	0.124	0.107	0.465
Hamlabad	0.138	0.091	0.399	Aralluy-e Bozorg	0.065	0.153	0.702
Khoshka Roud	0.132	0.087	0.396	Aralluy-e Kouchak	0.168	0.058	0.257
Khiarak	0.159	0.055	0.256	Ayuriq	0.129	0.102	0.442
Dijvijen	0.144	0.075	0.343	Khalilabad	0.132	0.105	0.443
Divlaq	0.139	0.076	0.353	Nowshahr	0.119	0.111	0.483

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Amuqin	0.157	0.058	0.269	Baqarabad	0.145	0.070	0.325
Qarah Tappeh-ye Sabalan	0.160	0.054	0.251	Shablu	0.158	0.052	0.249
Qaleh Juq-e Sabalan	0.141	0.078	0.354	Qezel Qayah	0.113	0.129	0.531
Garjan	0.117	0.114	0.494	Kargan	0.117	0.110	0.484
Gonsoul Kandi	0.154	0.063	0.289	Keriq	0.111	0.128	0.535
Vakilabad	0.164	0.051	0.236	Kuhsareh	0.153	0.069	0.311

According to Table 3, the studied villages were ranked in the following five categories:

- Very high: Somarin
- High: Aralluy-e Bozorg, Pir Aquam, Anzab-e Olya
- Moderate: Soltanabad, Karkaraq, Hakim Qeshlagi, Aq Bolagh-e Aqajan Khan, Sheykh Ahmad, Keriq, Qezel Qayah, Samian, Shamasbi, Garjan, Topraqlu, Kargan, Nowshahr, Gilandeh, Barough, Khalilabad, Ayuriq, Gendishmin
- Low: Hamlabad, Khoshka Roud, Aq Bolagh-e Rostam Khani, Qaleh Juq-e Sabalan, Divlaq, Omidcheh, Qarahlar, Dijvijen, Chanaghrood, Aqa Baqer, Baqarabad, Kuhsareh, Mijandi, Sowmaeh, Kamiabad, Jabah Dar, Gonsoul Kandi, Chanzanaq, Taleb Qeshlaqi, Amuqin, Hasan Baruq, Aralluy-e Kouchak, Khiarak, Qarah Tappeh-ye Sabalan, Shablu, Vakilabad, Masumabad, Yengejeh-ye Molla
- Very low: Tazeh Kand Sharifabad, Nuran

Table 4. The ranking of the villages in Ardabil County

Village	Score	Rank	Village	Score	Rank
Somarin	0.804	1	Divlaq	0.353	27
Aralluy-e Bozorg,	0.702	2	Omidcheh	0.352	28
Pir Aquam	0.657	3	Qarahlar	0.344	29
Anzab-e Olya	0.604	4	Dijvijen	0.343	30
Soltanabad	0.587	5	Chanaghrood	0.342	31
Karkaraq	0.566	6	Aqa Baqer	0.342	32
Hakim Qeshlagi	0.548	7	Baqarabad	0.325	33
Aq Bolagh-e Aqajan Khan	0.544	8	Kuhsareh	0.311	34
Sheykh Ahmad	0.542	9	Mijandi	0.308	35
Keriq	0.535	10	Sowmaeh	0.307	36
Qezel Qayah	0.531	11	Kamiabad	0.301	37
Samian	0.531	12	Jabah Dar	0.289	38
Shamasbi	0.523	13	Gonsoul Kandi	0.289	39
Garjan	0.494	14	Chanzanaq	0.277	40
Topraqlu	0.485	15	Taleb Qeshlaqi	0.275	41
Kargan	0.484	16	Amuqin	0.269	42
Nowshahr	0.483	17	Hasan Baruq	0.262	43
Gilandeh	0.465	18	Aralluy-e Kouchak	0.257	44
Barough	0.446	19	Khiarak	0.256	45
Khalilabad	0.443	20	Qarah Tappeh-ye Sabalan	0.251	46
Ayuriq	0.442	21	Shablu	0.249	47
Gendishmin	0.439	22	Vakilabad	0.236	48
Hamlabad	0.399	23	Masumabad	0.218	49
Khoshka Roud	0.396	24	Yengejeh-ye Molla	0.203	50
Aq Bolagh-e Rostam Khani	0.374	25	Tazeh Kand Sharifabad	0.301	51
Qaleh Juq-e Sabalan	0.354	26	Nuran	0.289	52

4.2. Potential of ecotourism development in the villages of Bileh Savar County

A total of 16 villages were studied in this county. The results are presented in Table 5. Accordingly, the village of Gug Tappeh was ranked first (CL =

0.821) followed by the villages of Anjirlu, Babak, Ruh Kandi, Shur Gol, and Qiz Qalehsi in the second to fifth ranks. The villages Gun Papaq, Fouladlu Qoei, Chalmah Kandi, Damirchilu, and Khalifelu Kandi Bozorg were ranked last. Most villages in this county are in the categories of villages with low rural ecotourism potential (7 villages, 44%) and moderate ecotourism potential (6 villages, 38%).

Table 5. The scores of villages in Bileh Savar County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Shur Gol	0.148	0.174	0.541	Babak	0.136	0.191	0.585
Chalmah Kandi	0.235	0.069	0.226	Damirchilu	0.252	0.070	0.217
Khan Baba Kandi	0.201	0.109	0.353	Zargar	0.240	0.113	0.321
Khalifelu Kandi Bozorg	0.267	0.031	0.105	Fouladlu Qoei	0.204	0.090	0.305
Ruh Kandi	0.151	0.200	0.570	Qarah Qasemlu	0.203	0.166	0.451
Anjirlu	0.150	0.228	0.603	Gug Tappeh	0.052	0.239	0.821
Qiz Qalehsi	0.190	0.196	0.508	Gun Papaq	0.209	0.095	0.312
Odolo	0.161	0.146	0.476	Moradlu	0.180	0.116	0.393

According to the output of the TOPSIS model, the studied villages were divided into the following five categories:

- Very high: Gug Tappeh
- High: Anjirlu
- Moderate: Babak, Ruh Kandi, Shur Gol, Qiz Qalehsi, Odolo, Qarah Qasemlu
- Low: Moradlu, Khan Baba Kandi, Zargar, Gun Papaq, Fouladlu Qoei, Chalmah Kandi, Damirchilu
- Very low: Khalifelu Kandi Bozorg

Table 6. The ranking of the villages in Bileh Savar County

Village	Score	Rank	Village	Score	Rank
Gug Tappeh	0.821	1	Moradlu	0.393	9
Anjirlu	0.603	2	Khan Baba Kandi	0.353	10
Babak	0.585	3	Zargar	0.321	11
Ruh Kandi	0.570	4	Gun Papaq	0.312	12
Shur Gol	0.541	5	Fouladlu Qoei	0.305	13
Qiz Qalehsi	0.508	6	Chalmah Kandi	0.226	14
Odolo	0.476	7	Damirchilu	0.217	15
Qarah Qasemlu	0.451	8	Khalifelu Kandi Bozorg	0.105	16

4.3. Potential of ecotourism development in the villages of Parsabad County

After Ardabil and Meskinshahr, the county of Parsabad has the highest number of villages with a population of over 500 people. In this county, 47 villages were studied. The results of the TOPSIS model revealed that Shahrak-e Gharbi, Eslamabad-e Qadim, Owltan, and Gushlu were in the first to four ranks, respectively. The villages of Hallajabad, Takah Chi, Gedaylu, Palanglu, Omranabad, Tupraq Kandi, and Qeshlaq Amir Khanlu were ranked last. According to Table 7, no villages were in the category of villages with very high ecotourism potential. The categories of the villages with low and moderate ecotourism potential included 22 and 19 villages (47% and 40% of whole the villages), respectively.

Table 7. The scores of villages in Parsabad County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Aq Qabaq-e Sofla	0.156	0.109	0.412	Bahramabad	0.139	0.110	0.441
Idir-e Olya	0.107	0.119	0.527	Para Qeshlaq	0.155	0.103	0.399
Palanglu	0.177	0.053	0.229	Takah Chi	0.174	0.054	0.237
Tarbat Kandi	0.168	0.068	0.287	Khan Qeshlaqi-ye Yek	0.136	0.111	0.449

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Omranabad	0.162	0.048	0.228	Dust Kandi	0.150	0.095	0.387
Qareh Qabaq-e Sofla	0.125	0.102	0.451	Abdol Rezaabad	0.135	0.090	0.400
Gedaylu	0.175	0.054	0.234	Arablu Kandi	0.162	0.061	0.272
Mahbub Kandi	0.158	0.062	0.280	Qatarabad	0.134	0.114	0.459
Maqsudlu-ye Olya	0.143	0.106	0.426	Gushlu	0.099	0.149	0.601
Nur Mohammad Kandi	0.142	0.068	0.324	Majidabad	0.168	0.060	0.264
Nur Mohammad Kandi	0.159	0.063	0.284	Molla Kandi	0.114	0.128	0.529
Borran-e Sofla	0.145	0.098	0.403	Ebrahimabad	0.146	0.101	0.409
Borran-e Olya	0.123	0.119	0.491	Eslamabad-e Jadid	0.146	0.109	0.426
Owzun Qui-ye Yek	0.149	0.089	0.374	Eslamabad-e Qadim	0.087	0.161	0.650
Takleh-ye Bakhsh-e Yek	0.133	0.115	0.464	Uzun Tappeh	0.145	0.075	0.341
Takleh-ye Bakhsh-e Do	0.136	0.104	0.434	Owltan	0.093	0.148	0.613
Firuzabad	0.160	0.073	0.314	Pirayuvatlu	0.150	0.065	0.300
Qeshlaq-e Hajji Avaz	0.141	0.114	0.448	Tupraq Kandi	0.166	0.042	0.200
Esmail Kandi	0.141	0.084	0.373	Shahrak-e Gharbi	0.052	0.175	0.771
Hallajabad	0.173	0.057	0.248	Qarah Daghlu	0.135	0.110	0.449
Qeshlaq Amir Khanlu	0.186	0.033	0.152	Qeshlaq-e Eslamabad	0.164	0.060	0.269
Mahmudabad-e Taleqani	0.136	0.111	0.449	Qeshlaq-e Qitranlu	0.151	0.088	0.369
Ajirlu	0.107	0.141	0.569	Hezar Kandi	0.143	0.082	0.365
Iranabad	0.124	0.116	0.482				

The studied villages in this county were divided into the following five categories:
Very high: -

- High: Shahrak-e Gharbi, Eslamabad-e Qadim, Owltan, and Gushlu
- Moderate: Ajirlu, Molla Kandi, Idir-e Olya, Borran-e Olya, Iranabad, Takleh-ye Bakhsh-e Yek, Qatarabad, Qareh Qabaq-e Sofla, Khan Qeshlaqi-ye Yek, Mahmudabad-e Taleqani, Qarah Daghlu, Qeshlaq-e Hajji Avaz, Bahramabad, Takleh-ye Bakhsh-e Do, Eslamabad-e Jadid, Maqsudlu-ye Olya, Aq Qabaq-e Sofla, Ebrahimabad-e Jadid, Borran-e Sofla, and Abdol Rezaabad
- Low: Para Qeshlaq, Dust Kandi, Owzun Qui-ye Yek, Esmail Kandi, Qeshlaq-e Qitranlu, Hezar Kandi, Uzun Tappeh, Nur Mohammad Kandi-e Sulfa, Firuzabad, Pirayuvatlu, Tarbat Kandi, Nur Mohammad Kandi-e Olya, Mahbub Kandi, Arablu Kandi, Qeshlaq-e Eslamabad, Majidabad, Hallajabad, Takah Chi, Gedaylu, Palanglu, Omranabad, and Tupraq Kandi
- Very low: Qeshlaq Amir Khanlu

Table 8. The ranking of the villages in Parsabad County

Village	Score	Rank	Village	Score	Rank
Shahrak-e Gharbi	0.771	1	Para Qeshlaq	0.399	25
Eslamabad-e Qadim	0.650	2	Dust Kandi	0.387	26
Owltan	0.613	3	Owzun Qui-ye Yek	0.374	27
Gushlu	0.601	4	Esmail Kandi	0.373	28
Ajirlu	0.569	5	Qeshlaq-e Qitranlu	0.369	29
Molla Kandi	0.529	6	Hezar Kandi	0.365	30
Idir-e Olya	0.527	7	Uzun Tappeh	0.341	31
Borran-e Olya	0.491	8	Nur Mohammad Kandi-e Sulfa	0.324	32
Iranabad	0.482	9	Firuzabad	0.314	33
Takleh-ye Bakhsh-e Yek	0.464	10	Pirayuvatlu	0.300	34
Qatarabad	0.459	11	Tarbat Kandi	0.287	35
Qareh Qabaq-e Sofla	0.451	12	Nur Mohammad Kandi-e Olya	0.284	36
Khan Qeshlaqi-ye Yek	0.449	13	Mahbub Kandi	0.280	37
Mahmudabad-e Taleqani	0.449	14	Arablu Kandi	0.272	38
Qarah Daghlu	0.449	15	Qeshlaq-e Eslamabad	0.269	39

Village	Score	Rank	Village	Score	Rank
Qeshlaq-e Hajji Avaz	0.448	16	Majidabad	0.264	40
Bahramabad	0.441	17	Hallajabad	0.248	41
Takleh-ye Bakhsh-e Do	0.434	18	Takah Chi	0.237	42
Eslamabad-e Jadid	0.426	19	Gedaylu	0.234	43
Maqsudlu-ye Olya	0.426	20	Palanglu	0.229	44
Aq Qabaq-e Sofla	0.412	21	Omranabad	0.228	45
Ebrahimabad-e Jadid	0.409	22	Tupraq Kandi	0.200	46
Borran-e Sofla	0.403	23	Qeshlaq Amir Khanlu	0.152	47
Abdol Rezaabad	0.400	24			

4.4. Potential of ecotourism development in the villages of Khalkhal County

Khalkhal, which is the southeast county in Ardabil, is composed of three districts of Khvor Rostan, Shahrud, and Central. Based on the results of the TOPSIS model, the villages of Shal, Lerd, Lonbar, and Barandaq were ranked first to fourth (CL = 0.855, CL = 0.789, CL = 0.753, and CL = 0.721), respectively. The last ranks were assigned to the villages of Aghbolagh, Mian Rudan , Derav, Diz, and Mostafalu. Out of the studied villages, 60 percent (18 villages) are in the category of moderate potential for the development of ecotourism.

Table 9. The scores of villages in Khalkhal County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Barandaq	0.065	0.168	0.721	Khames	0.134	0.113	0.458
Nesaz	0.147	0.101	0.408	Khujin	0.109	0.156	0.588
Nemahil	0.109	0.130	0.545	Towlash	0.141	0.114	0.445
Kazaj	0.144	0.103	0.417	Aliabad	0.132	0.104	0.440
Til	0.128	0.082	0.390	Guran Sarab	0.147	0.120	0.450
Karin	0.150	0.115	0.433	Mazraeh	0.107	0.131	0.551
Lerd	0.047	0.174	0.789	Mezajin	0.102	0.134	0.569
Mian Rudan	0.157	0.071	0.312	Tarzanaq	0.147	0.100	0.405
Diz	0.175	0.045	0.204	Susahab	0.141	0.108	0.434
Shal	0.030	0.177	0.855	Koli	0.149	0.113	0.432
Askestan	0.134	0.116	0.464	Lameh Dasht	0.133	0.123	0.480
Derav	0.167	0.058	0.256	Aghbolagh	0.160	0.084	0.343
Andabil	0.146	0.089	0.379	Owchghaz-e Olya/Bolukan	0.151	0.086	0.364
Bafrajerd	0.140	0.112	0.445	Lonbar	0.056	0.172	0.753
Khaneqah-e Bafrajerd	0.149	0.110	0.424	Mostafalu	0.182	0.030	0.142

The studied 16 villages of this county were divided into the following five categories:

- Very high: Shal
- High: Lerd, Lonbar, Barandaq
- Modrate: Khujin, Mezajin, Mazraeh, Nemahil, Lameh Dasht, Askestan, Khames, Guran Sarab, Towlash, Bafrajerd, Aliabad, Susahab, Karin, Koli, Khaneqah-e Bafrajerd, Kazaj, Nesaz, Tarzanaq
- Low: Til, Andabil, Owchghaz-e Olya/Bolukan, Aghbolagh, Mian Rudan, Derav, Diz
- Very low: Mostafalu

Table 10. The ranking of the villages in Khalkhal County

Village	Score	Rank	Village	Score	Rank
Shal	0.855	1	Susahab	0.434	16
Lerd	0.789	2	Karin	0.433	17
Lonbar	0.753	3	Koli	0.432	18
Barandaq	0.721	4	Khaneqah-e Bafrajerd	0.424	19
Khujin	0.588	5	Kazaj	0.417	20

Village	Score	Rank	Village	Score	Rank
Mezajin	0.569	6	Nesaz	0.408	21
Mazraeh	0.551	7	Tarzanaq	0.405	22
Nemahil	0.545	8	Til	0.390	23
Lameh Dasht	0.480	9	Andabil	0.379	24
Askestan	0.464	10	Owchghaz-e Olya/Bolukan	0.364	25
Khames	0.458	11	Aghbolagh	0.343	26
Guran Sarab	0.450	12	Mian Rudan	0.312	27
Towlash	0.445	13	Derav	0.256	28
Bafrajerd	0.445	14	Diz	0.204	29
Aliabad	0.440	15	Mostafalu	0.142	30

4.5. Potential of ecotourism development in the villages of Sareyn

The county of Sareyn is known as a medical tourism hub in Ardabil province. Fifteen villages of this county were studied. According to the TOPSIS model, the villages of Ardi Musa, Aldashin, and Shayeq were ranked first to third and the villages of Owjur and Darabad were ranked last. According to CL values, no villages were put in the categories of very high and very high potential for ecotourism development. The highest frequency was for the category of moderate potential with 10 villages.

Table 11. The scores of villages in Sareyn County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Atashgah	0.153	0.145	0.486	Owjur	0.177	0.114	0.393
Benmar-e Sabalan	0.171	0.114	0.400	Shayeq	0.125	0.203	0.620
Sain	0.168	0.119	0.414	Vargeh Saran	0.165	0.169	0.506
Ardi Musa	0.063	0.204	0.764	Bilah Daraq	0.155	0.176	0.532
Darabad	0.219	0.095	0.303	Kordeh Deh	0.155	0.164	0.515
Asb-e Marz	0.160	0.134	0.456	Kalkhvoran-e Viyand	0.163	0.131	0.445
Aldashin	0.124	0.204	0.623	Kanzaq	0.146	0.163	0.527
Alvars	0.161	0.175	0.522				

Based on the results, the villages were divided into the following five categories:

- Very high: -
- High: Ardi Musa, Aldashin, Shayeq
- Moderate: Bilah Daraq, Kanzaq, Alvars, Kordeh Deh, Vargeh Saran, Atashgah, Asb-e Marz, Kalkhvoran-e Viyand, Sain, Benmar-e Sabalan
- Low: Owjur, Darabad
- Very low: -

Table 12. The ranking of the villages in Sareyn County

Village	Score	Rank	Village	Score	Rank
Ardi Musa	0.764	1	Atashgah	0.486	9
Aldashin	0.623	2	Asb-e Marz	0.456	10
Shayeq	0.620	3	Kalkhvoran-e Viyand	0.445	11
Bilah Daraq	0.532	4	Sain	0.414	12
Kanzaq	0.527	5	Benmar-e Sabalan	0.400	13
Alvars	0.522	6	Owjur	0.393	14
Kordeh Deh	0.515	7	Darabad	0.303	15
Vargeh Saran	0.506	8			

4.6. Potential of ecotourism development in the villages of Kowsar

Kowsar County in Ardabil has 19 villages with a population of over 500 people. Based on the results, the villages of Zarjabad and Firuzabad were ranked first and second, respectively. The villages of Heshin, Havashanq, Goli Jan, Saqqavaz, Joghanab, Aqa Mirlu, and Chalgarud were ranked last. CL for the village of Zarjabad for its potential for ecotourism development was estimated at 0.663, showing its undesirable conditions.

Table 13. The scores of villages in Kowsar County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Burestan	0.180	0.149	0.453	Meresht	0.143	0.199	0.582
Zarjabad	0.109	0.215	0.663	Aqa Mirlu	0.218	0.070	0.242
Quzlu	0.169	0.181	0.517	Joghanab	0.222	0.082	0.270
Firuzabad	0.121	0.237	0.663	Chalgarud	0.247	0.057	0.187
Goli Jan	0.215	0.091	0.298	Sangabad	0.187	0.159	0.459
Heshin	0.182	0.106	0.367	Farab	0.161	0.161	0.500
Bonyadabad	0.217	0.146	0.402	Ganjgah	0.160	0.185	0.535
Zaviyeh-ye Kord	0.175	0.173	0.498	Nilaq	0.189	0.154	0.449
Saqqavaz	0.226	0.087	0.278	Havashanq	0.207	0.091	0.305
Karandaq	0.190	0.154	0.448				

Based on the results in Table 14, the villages f Kowsar County were divided into the following five categories:

- Very high: -
- High: Zarjabad, Firuzabad
- Moderate: Meresht, Ganjgah, Quzlu, Farab, Zaviyeh-ye Kord, Sangabad, Burestan, Nilaq, Karandaq, Bonyadabad
- Low: Heshin, Havashanq, Goli Jan, Saqqavaz, Joghanab, Aqa Mirlu
- Very low: Chalgarud

Table 14. The ranking of the villages in Kowsar County

Village	Score	Rank	Village	Score	Rank
Zarjabad	0.663	1	Karandaq	0.448	11
Firuzabad	0.663	2	Bonyadabad	0.402	12
Meresht	0.582	3	Heshin	0.367	13
Ganjgah	0.535	4	Havashanq	0.305	14
Quzlu	0.517	5	Goli Jan	0.298	15
Farab	0.500	6	Saqqavaz	0.278	16
Zaviyeh-ye Kord	0.498	7	Joghanab	0.270	17
Sangabad	0.459	8	Aqa Mirlu	0.242	18
Burestan	0.453	9	Chalgarud	0.187	19
Nilaq	0.449	10			

4.7. Potential of ecotourism development in the villages of Germi

Germi is the fourth county in Ardabil province with the most number of villages that have a population of over 500 people. 35 villages were included in the research. The analysis by the TOPSIS model revealed that the village of Qarah Aghaj-e Pain was ranked first (CL = 0.836) and the villages of Sarvaghaji, Yekvan, Kalan, Kalansura, Qeshlaq, and Mollalu were ranked the last.

Table 15. The scores of villages in Germi County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Abbas Alilu	0.153	0.081	0.346	Shahrak-e Vali Asr	0.166	0.079	0.323
Kuramalu	0.151	0.085	0.361	Qeshlaq	0.197	0.055	0.217
Garmi Angut	0.151	0.117	0.435	Zengir	0.162	0.080	0.331
Mohammad Taqi Kandi	0.155	0.126	0.448	Ezmareh-ye Sofla	0.128	0.138	0.519
Mollalu	0.191	0.052	0.214	Ani-ye Sofla	0.163	0.071	0.302
Aqa Mohammad Beyglu	0.114	0.134	0.540	Ani-ye Olya	0.145	0.109	0.430
Ziveh	0.122	0.127	0.509	Ani-ye Vosta	0.121	0.141	0.539
Sarvaghaji	0.180	0.067	0.272	Tappeh	0.147	0.084	0.363
Qarah Aghaj-e Pain	0.040	0.202	0.836	Chalak	0.161	0.101	0.387
Qarah Khan Beyglu	0.133	0.136	0.506	Pormehr	0.113	0.161	0.588
Yekvan	0.183	0.062	0.252	Darmanlu	0.138	0.125	0.475
Qasem Kandi	0.134	0.126	0.484	Kalan	0.188	0.059	0.239
Nasrollah Beyglu	0.145	0.122	0.455	Kalansura	0.193	0.056	0.225
Aranchi	0.169	0.069	0.290	Van-e Sofla	0.128	0.115	0.472
Own Bir Beyglu	0.174	0.069	0.284	Hachakand-e Darmanlu	0.157	0.078	0.332
Beneh	0.137	0.129	0.485	Parchin-e Sofla	0.140	0.101	0.418
Takanlu	0.114	0.148	0.566	Kord Lar	0.135	0.138	0.505
Dizaj	0.140	0.101	0.418				

The studied villages in Germi County were divided into the following five categories:

- Very high: Qarah Aghaj-e Pain
- High: -
- Moderate: Pormehr, Takanlu, Aqa Mohammad Beyglu, Ani-ye Vosta, Ezmareh-ye Sofla, Ziveh, Qarah Khan Beyglu, Kord Lar, Beneh, Qasem Kandi, Darmanlu, Van-e Sofla, Nasrollah Beyglu, Mohammad Taqi Kandi, Garmi Angut, Ani-ye Olya, Dizaj, Parchin-e Sofla
- Low: Chalak, Tappeh, Kuramalu, Abbas Alilu, Hachakand-e Darmanlu, Zengir, Shahrak-e Vali Asr, Ani-ye Sofla, Aranchi, Own Bir Beyglu, Sarvaghaji, Yekvan, Kalan, Kalansura, Qeshlaq, Mollalu
- Very low: -

Table 16. The ranking of the villages in Germi County

Village	Score	Rank	Village	Score	Rank
Qarah Aghaj-e Pain	0.836	1	Parchin-e Sofla	0.418	19
Pormehr	0.588	2	Chalak	0.387	20
Takanlu	0.566	3	Tappeh	0.363	21
Aqa Mohammad Beyglu	0.540	4	Kuramalu	0.361	22
Ani-ye Vosta	0.539	5	Abbas Alilu	0.346	23
Ezmareh-ye Sofla	0.519	6	Hachakand-e Darmanlu	0.332	24
Ziveh	0.509	7	Zengir	0.331	25
Qarah Khan Beyglu	0.506	8	Shahrak-e Vali Asr	0.323	26
Kord Lar	0.505	9	Ani-ye Sofla	0.302	27
Beneh	0.485	10	Aranchi	0.290	28
Qasem Kandi	0.484	11	Own Bir Beyglu	0.284	29
Darmanlu	0.475	12	Sarvaghaji	0.272	30
Van-e Sofla	0.472	13	Yekvan	0.252	31
Nasrollah Beyglu	0.455	14	Kalan	0.239	32
Mohammad Taqi Kandi	0.448	15	Kalansura	0.225	33
Garmi Angut	0.435	16	Qeshlaq	0.217	34
Ani-ye Olya	0.430	17	Mollalu	0.214	35
Dizaj	0.418	18			

4.8. Potential of ecotourism development in the villages of Meshgin Shahr

Meshgin Shahr is in the top rank with 53 villages with a population of over 500 people. This county is composed of four districts of Arshaq, Moradlu, Central, and Meshgin-e Sharqi. According to the results of the TOPSIS model, the villages of Alni, Qowsheh-ye Sofla, Sarbanlar, Naqdi-ye Olya, and Movil are at the top of the list, and the villages of Mazraeh-e Khalaf, Kavich, Majandeh, Qarah Aghaj, Jamalabad, and Salman Kandi are the bottom of the list.

Table 17. The scores of villages in Meshgin Shahr County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Davahchi-ye Olya	0.100	0.106	0.516	Ballujeh Mirak	0.105	0.108	0.508
Qowsheh-ye Sofla	0.047	0.131	0.736	Bijaq	0.128	0.049	0.276
Koli-ye Olya	0.110	0.070	0.389	Dowlatabad	0.111	0.082	0.425
Qurt Tappeh	0.098	0.086	0.468	Sarbanlar	0.050	0.134	0.726
Gadeh Kahriz	0.116	0.059	0.338	Ahmadabad	0.113	0.063	0.359
Mazafa	0.096	0.086	0.482	Ahmad Beyglu	0.106	0.065	0.381
Salavat	0.086	0.124	0.589	Andazaq	0.091	0.096	0.512
Qarah Aghaj	0.130	0.041	0.241	Jamalabad	0.134	0.041	0.232
Kanchubeh	0.094	0.086	0.468	Hiq	0.118	0.059	0.333
Mashiran	0.094	0.110	0.540	Asrabad	0.135	0.073	0.351
Agh Bolagh	0.109	0.104	0.486	Ur	0.137	0.049	0.264
Barezil	0.094	0.094	0.501	Qosabeh	0.079	0.122	0.607
Parikhan	0.087	0.119	0.579	Majandeh	0.133	0.043	0.243
Tobnaq	0.135	0.053	0.281	Mazraeh-e Khalaf	0.127	0.045	0.261
Jabdaraq	0.071	0.130	0.645	Mir Kandi	0.109	0.095	0.466
Khorramabad	0.133	0.054	0.288	Arjaq	0.100	0.086	0.461
Dust Beyglu	0.119	0.057	0.324	Chapaqan	0.105	0.066	0.384
Sarikhanlu	0.105	0.077	0.421	Dadeh Beyglu	0.083	0.097	0.537
Saheb Divan	0.095	0.095	0.0497	Kavich	0.129	0.042	0.248
Arablu	0.120	0.057	0.321	Lombar	0.088	0.095	0.518
Qurt Tappeh	0.090	0.104	0.535	Anar	0.073	0.097	0.570
Kujanaq	0.081	0.127	0.610	Jalayer	0.130	0.076	0.367
Movil	0.066	0.139	0.679	Qarah Qayah	0.093	0.110	0.543
Nasirabad	0.129	0.047	0.267	Kangarlu	0.086	0.117	0.576
Salman Kandi	0.144	0.042	0.227	Arbab Kandi	0.108	0.096	0.471
Mizan	0.134	0.051	0.277	Naqdi-ye Olya	0.059	0.134	0.693
Alni	0.018	0.153	0.896				

The studied villages were divided into the following five categories:

- Very high: Alni
- High: Qowsheh-ye Sofla, Sarbanlar, Naqdi-ye Olya, Movil, Jabdaraq, Kujanaq, Qosabeh,
- Moderate: Salavat, Parikhan, Kangarlu, Anar, Qarah Qayah, Mashiran, Dadeh Beyglu, Qurt Tappeh, Lombar, Davahchi-ye Olya, Andazaq, Ballujeh Mirak, Barezil, Saheb Divan, Agh Bolagh, Mazafa, Arbab Kandi, Qurt Tappeh, Kanchubeh, Mir Kandi, Arjaq, Dowlatabad, Sarikhanlu
- Low: Koli-ye Olya, Chapaqan, Ahmad Beyglu, Jalayer, Ahmadabad, Asrabad, Gadeh Kahriz, Hiq, Dust Beyglu, Arablu, Khorramabad, Tobnaq, Mizan, Bijaq, Nasirabad, Ur, Mazraeh-e Khalaf, Kavich, Majandeh, Qarah Aghaj, Jamalabad, Salman Kandi
- Very low: -

Table 18. The ranking of the villages in Meshgin Shahr County

Village	Score	Rank	Village	Score	Rank
Alni	0.896	1	Mir Kandi	0.466	28
Qowsheh-ye Sofla	0.736	2	Arjaq	0.461	29
Sarbanlar	0.726	3	Dowlatabad	0.425	30
Naqdi-ye Olya	0.693	4	Sarikhanlu	0.421	31
Movil	0.679	5	Koli-ye Olya	0.389	32
Jabdaraq	0.645	6	Chapaqan	0.384	33
Kujanaq	0.610	7	Ahmad Beyglu	0.381	34
Qosabeh	0.607	8	Jalayer	0.367	35
Salavat	0.589	9	Ahmadabad	0.359	36
Parikhan	0.579	10	Asrabad	0.351	37
Kangarlu	0.576	11	Gadeh Kahriz	0.338	38
Anar	0.570	12	Hiq	0.333	39
Qarah Qayah	0.543	13	Dust Beyglu	0.324	40
Mashiran	0.540	14	Arablu	0.321	41
Dadeh Beyglu	0.537	15	Khorramabad	0.288	42
Qurt Tappeh	0.468	16	Tobnaq	0.281	43
Lombar	0.518	17	Mizan	0.277	44
Davahchi-ye Olya	0.516	18	Bijaq	0.276	45
Andazaq	0.512	19	Nasirabad	0.267	46
Ballujeh Mirak	0.508	20	Ur	0.264	47
Barezil	0.501	21	Mazraeh-e Khalaf	0.261	48
Saheb Divan	0.0497	22	Kavich	0.248	49
Agh Bolagh	0.486	23	Majandeh	0.243	50
Mazafa	0.482	24	Qarah Aghaj	0.241	51
Arbab Kandi	0.471	25	Jamalabad	0.232	52
Qurt Tappeh	0.535	26	Salman Kandi	0.227	53
Kanchubeh	0.468	27			

4.9. Potential of ecotourism development in the villages of Nir

The county of Nir with 9 villages had the fewest number of villages with a population of over 500 people in Ardabil province. The results of the TOPSIS model showed that the villages of Virseq and Busjin were at the top and the village of Vali Asr was at the bottom of the list.

Table 19. The scores of villages in Nir County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Busjin	0.222	0.347	0.609	Eslamabad	0.384	0.112	0.225
Qurtulmush	0.293	0.167	0.362	Diman	0.338	0.167	0.330
Qarah Shiran	0.337	0.209	0.383	Virseq	0.170	0.314	0.649
Majidabad	0.290	0.172	0.373	Golestan	0.241	0.231	0.490
Vali Asr	0.420	0.033	0.072				

The studied villages were divided into the following five categories:

- Very high: -
- High: Virseq, Busjin
- Moderate: Golestan
- Low: Qarah Shiran, Majidabad, Qurtulmush, Diman, Eslamabad
- Very low: Vali Asr

Table 20. The ranking of the villages in Nir County

Village	Score	Rank	Village	Score	Rank
Virseq	0.649	1	Qurtulmush	0.362	6
Busjin	0.609	2	Diman	0.330	7
Golestan	0.490	3	Eslamabad	0.225	8
Qarah Shiran	0.383	4	Vali Asr	0.072	9
Majidabad	0.373	5			

4.10. Potential of ecotourism development in the villages of Namin

Namin County has 35 villages and is the fourth county after Germin in the number of villages with a population of over 500 people. The results indicated that the villages of Anbaran-e Olya and Niyaraq were ranked first and second and the villages Hur, Kolosh, and Mahmudabad were ranked last.

Table 21. The scores of villages in Namin County for the ecotourism index

Village	Di+	Di-	LC	Village	Di+	Di-	LC
Anbaran-e Olya	0.000	0.224	1	Kolleh Sar	0.133	0.120	0.475
Jeyd	0.145	0.128	0.469	Gollu	0.171	0.070	0.292
Kolosh	0.211	0.049	0.190	Naneh Karan	0.120	0.139	0.536
Mirzanaq	0.163	0.085	0.342	Hur	0.210	0.050	0.192
Minabad	0.107	0.155	0.590	Saqqezchi	0.173	0.066	0.278
Anzab-e Sofla	0.136	0.128	0.484	Arkhazlu	0.105	0.142	0.575
Dowlatabad	0.116	0.145	0.556	Agh Bolagh-e Mostafa Khan	0.162	0.073	0.310
Saqsolu	0.156	0.102	0.395	Aladizgeh	0.201	0.057	0.222
Ali Bolaghi	0.143	0.090	0.387	Beris	0.138	0.119	0.463
Nowjeh Deh	0.127	0.135	0.516	Khalifehlu	0.162	0.073	0.310
Yeznabad	0.177	0.065	0.268	Suha	0.199	0.088	0.308
Yengejeh-ye Molla Mohammad Reza	0.160	0.075	0.320	Qarah Tappeh	0.172	0.069	0.288
Gerdeh	0.142	0.112	0.439	Garm Cheshmeh	0.200	0.052	0.205
Novashnaq	0.139	0.117	0.456	Mahmudabad	0.212	0.038	0.151
Pateh Khvor	0.192	0.065	0.254	Marani	0.151	0.086	0.364
Khaneqah-e Sofla	0.168	0.101	0.376	Niyaraq	0.080	0.172	0.682
Dagermandaraq	0.196	0.061	0.239	Yunjalu	0.195	0.059	0.231
Sula	0.176	0.058	0.247				

The studied villages were divided into the following five categories:

- Very high: Anbaran-e Olya
- High: Niyaraq
- Moderate: Minabad, Arkhazlu, Dowlatabad, Naneh Karan, Nowjeh Deh, Anzab-e Sofla, Kolleh Sar, Jeyd, Beris, Novashnaq, Gerdeh
- Low: Saqsolu, Ali Bolaghi, Khaneqah-e Sofla, Marani, Mirzanaq, Yengejeh-ye Molla Mohammad Reza, Agh Bolagh-e Mostafa Khan, Khalifehlu, Suha, Gollu, Qarah Tappeh, Saqqezchi, Yeznabad, Pateh Khvor, Sula, Dagermandaraq, Yunjalu, Aladizgeh, Garm Cheshmeh
- Very low: Hur, Kolosh, Mahmudabad

Table 22. The ranking of the villages in Namin County

Village	Score	Rank	Village	Score	Rank
Anbaran-e Olya	1	1	Yengejeh-ye Molla Mohammad Reza	0.320	19
Niyaraq	0.682	2	Agh Bolagh-e Mostafa Khan	0.310	20
Minabad	0.590	3	Khalifehlu	0.310	21
Arkhazlu	0.575	4	Suha	0.308	22

Village	Score	Rank	Village	Score	Rank
Dowlatabad	0.556	5	Gollu	0.292	23
Naneh Karan	0.536	6	Qarah Tappeh	0.288	24
Nowjeh Deh	0.516	7	Saqqezchi	0.278	25
Anzab-e Sofla	0.484	8	Yeznabad	0.268	26
Kolleh Sar	0.475	9	Pateh Khvor	0.254	27
Jeyd	0.469	10	Sula	0.247	28
Beris	0.463	11	Dagermandaraq	0.239	29
Novashnaq	0.456	12	Yunjalu	0.231	30
Gerdeh	0.439	13	Aladizgeh	0.222	31
Saqsolu	0.395	14	Garm Cheshmeh	0.205	32
Ali Bolaghi	0.387	15	Hur	0.192	33
Khaneqah-e Sofla	0.376	16	Kolosh	0.190	34
Marani	0.364	17	Mahmudabad	0.151	35
Mirzanaq	0.342	18			

According to the output of the TOPSIS model (Figure 3), the village of Anbaran-e Olya in Namin County (LC = 1) was found to be the best village for the development of ecotourism. Also, the villages of Alni in Meshgin Shahr (LC = 0.896), Shal in Khalkhal (LC = 0.855), Qarah Aghaj in Germi (LC = 0.836), Gug Tappeh in Bileh Savar (LC = 0.821), and Somarin in Ardabil (LC = 0.804) have high potential for the development of rural ecotourism.

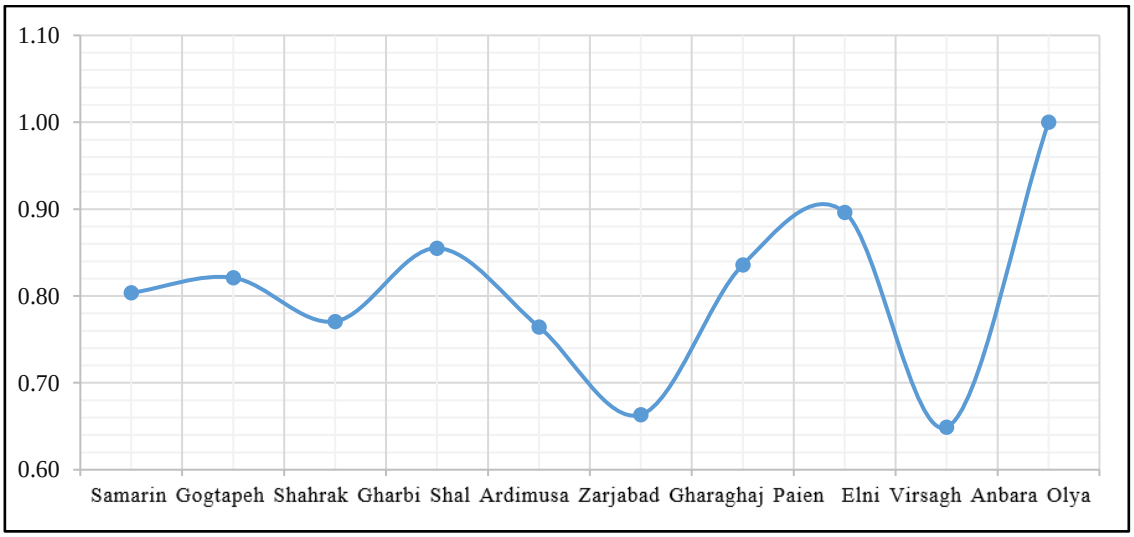

Figure 3. The best villages for the development of rural ecotourism in Ardabil province

5. Discussion and Conclusion

As the most compatible tourism type, ecotourism has drawn attention more than other forms of tourism for rural development in recent years. Since some villages have no or very weak potential for the development of ecotourism, it is imperative to select villages for this purpose consciously. The prioritization of villages for the development of rural tourism is even more important when considering the constraints on financial resources. So, the present study aimed to analyze the infrastructure for the development of rural ecotourism in Ardabil province. The results of the analysis were used to answer the research questions. Regarding the question as to which villages have higher potential for the development of rural ecotourism in Ardabil province, the results showed that the villages of Somarin, Gug Tappeh, Shahrak-e Gharbi, Shal, Ardi Musa, Zarjabad, Qarah Aghaj-e Pain, Alni, Virseq, and Anbaran-e Olya had the highest potential for the development in rural ecotourism in the counties of Ardabil, Bileh Savar, Parsabad, Khalkhal, Sareyn,

Kowsar, Germi, Meshgin Shahr, Nir, and Namin, respectively. Among these villages, Anbaran-e Olya in Namin obtained a TOPSIS score of 1, showing the best performance across the province. Regarding the question as to what fraction of the studied villages can be candidates for becoming a rural ecotourism hub in Iran, it was found that out of the studied 311 villages, six villages of Anbaran-e Olya, Alni, Shal, Qarah Aghaj-e Pain, Gug Tappeh, and Somarin with CL scores of 1, 0.896, 0.855, 0.836, 0.821, and 0.804, respectively can have the performance in the development of rural ecotourism. They account for 2 percent of the studied villages. Also, 26 villages (8%) have high potential. A total of 134 villages were put in the category of moderate potential and 134 villages in the category of low potential, each accounting for 43 percent of all the studied villages. So, most studied villages were put in the categories of moderate and low potential. Finally, 11 villages (8%) have very low potential. These results are somewhat consistent with the reports of Lotfi (2019), Kia Kojori and Isa Kakroodi (2015), and Maleki et al., (2013) regarding the fact that rural ecotourism can be developed by planning for, managing, and recognizing their potential. The difference arises from the fact that our results are based on real data, while these studies have mostly used questionnaires and the SWOT model. According to the results, it is recommended to

- plan for attracting investors for villages with very high potential (Anbaran-e Olya, Alni, Shal, Qarah Aghaj-e Pain, Gug Tappeh, and Somarin),
- introduce Anbaran-e Olya in Namin County as the best tourism village in Iran,
- provide more facilities for 28 villages with high potential for the development of ecotourism, and
- provide incentives for investment in tourism hubs of each county in the province.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

The authors equally contributed to the preparation of this article**.**

Conflict of interest

The author declare no conflict of interest.

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Journal of Research and Rural Planning
Volume 11, No. 4, Autumn 2022, Serial No. 39, Pp. 73-98
eISSN: 2783-2007 **ISSN: 2783-2791**
http://jrrp.um.ac.ir

Original Article

تحلیل زیرساخت‌های توسعه اکوتوریسم روستایی در استان اردبیل

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چکیده مبسوط

۱. مقدمه

در میان رویکردهای متعدد برای گردشگری پایدار، اکوتوریسم به‌عنوان سازگارترین نوع گردشگری با بزرگ‌ترین پتانسیل مطرح شد. این شکل گردشگری احترام عمیقی نسبت به مردم، مکان‌های گردشگری و اشیایی که مورد بازدید قرار می‌گیرند دارد و در آن تأکید خاصی روی حفاظت از منابع طبیعی و فرهنگی، درگیر کردن مردم محلی در فرآیندهای برنامه‌ریزی و ایجاد رفاه برای این مردم دیده می‌شود. ازآنجایی‌که نقاط روستایی از پتانسیل‌های گردشگری در ابعاد مختلف اجتماعی، فرهنگی، اقتصادی و طبیعی برخوردار هستند می‌توانند یکی از کانون‌های گردشگری در قلمرو سرزمینی باشند. از میان فرصت‌های گردشگری موجود در مناطق روستایی، وجود جاذبه‌های طبیعی، چشم‌اندازهای بکر و آب‌وهوای مناسب، زمینه را برای توسعه اکوتوریسم در روستاها بیش از سایر جنبه‌های توسعه گردشگری تقویت می‌کند. درواقع اکوتوریسم مناطق روستایی با توجه به ظرفیت‌های طبیعی و فرهنگی موجود در روستاها، می‌تواند فرایند باارزشی در تجدید حیات روستاها، ایجاد اشتغال و درآمد برای روستاییان باشد و به‌عنوان اقتصاد مکمل روستایی راهکاری مفید در جهت کاهش فقر و کاهش مهاجرت‌های روستایی به شهر و افزایش سطح رفاه مردم روستایی مطرح است و می‌تواند تأثیر همه‌جانبه بر زندگی مردم روستایی داشته باشد.

با توجه به اهمیت اکوتوریسم و اینکه استان اردبیل با داشتن جاذبه‌های بسیار زیاد و منحصربه‌فرد مستعد توسعه اکوتوریسم در سطح کشور می‌باشد و این ویژگی‌ها و مزیت‌ها در صورت برنامه‌ریزی می‌تواند مبنای توسعه پایدار روستایی استان تلقی شود. لذا پژوهش حاضر باهدف تحلیل زیرساخت‌های توسعه اکوتوریسم روستایی در روستاهای بالای ۵۰۰ نفر جمعیت استان اردبیل انجام‌شده است.

۲. مبانی نظری

تاریخچه اکوتوریسم به سال ۱۹۶۵ میلادی بازمی‌گردد و از ترکیب دو واژه "اکولوژی" و "توریسم" تشکیل‌شده است. در سطح بین‌الملل، اکوتوریسم به‌عنوان مفهومی که ریشه در حفاظت منابع طبیعی و آرمانه‌ای توسعه‌ی پایدار دارد، مطرح‌شده است."انجمن بین‌المللی اکوتوریسم (TIES) اکوتوریسم را این‌گونه تعریف می‌کند. سفر مسئولانه به عرصه‌های طبیعی که اهداف عمده‌ی آن حفاظت از منابع محیط‌زیست طبیعی و ارتقای سطح زندگی جوامع محلی است. اکوتوریسم مانند هر فعالیت دیگری مزایا و مضراتی دارد. مسلماً در این شاخه از گردشگری هرچه اساس و ضوابط عمل شود زیان‌های ناشی از آن کاهش میابد و هرچه برنامه‌ها شتاب‌زده و بی‌انضباط پیش رود تبعات منفی آن بیشتر خواهد بود. یکی از مشکلات فعالان در این بخش متقاعد کردن افراد به رعایت اصول و قواعد اکوتوریسم است. به‌ویژه اگر موضوع منافع مالی و کاهش سوددهی در میان باشد این مشکلات وسیع‌تر و عمیق‌تر خواهد بود. از دیگر مسائل توریسم وجود باید متفاوت در این شاخه‌ای از گردشگری است که به گروه‌های مختلف فرصت می‌دهند تا بانام اکوتوریسم به اهداف و منافع خود برسند.

۳. روش‌شناسی تحقیق

پژوهش حاضر به لحاظ هدف و ماهیت به ترتیب از نوع کاربردی و روش‌های تحلیلی و توصیفی است. محدوده مکانی موردمطالعه ۳۱۱ نقطه روستایی بالای ۵۰۰ نفر جمعیت استان اردبیل و حجم نمونه ۵۰ نفر از دانشجویان و اساتید گردشگری جهت تعیین اهمیت

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شاخص‌ها است و اهمیت‌ها به ترتیب از ۵ تا ۱ می‌باشد. داده‌های کمی مورداستفاده در این پژوهش از طریق اطلاعات مندرج در شناسنامه آبادی‌ها که توسط معاونت توسعه روستایی و مناطق محروم کشور انتشار می‌یابد به‌دست‌آمده و با استفاده از مدل تاپسیس تحلیل‌شده و روستاها با توجه به امتیاز به‌دست‌آمده به پنج گروه با قابلیت اکوتوریسم خیلی بالا (۱ الی ۰/۸۰)، بالا (۰/۸۰ الی ۰/۶۰)، متوسط (۰/۶۰ الی ۰/۴۰)، پایین (۰/۴۰ الی ۰/۲۰) و خیلی پایین (۰/۲۰ الی ۰) تقسیم شدند.

۴. یافته‌های تحقیق

باتوجه به خروجی مدل تاپسیس، روستای عنبران علیا شهرستان نمین با میزان تاپسیس ۱ بهترین روستا جهت توسعه اکوتوریسم می‌باشد. همچنین روستای آلنی مشکین‌شهر با امتیاز ۰/۸۹۶، روستای شال شهرستان خلخال با امتیاز ۰/۸۵۵، روستاهای قره‌آغاج شهرستان گرمی با امتیاز ۰/۸۳۶، روستاهای گوک‌تپه شهرستان بیله‌سوار با امتیاز ۰/۸۲۱ و روستای ثمرین شهرستان اردبیل با امتیاز ۰/۸۰۴ از پتانسیل بالایی برای اکوتوریسم روستایی برخوردار هستند. به طور کلی نتایج تحلیل‌های انجام‌شده نشان داد که در شهرستان‌های اردبیل، بیله‌سوار، پارس‌آباد، خلخال، سرعین، کوثر، گرمی، مشکین‌شهر، نیر و نمین به ترتیب روستاهای ثمرین، گوگتپه، شهرک غربی، شال، اردیموسی، زرج آباد، قره‌آغاج پائین، النی، ویرسق و عنبران علیا از بالاترین قابلیت توسعه اکوتوریسم روستایی برخوردار هستند. در این میان روستای عنبران علیا شهرستان نمین با امتیاز تاپسیس ۱ بهترین عملکرد را در کل استان دارا می‌باشد.

۵. بحث و نتیجه‌گیری

نتایج تحلیل‌های انجام شده با استفاده از مدل تاپسیس حاکی از آن است که از ۳۱۱ روستای مورد مطالعه، ۶ روستای عنبران علیا، النی، شال، قره‌آغاج پائین، گوگتپه و ثمرین به ترتیب با امتیاز CL برابر ۱، ۰/۸۹۶، ۰/۸۵۵، ۰/۸۳۶، ۰/۸۲۱ و ۰/۸۰۴ بهترین و بالاترین عملکرد را در زمینه توسعه اکوتوریسم روستایی دارا هستند که مجموع ۲ درصد از روستاها را تشکیل، تعداد ۲۶ روستا(۸درصد) در وضعیت بالا قرار دارند. تعداد ۱۳۴ روستا در وضعیت متوسط و تعداد ۱۳۴ روستا در وضعیت پایین قرار دارند که هریک ۴۳ درصد را به خود اختصاص داده‌اند. به‌این‌ترتیب بیشتر روستاهای موردمطالعه در طبقه متوسط و پایین قرارگرفته‌اند. درنهایت ۱۱ روستا که شامل ۸ درصد از روستاها می‌باشد در وضعیت خیلی پایین قرارگرفته‌اند. نتایج پژوهش حاضر به طور تقریبی با نتایج پژوهش‌های لطفی(۱۳۹۸)، کیا کجوری و عیسی کاکرودی(۱۳۹۴)، ملکی و همکاران (۱۳۹۲) در این مورد که درصورت برنامه‌ریزی، مدیریت و شناخت پتانسیل‌ها می‌توان اکوتوریسم روستایی را توسعه داد؛ برابر می‌باشد. تمایز یافته‌های این پژوهش در این می‌باشد که نتایج تحقیق حاضر براساس داده‌های واقعی بدست آمده درصورتیکه اغلب پژوهش‌های انجام شده در این زمینه با استفاده از ابزار پرسشنامه و مدل SWOT به نتایجی دست یافته‌اند.

کلیدواژه‌ها: اکوتوریسم، روستا، تاپسیس، استان اردبیل.

تشکر و قدرانی

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How to cite this article:

Imani, B. & Alavi, S. (2022). An analysis of the infrastructure for the development of rural ecotourism in Ardabil Province. *Journal of Research & Rural Planning*, *11*(4), 73-98.

http://dx.doi.org/10.22067/jrrp.v11i4.2207.1053

Date:

Received: 12-07-2022

Revised: 19-09-2022

Accepted: 27-10- 2022

Available Online: 31-12-2022