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Land Quality Management for Ecotourism Development; Case of Mahallat District

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Authors' contributions

This work was carried out in collaboration between both authors. Author SP designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SA managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

This study aimed to evaluate a combination of Multi Criteria Decision Making (MCDM) methods for land quality management in Ecotourism planning for identifying the most important strategies for ecotourism development planning. Mahallat city was chosen as the study area. It is located in the south-eastern of Markazi Province, Iran. In this study, the internal strategic factors (strengths and weaknesses) and external factors (opportunities and threats) were identified. Then, MCDM, especially Analytic Network Process (ANP) and decision-making trial and evaluation laboratory (DEMATEL) techniques, were used in the matrix to evaluate and prioritize these factors and to develop proposed strategies. Then, using a designed network model, the proposed strategies were weighted and the main strategies of the evaluation matrix were ranked. Research findings revealed that the most effective strategy is an emphasis on nature tourism and eco-tourism development due to natural, historical and cultural attractions as an absorbent factor and tourism development model in order to enhance regional development. Based on the results, this research successfully identified the effective strategies in the framework of weakness and strengths, opportunities and threats and their weights and ranks of criteria by ANP and DEMATEL. Finally, this method helped to make

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suitable strategies for sustainable development of ecotourism in Mahallat district. Therefore, the study showed that MCDM can be applied to manage land and implement land use programs as a qualitative method.

Keywords: Strategic planning; land management; urban ecotourism planning; Mahallat district.

1. INTRODUCTION

Land quality relates to the potential and capacity of land components for different applications. These components include soil, biological properties, weather and other ecosystem' elements which determine the land capability for some utilities such as conservation, production or environmental management [1]. In addition, effective land management and land quality monitoring leads to a suitable use of land resources and development of quantitative Land Quality Indicators (LQI) [2]. LQI program is a joint plan of UNDP, FAO, the World Bank and UNEP to guide countries' stakeholders and planners to apply their land quality information for a better use of natural resources. Land quality assessment has been presented in FAO since 1945. After that, many governments have conducted land capability classification and land evaluation in their countries since 1970 [3].

Implementation of land quality management programs requires effective and principled planning in order to achieve urban sustainable development. Also, the implementation of mentioned process should be done accurately. As urban sustainable development is a significant environmental issue, it can be accomplished using land quality indicators. Many researchers have used LQI for different purposes all around the world. Dumanski and Pieri published a research plan about land quality indicators. The researcher classified the impacts of human interventions on the landscape in tropical, sub-tropical and temperate environment zones [4]. P.S. Bindraban et al. [2] applied this method in the study of land quality indicators for sustainable land management. The focus of the present study was on yield gap and soil nutrient balance. They defined the yield gaps and nutrient balance indicators and described their quantification. Therefore, the general applicability of land for given applications was discussed [2]. Other researches have been done by Geyer et al. [5] in 2011. They analysed the agriculture potential of developed lands and the effect of the urban growth on these agricultural lands between 2002 and 2007. Finally, they claimed that high potential of agricultural lands in the urban area

was allocated for agricultural use and other parts (outside of the urban area with little agricultural capability) were suitable for future urban development [5]. Iranian researchers carried out few studies about land quality. Sepehr et al. [6] evaluated land quality in Turan protected area using Destruction Model. The researchers stated that protection levels have no effect on land quality [6]. In another study; Mirkarimi et al. [7] investigated the evaluation of the visual quality of the landscape. The researchers in given study illustrated that this is a useful method for different environments. Also, they stated that the results of the present study can be helpful for tourism manager to identify visual quality by spending less cost and time [7].

Tourism is one of the world's largest economic activities. This activity can grow faster than any other economic sectors and create new job opportunities for people living in urban area. Also, this application is considered as an industry pioneer. In addition, tourism dependency on cultural assets, natural health, and the environment is raised as an important element in growth and development of tourism industry. Thus, the need for a systematic approach to guarantee sustainable eco-tourism development and a balance between economic, social and environmental development is an inevitable necessity in urban planning. Also, this issue requires complete recognition of the study area, quantitative assessment and unique scoring indicators. These steps can be due to this fact that all the available parameters cannot be stability guarantor. The main objective of this study is to provide a novel method for planning eco-tourism development in urban areas using decision-making models based on land quality indicators. This method determines the best developmental strategies by assessing capabilities, weaknesses, opportunities, and threats, then quantifying these factors and finally creating urban ecotourism sustainable development planning. Many types of research have been done by the development of ecotourism at the global level. Some of these studies are about zoning ecotourism activities for Shells Uganda Africa region, ecotourism planning in Western India and evaluating the

tourism biosphere reserve in China by using Entropy method [8,9,10].

One of the innovations of the present study is using a combination of Multi Criteria Decision-Making for obtaining research purposes. Furthermore, strategic planning model is proposed as a successful way to find opportunities and threats in the form of development spatial analysis and implement the best method in ecotourism developmental planning. As seen, this is a qualitative model and multi-criteria decision-making methods can play a unique role as a complementary factor to quantify and prioritize effectively the factors weighting and ranking to determine planning priorities and the feasibility of eco-tourism development. In the case of management practices in tourism development, different methods can be used. Some studies determine a set of criteria for the indices with environmental objectives. These criteria will connect the environment condition with economic and social terms [11,12]. The SWOT model is the most efficient model in strategic planning [13]. Its main purpose is to present strategies that provide the best link and relationship between internal and external environmental factors. The strategy which is based on the final assessment, should be able to link the strengths and opportunities, it can minimize weaknesses and threats and converts weaknesses to strengths and threat to opportunities.

Many studies have been done on the use of integrated decision-making models. One of these studies is the integration of SWOT-AHP that done by Kurttila et al. [14] this study quantified the SWOT factors using hierarchical techniques for the first time. Then by using SWOT-AHP technique required information about the target group was obtained [14]. In some other studies, Analytical Hierarchy Process was used to rank the SWOT factors [15,16]. In addition, Masozera et al. [17] performed systemic management of involved administration in management and protection of forest area by this integrated model. Dwivedi and Alavalapati [18] used this integrated model for evaluation of forest biomass for bio-energy development. Also Kajanus et al. [19] used multi-criteria decision-making methods for quantifying the SWOT method for tourism development planning. Afterward, in 2012 they used this model in order to strategic management of natural resources. In another study, Basin used an integrating SWOT-AHP with Fuzzy TOPSIS decision-making method

[20]. FAHP- SWOT integration by Sevklı et al. [21] is considered as another study on the use of integrated models to quantify SWOT factors. Using Multi-Attribute Decision-Making methods in combination with SWOT was done by Marbini et al. and Sariisikin [22,23]. Yüksel and Dagdevirenin [24] used the ANP-SWOT integration with the aim of considering factors internal relations. On the other hand, Analytic Network Process has great potential for using in environmental planning [25,26,27].

Analytic Network Process (ANP) model due to considering the feed backs and interactions seems more logic in a natural system. This model is capable of processing all dependent and independent factors. It is the only mathematical theory provides a study of different types of interactions, dependencies and feedbacks systematically. Because communications in Analytic Network Process are unilateral and are done with dependencies, the issue is out from linear mode and final alternatives ranking requires complex calculations to create a big matrix (super matrixes), limited matrix and final matrix [28]. In some studies, ANP method was used in order to solve land problems [29,30,31]. So, the present study can be a base of a new idea about the feasibility of development capabilities along with the environmental protection by combining these two methods with DEMATEL technique which determines the effective factors [32,33].

2. METHODOLOGY

2.1 Study Area

Mahallat is located in the south eastern area of Markazi Province. This city is limited from the North and North East to Delijan city, from North West to Arak, from the West to the city of Khomein and South to Isfahan province. The area of this city is 1996 Km² which in terms of area is eighth and about 6.85percent of the province is allocated there. Fig. 1 shows the location of Mahallat in Markazi province.

In 2014 population of Mahallat was 53381. The city's population ratio was 3.77 percent of the total Markazi province's population. From this population, the Mahallat urbanization rate is 84.95% that is the highest rate of urbanization in Markazi province. Furthermore, population age and sex pyramid of this city shows that the city is normal in terms of age and sex ratio. Also, 91.28 percent of the city total active population is

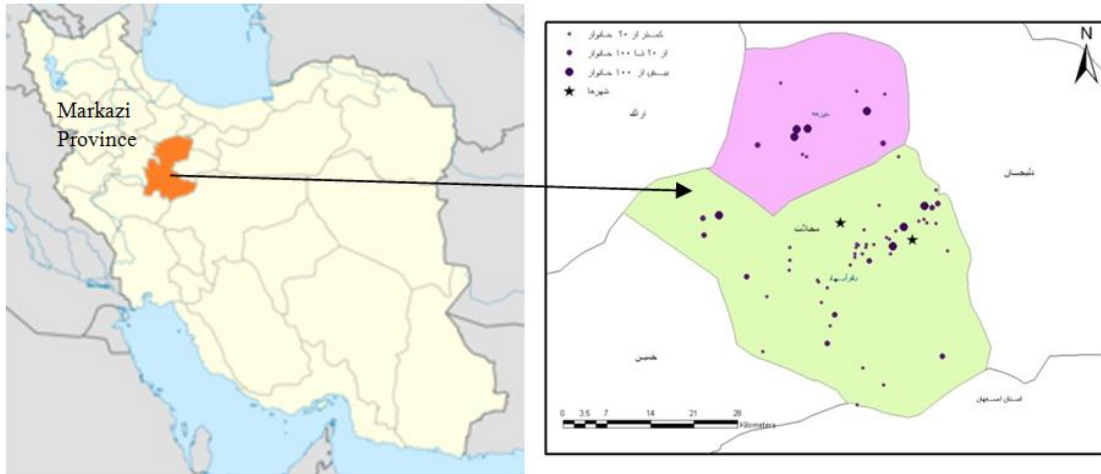


Fig. 1. Location of Mahallat City

employed and 8.72 percent of them are unemployed. The unemployment rate is less than provincial average rate. The main role of providing job opportunities respectively is in the service sector (48.55%) and industry and mining sectors (27.10%) but just 15.49% in agriculture and 8.84% in construction sectors are engaged.

Mahallat is placed in a semi-arid climate and its rainfall is limited too. This city is located in Qomroud catchment. Due to the presence of some rivers within the city, the surface water and ground water resources are relatively suitable for development. Area morphological landscape includes mountains and broad hills with small plains. Scattering of villages in the city is high. Because of the existence of hot springs and gardens of flowers, every year is the host of a large number of internal travellers and foreign visitors.

The attractions in this city that justifies the development of ecotourism as land indicators include: Existence of valuable cultural and religious monuments, bring the city in the direction of religious, historical and recreation tourism, cultural attractions including cultural celebrations and local customs, natural attractions including caves, surface water resources, springs in particular mineral springs and hot springs, mountains and the soaring peaks, unique landscapes, countryside, green spaces and gardens, gardens and narrow sloping streets, existence of Mahallat plants national research center, village of flowers, export terminal and greenhouses allocated to

growing flowers, suitable climate and fertile lands in order to production of medicinal and ornamental flowers and plants, cultural factors supporting tourism such as hospitality of residents, the high rate of urbanization and proportional population structure in the city that are seeking to develop the ecotourism industry. Identifying development potentials of ecotourism in this area will make it as one of the most attractive ecotourism areas at the regional level and even in the world. Despite the unique natural capabilities and even appropriate social structure in terms of public education, employment, and social capital, still a comprehensive planning has not been implemented for the development of tourism in Mahallat city.

2.2 Materials and Methods

The method of data collection and analysis of required information was documental, analytical and surveying. The research attempt is a systemic and comprehensive approach focused on comprehensive environmental analysis, in diagnosing and identification of various internal and external forces that the system is faced with. Therefore, the method is a combination of some decision-making tools. At first, the SWOT model has provided a list of opportunities, threats, strengths and weaknesses in the framework of standard tables. Then regional and spatial analysis was presented. In the process of extracting basic elements of SWOT expert opinions as well as the province planning studies and researches on the preparation of document of the fifth development plan of Markazi province were used.

Nowadays, many approaches and techniques are used in the process of strategic management. Among these approaches, analysis of the strengths, weaknesses, opportunities, and threats, or SWOT analysis is more practical. SWOT analysis has two main components:

- 1- Analysis of internal environment that is characterized by strong and weak points.
- 2- Analysis of a system external environment that will be expressed through existing threats and programmable opportunities.

This technique is one of the most successful techniques of decision support tools that provide a clear view of the current situation and trends prevailing for policy makers and also in the next parts of planning, it helps to compile develop strategies and sure targeting. Despite the important capabilities of SWOT technique, this method has weaknesses in measurement and assessment steps. This problem is due to lack of quantitative property and absence of weighing, the effects of each factor on development strategies cannot be identified separately. In other words, this technique is not an analytical tool to determine the relative importance of involved factors in strategy. In addition, it cannot give an appropriate priority for extracted strategy alternatives based on four analysis factors of indoor and outdoor environments. For this reason, the results of SWOT analysis area list of affecting internal and external factors regardless of their effectiveness ranking. To solve this problem, multi-criteria decision-making methods should be used. These methods have investigated the system in the form of a network of feedbacks and interactions.

In this research, after identifying a list of internal (strengths and weaknesses) and external environmental factors (opportunities and threats) to enhance efficiency in the process of strategic planning and also determination of importance and priority for each of the groups and assessing intra-group and intergroup relations and optimization of strategies provision, a combination approach of two DEMATEL and Analytic Network Process techniques have been applied.

Analytic Network Process approach was proposed in 1996 [28]. This method has developed because of AHP limitations, the inability of this approach in terms of the interdependence between the criteria and

factors, and having a framework with the unidirectional hierarchical relationship. ANP model is capable to process all dependent and independent factors. It is the only mathematical theory that provides the possibility to check the different types of interactions, dependencies, and systemic feedbacks. In this model, the pair-wise comparison is used to form matrices. These forms of matrix take advantage from multi-attribute models that are used in Analytical Hierarchy Process (AHP) and Analytic Network Process (ANP). ANP has a great potential for using in environmental planning. Because in ANP the communications have done in the form of unilateral and with dependency, the issue takes out from the linear mode and so the calculation of the final alternatives ranking requires complex calculations to create a huge matrix (Super matrixes), limited matrix and final matrix. The first phase of ANP is to compare parameters by the pairwise comparison method in the whole system, as long as the super matrix will be created. Super matrix is formed by experts' pair-wise comparison. In comparison between two indexes with a score range of 1-9, number 1 means the equal importance and number 9 means a considerable difference between two indexes. Thus, obtained data from performing pair-wise comparison make a Super Matrix [34]. A super matrix is a complex matrix of N branches, different components ($C_a, C_b, C_c, \dots, C_n$) and relations between the components weight. The general form of a super matrix can be as follows [28]:

$$W = \begin{matrix} & \begin{matrix} C_1 & C_2 & \dots & C_m \end{matrix} \\ \begin{matrix} e_{11} \dots e_{1n_1} \\ e_{21} \dots e_{2n_2} \\ \vdots \\ e_{m1} \dots e_{mn_m} \end{matrix} & \begin{bmatrix} W_{11} & W_{12} & \dots & W_{1m} \\ W_{21} & W_{22} & \dots & W_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ W_{m1} & W_{m2} & \dots & W_{mm} \end{bmatrix} \end{matrix} \quad (1)$$

Super matrix shape depends on variety and quality of its components and structure. After the formation of the super matrix, weighted super matrix adjusted in such a way that the sum of all columns is equal to 1. To obtain the final matrix, the weighted matrix should be power to a high number. On the other hand, if the super matrix has cyclical effects, some of the criteria have interactions, it needs to define several final super

matrices which should use the following formula such that the mean effects of the final matrix be stated:

$$\lim_{k \rightarrow \infty} \left(\frac{1}{N} \right) \sum_{k=1}^N W^k \tag{2}$$

The DEMATEL technique was designed and performed by Research Institute of Genoa in 1976 to determine the criteria presence or absence and its relationship and effects on each other [35,36]. In addition, mentioned method using a matrix of direct relations, total relations and by MATLAB software will be led to determine the effect of internal factors. The advantage of this technique is that in the pair-wise comparison, direct relations will be assessed by pairwise comparison and indirect relations are calculated by the technique. This method helps the planner to find the affecting factors by following steps:

- 1: Pairwise comparison between criteria using verbal words:
- 2: Forming direct relations Matrix:

A primary matrix of direct relation ($A=(a_{ij})$ Direct- relation matrix) is a $n * n$ matrix and is established based on the pair- wise comparisons among the criteria. The intensity of the factors' effect on each other is categorized by pair-wise comparison in four sections of 0 to3 (0 means without effect and 3 means immense effect).

- 3: Normalizing the direct relation matrix
- 4: Calculation of total relation matrix

T matrix that indicates the relative effect of the direct and indirect relations calculated by the Eq 3.

$$T=X(I-X)^{-1} \tag{3}$$

- 5: Forming a casual diagram

In this phase, the sum of rows' elements and also the sum of column elements and their differences in the T matrix are calculated.

$$T= [t_{ij}]_{n,n} \tag{4}$$

$$D= [\sum t_{ij}]_{n,1} \tag{5}$$

$$R= [\sum t_{ij}]_{1,n} \tag{6}$$

D-value for each factor reflects the effect of this factor on the other system factors and R-value

represents how much each factor is affected by other factors. Also, the sum of $R + D$ for each system component shows its importance and weight in the system and determines the overall effectiveness. The final amount of how much each factor can affect other factors obtained by calculating D-R. So, by forming a Cartesian coordinates and determining the location of each factor appointed in the system, a simple graphical view of the system's final structure will be obtained. T vectors form the sum of rows and columns for a matrix. So, the vertical axis (D-R) and the horizontal axis (D + R) is displayed. Thus, criteria are placed on two cause groups. Then if $(D-R) < 0$, the criteria will be placed in the affected group.

In order to implement DEMATEL technique along with SWOT analysis, the first step is to draw its network model. This helps how to understand the relationship between matrix factors. Dagdeviren and Yuksel [24] showed the relationship among factors in a SWOT matrix using Analysis Network Process. Based on their research, these factors are not independent and their dependence is as bellow model and can be examined by pairwise comparison [24].

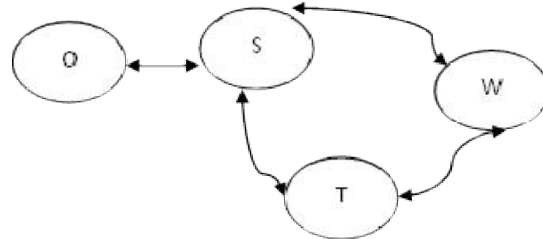


Fig. 2. The interdependences of SWOT analysis factors

According to Fig. 2, opportunity factor was in the direct relation only with the strength factor and it had an indirect relationship with the weaknesses and threats. The advantage of this technique is that in the pair-wise comparisons, direct relationship is measured by pair-wise comparison and indirect relation by the technique. In comparison between two indices with a score of 9-1, number 1 is related to equivalent importance and number 9 means a significant difference between the two indices [36]. This technique works like analytic network in some stages. But eventually, instead of factors ranking use affecting and being affected feature of factors. SWOT list is obtained in technical sessions and converted into specialized questionnaire in form of pair-wise comparisons.

All executive agencies' experts who were involved in the planning process of Mahallat were invited to a technical meeting and questionnaires were distributed. Then, the technical discussions took place. This assumes that identified factors and sub factors should be able to link between strengths and opportunities, minimize weaknesses and threats and also convert weaknesses into strengths and threats to opportunities. The related data to the pair-wise comparisons were in the form of a questionnaire carried out by each respondent, then super matrix made by using analytic network and were analyzed using DEMATEL. Afterward, MATLAB software was used for determination of presence or absence of the relationship and the effectiveness between direct relation and total relation matrixes. Finally, the flow graph was drawn. By drawing Flow graph, the most important factors affecting the development of eco-tourism in the SWOT model were revealed. Then, strategies conforming to tourism sustainable development and sustainable eco-tourism in Mahallat were presented that can be a

basis for the development of eco-tourism planning.

3. RESULTS AND DISCUSSION

According to experts' meetings, six Strength sub-factors, eight Weakness sub-factors, three threat sub-factors and four opportunities sub-factors were listed. Based on objectives of sustainable eco-tourism in the Mahallat city, the final list of SWOT factors is formed in Table 1.

Based on ANP procedure explained in the Method part, the following table showed the factors' final weights. Relevant information achieved from experts and specialists in the given field using a questionnaire, pair-wise comparison and forming ANP super matrix. Then DEMATEL technique led to perform flow graph calculations using MATLAB software. Afterward, intensity value of direct and indirect relations was extracted. SWOT ranking has been shown in Table 2 according to effectiveness, being affected, relation vector and preference vector.

Table 1. Strengths, weaknesses, constraints, opportunities and threats in ecotourism development of Mahallat City

Weakness	Strength
W1: Villages dispersion, negative growth rates and their emigration.	S1: High contribution of service sector employment and the development of cultural facilities and social welfare.
W2: Lack of residential and tourism infrastructure, interstate welfare buildings and lack of information centers.	S2: Using young, indigenous and cheap workers to strengthen the region's economy
W3: Lack of cultural, local (local fairs and festivals) programs in order to introduce the rich cultural heritage of the region.	S3: Existence of a research center for flowers and ornamental plants and favorable conditions to produce medicinal and ornamental flowers and plants.
W4: Weak links within the province and tend to use the services of neighbor provinces in particular Tehran.	S4: Positive population developments: a balanced sex ratio, low unemployment rate, high urbanization, and literacy rate.
W5: The absence of a strong communication network and the lack of direct access to the airport, highway and rail networks.	S5: Suitable climatic conditions and surface water and ground water resources.
W6: Scattering attractions and the absence of numerous attractions side by side and the lack of information panels on the roads.	S6: A unique feature of natural, historical and cultural attractions as a tourism attraction and regional tourism model development.
W7: The lack of integrated management and sustainable development of tourism in the region.	S7: Locating in the path of historical, recreational and religious tourism.
Threats	Opportunities
T1: Huge effective problems such as different interest rates, systematic subsidies, a multi-policy of decision making, instability in economic market and prices and lack of economic competition.	O1: Supporting private sector investment and funding of indigenous peoples in the social, cultural and especially the activities of NGOs.
T2: The risk of occurrence of unexpected natural disasters such as earthquakes in the city.	O2: Geographical location and proximity to densely populated centers and tourist origins such as Tehran, Isfahan, and Hamedan.
	O3: Explained proper perspective for the city in the development documents of province and country.

Table 2. Ranking the SWOT factors in Mahallat according to affecting and affected degree

	R	Rank	D	Rank	D+R	Rank	D-R	Rank
o1	1,815	2	1,829	2	3,645	2	0,014	2
o2	1,982	1	2,125	1	4,107	1	0,144	1
o3	1,720	3	1,654	3	3,373	3	-0,066	3
t1	4,063	1	4,788	1	8,851	1	0,725	1
t2	3,751	2	4,441	2	8,192	2	0,690	2
s1	3,880	1	3,594	1	7,475	1	-0,286	6
s2	3,105	7	3,032	6	6,136	7	-0,073	4
s3	3,249	4	3,327	2	6,576	3	0,078	2
s4	3,336	3	3,001	7	6,338	5	-0,335	7
s5	3,432	2	3,264	3	6,695	2	-0,168	5
s6	3,114	6	3,233	4	6,347	4	0,119	1
s7	3,153	5	3,139	5	6,291	6	-0,014	3
w1	3,211	2	2,983	2	6,193	2	-0,228	6
w2	3,222	1	3,385	1	6,607	1	0,163	1
w3	3,170	3	2,995	3	6,164	3	-0,175	5
w4	3,166	4	2,625	4	5,791	4	-0,541	7
w5	2,727	6	2,742	6	5,469	6	0,015	3
w6	2,392	7	2,445	7	4,837	7	0,052	2
w7	2,929	5	2,815	5	5,744	5	-0,115	4

Fig. 3 shows the effective and affected factors. Obtained results in D-R column shows the preference degree of the topics related to opportunities, threats, strengths, and weaknesses.

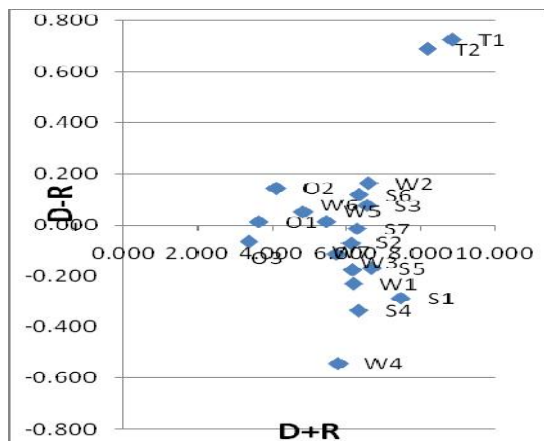


Fig. 3. Effective and affected degree of factors in Mahallat City

According to the results, the following factors are among the effective factors respectively. Among all the strengths, weaknesses, opportunities and threats listed in the tables, only a few are effective. Results showed that the most important factors in the tourism development of Mahallat are as follows:

T1: Huge effective problems such as different interest rates, targeted subsidies, a multi-

policy of decision making, instability in economic market and prices and lack of economic competition.

T2: The risk of occurrence of unexpected natural disasters such as earthquakes in the city.

W2: Lack of residential and tourism infrastructure, interstate welfare buildings and information centres.

O2: Geographical location and proximity to densely populated centres and tourist origins such as Tehran, Isfahan, and Hamedan.

S6: A unique feature of natural, historical and cultural attractions as an absorbent factor and tourism development model of region.

S3: Existence of research centre for flowers and ornamental plants and favourable conditions to produce medicinal and ornamental flowers and plants.

W6: Attractions dispersion, the absence of numerous attractions side by side and the lack of information panels on the roads.

W5: The absence of a strong communication network and unavailability of direct access to the airport and high way and rail network.

O1: Supporting private sector investment and funding indigenous people in the social, cultural and especially the activities of NGOs.

After ranking the effective factors, a collection of competitive/aggressive, diversifying, reviewing

and defensive strategies are provided as ways to achieve the planning goals based on the effective factors. These strategies are as follows:

SO competitive strategies based on the results include:

- 1- Emphasis on nature tourism and eco-tourism development due to natural, historical and cultural attractions as an absorbent factor and tourism development model of region.
- 2- Considering the scientific/ investigative capabilities of this area as a natural laboratory for medicinal and ornamental plants.
- 3- Introducing and identifying appropriate opportunities to local investors and the participation of young population and NGOs in the development of sustainable ecotourism.
- 4- Increasing in facilities, equipment, and advertising in order to attract tourists from neighbour provinces.

While taking advantage of the capabilities and natural potential around the world has led tourism development, despite the natural attractions as well as the development of scientific and research activities, taking advantage of the natural capabilities in Mahallat City has not been performed well. Therefore, strategy diversification collection (ST) in Mahallat City includes:

- 1- Provide investment security in investment return to attract investment in the development of ecotourism.
- 2- Studies of natural hazard risk assessment and identification of vulnerable zone.
- 3- Monitoring developmental plans in terms of equipment compliance with the updated world standards dealing with natural disasters.
- 4- Establishing headquarters of tourism planning and management in urban management organs.

According to the given weaknesses and opportunities, WO reviewed strategies collection include:

- 1- Improving and enhancing the quality of the natural environment and using necessary standards in equipment development, especially construction and improvement of municipal services infrastructure with the approach of tourism boosting.

2- Providing basic substrates and developing infrastructure, especially roads and access ways out of the province.

3- Investment attraction in the development of promotional plans, informing about the Mahallat city, creating specialized blogs and websites, comprehensive database of tourism information with detailed statistics of tourists information in different seasons and marking access roads.

4- Investment attraction in the development of tourism facilities and services (recreation, sports, shopping centres, cultural and academic development, etc.), especially residential centres and interstate welfare buildings due to the proximity of city with major population centres.

Perhaps the most difficult strategy in terms of both formulating and implementing the strategies will be WT or defensive strategy. In Mahallat City, despite the risk of natural disasters and large-scale investment problems as well as some problems such as lack of strong communication network and equipment and development infrastructure, due to lack of attractions concentration, review strategies include:

- 1- Institutionalization of partnerships between local community, managers, professionals, organizing committees and tourism trade associations.
- 2- Preparation and implementation of pilot tourism areas' projects and carrying out a complete Environmental Impact Assessment study in the city.
- 3- Increasing investor's participation in the development of tourism activities and facilitating investment in national level.
- 4- Strengthening the information technology infrastructure, developing of educational programs and informing local people to participate in the field of tourism.
- 5- Supporting research and scientific studies, especially in the production of medicinal plants and its products, developing ornamental plants and aquaculture with the approach of export.

4. CONCLUSION

This paper, using a combination of strategic planning and multi- criteria decision-making models, especially Analytic Network Process model and DEMATEL has developed strategies to achieve sustainable tourism development in Mahallat city by finding weights and effects of internal and external factors using experts and

specialists opinion. According to the used logical and mathematical processes, these strategies are fully operational and programmable. These models can also help to use land quality indicators properly because of the quantitative feature. Mahallat city existing conditions indicate that, on the one hand, there are powerful and extensive capabilities in the field of tourism. On the other hand, it is still at the beginning of this potential capability. In this regard, the possibility of creating a favourable context to define the most appropriate mechanisms for a sustainable tourism development is provided. According to the eco-tourism attractions of Mahallat, relying on unique features and valuable natural, historical, cultural and religious communities could be considered as a model, and guide the development of sustainable tourism. A comprehensive and integrated set of ecotourism in Mahallat is formable by paving the way for investment in eco-tourism, scientific tourism, research and many spatial patterns of tourism as an opportunity. In addition, to create the possibility of developing ecotourism, development in the region can create massive amounts of jobs which directly involve indigenous people.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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