

Article

Factors Affecting the Lut Desert Tourism in Iran: Developing an Interpretive-Structural Model

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Abstract: The Lut desert is one of the largest and most attractive deserts in Iran. The value of desert tourism remains unclear for Iran's economy and has only recently been taken into consideration by the authorities, although its true national and international value remains unclear. This study was aimed at investigating the factors that influence tourism development in the Lut desert. Data collected through the purposive sampling method was analyzed using Interpretive Structural Modeling and the MICMAC Analysis. According to the results, cost-effective travel expenses, security, and safety provided in the desert, together with appropriate media advertising and illustration of the Lut desert (branding) are the leading factors that influence tourism in the Lut desert in Iran. This paper highlighted the importance of desert tourism, especially in this region.



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Keywords: tourism; desert tourism; Lut desert; Iran

1. Introduction

Nowadays, tourism has become one of the key drivers for progress [1] and economic growth [2], both in advanced and developing countries [3]. As an industry, tourism has become a subject of interest and is becoming progressively more important in academic research and policy-making in countries. It noticeably impacts various sectors such as society, the economy, politics, culture, and etc., and has attracted considerable attention in recent years. According to the World Tourism Organization [4], the tourism industry was expected to expand at a rate of 3.3% per year and reach 1.8 billion tourists by 2030. However, the current global situation and the COVID-19 pandemic has prevented tourists from travelling to other destinations, causing a delay in the predicted annual growth in this industry.

According to the environmental movements of the 1960s and 1970s, ecotourism initiatives, and the UNESCO and Brundtland Commission report entitled “our common future” [5], sustainable tourism has become a key factor in tourism development. The concept of sustainable tourism stems from another broader notion, namely sustainable development, which involves satisfying the needs of the present without compromising the possibilities of future generations [6]. This concept also refers to the capability of productive activities to satisfy the necessities of today without compromising the possibilities of future generations [7]. The term “sustainable tourism” refers to tourism that is economically, environmentally, culturally, and socially sustainable in the long term [8,9]. It covers various types of tourism, one of which is the use of desert areas as tourist attractions under the title of “desert tourism”.

As Martín et al. [10] argued, new trends in tourism have progressively made some places become tourist destinations. Among these are the deserts, which have recently

attracted the attention of tourists. Desert tourism has been highlighted in recent years, even if there remains little available literature on desert tourism. However, research is ongoing internationally. In Iran, desert tourism is not a subject with a deep history. More than one-fifth of the Iranian plateau is covered by broad desert areas. The unique features of such areas have made the deserts of Iran among the top four attractive deserts in the world [11]. In this study, we aimed to model the factors influencing desert tourism in Iran, with a focus on Dasht-e Lut, given the special importance of desert tourism and the existence of potential capabilities of this industry in the country.

A reliable and principled understanding of desert potential and techniques for their exploitation are essential factors for the social and economic development both of the region and of Iran [12]. An identification of tourist and ecotourism attractions in desert areas has not yet been adequately reported. Therefore, it is important to carry out detailed studies on the characteristics of these attractions, as well as techniques for the exploitation and creation of an appropriate infrastructure aiming at developing this newly-emerged industry in these areas [13]. Until two years ago, desert tourism was not considered at all in Iran. However, deserts are one of the most attractive travel destinations among tourists. Therefore, this study was conducted to emphasize the importance of desert tourism in Iran. Thus, important and attractive tourist factors on tourism in the Lut desert were explored and the importance of each of these factors was determined. The research gap pertains to the investigation of the factors that affect the development of tourism in the Lut desert.

In general, the aim of this study was to identify the factors that regulate the development of tourism in the Lut desert. Furthermore, after identifying the influencing factors, a structural-interpretive model was developed for it. Thus, to guide the research, the following question was raised: What are the factors that influence the development of tourism in the Lut desert? And what is its interpretive-structural model?

2. Literature Review

Tourism, as a global economic and cultural phenomenon, noticeably impacts all pillars of the economy, society, and environment [14,15]. Natural attractions and socio-cultural features attract a multitude of tourists every year [16]. Inspired by systems theory, the choice of tourism destinations is a difficult and dynamic process [17] and consists of diverse but organized beneficiaries, each with distinct goals, programs, and preferences [18]. This process provides a complicated and intertwined system in order to satisfy tourist demands [19], which is important in the analysis of tourism destinations where several beneficiaries are present [20,21]. The concepts of ecotourism and sustainable tourism development have been considered as solutions since the mid-1980s following the destructive effects of conventional mass tourism [9]. Ecotourism is a new class of non-consumptive, educational, and romantic tourism in somewhat turbulent areas with unique natural beauties of cultural and historical importance [22], and whose accountability is based on sustainable principles [23]. Ecotourism appears in different forms and has recently introduced a new branch: desert tourism. Deserts share a unique natural and cultural heritage that is increasingly endangered by unsustainable human activities [24]. Therefore, the preservation and exploitation of deserts is essential for local and regional development. The heritage of communities and desert areas is becoming an increasingly important tourism asset [25], and they are therefore classified under ecotourism according to the specific environmental and geographical conditions in which they exist [26].

In recent decades, desert tourism has become a popular attraction with a range of specialized tourism markets [27]. In 2006, the United Nations developed a program to manage desert tourism [28]. There are relevant articles published at an international academic level [16,22,24,27,29]. There remain limited studies on desert tourism that have been conducted in Iran [10,12,30–33].

Desert tourism has been established on a global scale and responds to the growing demands of tourists by using symbolic values such as natural beauty, tranquility, freshness, etc. [34]. Desert tourism, also referred to as geo-tourism [29] by its own followers, is

a branch of ecotourism [27]. Sports, psychology, adventure, medicine, exploration, and etc. are the main reasons for traveling to the desert. According to Atkinson [27], desert tourism is a type of tourism in which certain people enjoy visiting unusual places which offer special attractions or activities. Laing et al. [35] considered desert tourism as a branch of “bounded tourism” and defined it as: “Travel to places that are now geographically and socio-culturally located at the margins or end of the world or somewhere beyond our experiences. Additionally, it involves travel to places with no permanent residence and tourism infrastructure”. According to UNWTO [36], desert tourism means walking in the desert and visiting desert attractions, vegetation, animal life, and morphological forms, as well as doing sports activities and seeing other phenomena. It also refers to diversity in products, experiences, and environments and is acknowledged with complex interactions between natural, social, and cultural environments [37]. Tourism in desert areas reduces the potentially negative effects of desert activities on the development of local communities and helps rebuild the environment and ecosystem [38]. It is an alternative to the exploitation of the environment with the capacity to preserve endangered biodiversity in arid and desert regions [39]. This type of tourism protects threatened biodiversity and strengthens the economies of local communities [40] as well as cultural heritage [39].

Desert tourism development is a step forward towards achieving sustainable development, where the quality of space and many resources [41] are the determining factors, and countries should prioritize the logical use of space and resources for long-term sustainable development. Iran is a country with a deep civilization that holds significant potential from a tourist point of view. However, such potential is less known worldwide. According to Khodadadi [42], tourist destinations in Iran have failed to achieve their true potential due to poor media advertising. On the other hand, some international media have depicted and presented an erroneous, negative, and unfair image of Iran to international tourists [42]. Iran holds many tourist attractions and the requirements for the reception of foreign tourists are available. There are some political differences and disputes among nations, but such controversies are not be limited to the public and the hospitality of the countries. Iran’s tourism industry, with the provisions and facilities that are provided, can host a high number of international tourists every year.

Despite all the potential that Iran’s deserts possess to become tourist destinations, no practical program has yet been carefully developed to make the most of such a worthwhile resource. Furthermore, in spite of the significant tourist potential in the deserts of Iran, no advertisements and investments have been made in these sectors. In Dasht-e Lut, particularly, there is high potential for the development of desert tourism. However, the tourist value of Dasht-e Lut has only recently been taken into consideration, i.e., in the past three to five years. Dasht-e Lut has not been properly presented nationally or internationally and its attractions are unknown to many tourists. In fact, there is little literature on Dasht-e Lut and it has not been suitably introduced to the global tourism market. Figure 1 shows a conceptual model of research based on processes and forms. In this figure, the underlying factors as well as reinforcing factors in order to achieve sustainable development are shown.

In general, this study sought to highlight the importance of tourism in the Lut desert and, as academic research, to introduce the Lut desert to desert tourism enthusiasts and investigate its development factors.

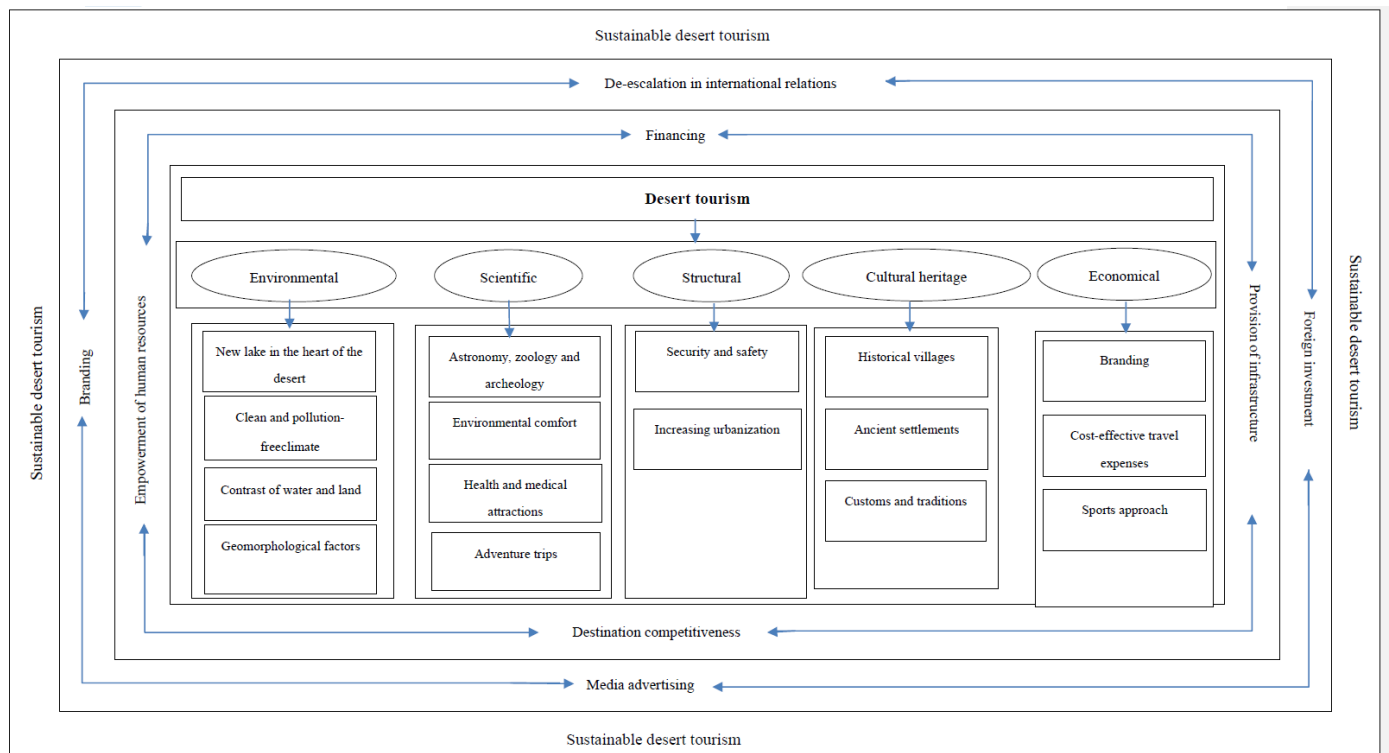


Figure 1. Conceptual model of research.

3. Methodology

3.1. Factor Selection and Design of Matrices

Initially, 30 factors affecting tourism in the Lut desert were identified, but by using the Delphi questionnaire, experts were asked to select the most important ones. In the end, only 16 factors were selected to continue the research (Table 1). Subsequently, a questionnaire was created following a structural-interpretive approach and was distributed among the experts to check the content and face validities of the questionnaire. Based on feedback from the experts, a final questionnaire was drawn up. It should be noted that this study was conducted between February and March 2021.

3.2. Data Analysis Method: Structural-Interpretive Modeling

Interpretive-Structural Modeling is a systematic and structured method for the creation and understanding of relationships between elements of a complex system [43], introduced in 1974 by Warfield. ISM is a powerful qualitative tool in various fields and a suitable technique for the analysis of the impact of one element on other elements; additionally, it examines the complex relationships between the elements of a system [43]. It also aids in creating and directing complex relationships between the elements of a system [44]. In this method, the judgment of a group of people determines whether there are relationships between these elements or not. The main idea of interpretive structural modeling is to break down a complex system into several subsystems using expert knowledge to construct a multilevel structural model [45,46].

As mentioned earlier, the questionnaire was designed to undertake structural-interpretive modeling. This is an interactive process wherein a group of different, yet associated elements are structured into a comprehensive systematic model. Using this system, one can evaluate the associations among different elements of a system, understand the relationships among various factors of a complicated system, and present a comprehensive model of the factors.

Table 1. Factors affecting Lut desert tourism.

Factor	Code
Sports approach to the Lut desert (rally, off-road competitions)	C1
Existence of ancient settlements	C2
Existence of historical villages	C3
Existence of special geomorphological factors (Klots, Hamada, Nebka)	C4
Existence of the Kal Shor river in the heart of the desert (contrast of water and land)	C5
Clean and pollution-free climate	C6
Adventure trips (difficult routes)	C7
Emergence of a new lake in the heart of the desert (young lake)	C8
Cost-effective travel expenses	C9
Health and medical attractions (hydrotherapy in the Lut desert)	C10
Environmental comfort in the desert (environmental psychology)	C11
Exploration trips for astronomy, zoology and archeology	C12
Increasing urbanization and escape from urban life (especially in big cities)	C13
Existence of different customs and traditions in the settlements on the edge of the desert	C14
Security and safety provided in the desert	C15
Appropriate media advertising and illustration of the Lut desert (branding)	C16

3.3. Steps of Structural-Interpretive Modeling

1. Identify the factors affecting the problem;

2. Formulate the structural self-interaction matrix (SSIM);

In this matrix, some symbols are used to represent the access. These are as follows:

V: If factor *I* affects the emergence of factor *J*;

A: If factor *J* affects factor *I*;

X: If both factors affect one another (two-way effect);

O: If no association exists between the two factors.

3. Build the primary reachability matrix;

By converting the symbols of the SSIM matrix to the numbers zero and one, the primary reachability matrix is obtained.

The primary reachability matrix can be built by transforming the structural self-interaction matrix into a binary matrix of 1s and 0s. For this purpose, on each row of the structural self-interaction matrix, the symbols X and V are replaced by 1s and the symbols A and O are replaced by 0s.

4. Formulate the secondary reachability matrix;

In the fourth step, the primary reachability matrix must be compatibilized. The secondary reachability matrix is developed by determining multivariate associations among the factors. That is, if factor *i* causes factor *j* and factor *j* causes factor *k*, it can, in turn, be concluded that factor *i* causes factor *k*. At this step, the elements on the main diagonal are set to 1, and the association and influence of each factor is determined.

5. Determine levels;

In this step, sets of input factors (prerequisites) and outputs (reachability) are calculated for each factor followed by the characterization of the common factors. Here the factor for which the output set (reachability) coincides with the common set has the highest level of ISM. Once having finished with identifying such factors, the corresponding rows and columns are eliminated from the table and this step is repeated on other factors.

6. Draw the network of interactions.

In this step, given the levels of different factors in the ISM and their associations, a graph of the interaction network is prepared. Level 1 represents the most-affected factors while the highest level refers to the most effective ones.

3.4. Mic Mac and Clustering Analyses

The MICMAC analysis is based on the driving power (influence) and the degree of dependence (influence) of each variable. It allows one to further examine the range of each of the variables. With this method, the importance of the variables is measured further based on indirect relationships among them. In this analysis, the variables are divided into four groups: autonomous, dependent, connected, and independent. In this section, the Mic Mac analysis was used to classify the factors based on their influence and dependence on other factors. Accordingly, using the influence and dependence of different factors, one can cluster the entire set of factors affecting tourism in the Lut desert under any of the four clusters.

4. Case Study

Dasht-e Lut is the largest desert in Iran and is located between the provinces of Kerman, Sistan, Baluchestan, and South Khorasan (Figure 2). It is 900 km in length and 300 km in width. Dasht-e Lut covers an area of 40,000 km², about 70% of which is located in the Kerman province. It is split into three regions: northern, central, and southern. The central region is the widest. Dasht-e Lut is a very hot area, so much so that it was declared by NASA as the hottest spot on Earth in 2004, 2005, 2006, 2007, and 2009 [47]. In 2005, the hottest temperature on Earth, 70 °C, was reported in this desert. This feature has turned Dasht-e Lut into a tourist destination that attracts tourists from all over the world, where tourists and especially geologists can see the hottest spot in the world and experience a memorable journey to this destination. In 2016, Dasht-e Lut was registered as the first Iranian natural monument by UNESCO. The word “Lut” means “naked” and “bare”, resembling a place without water and grass.

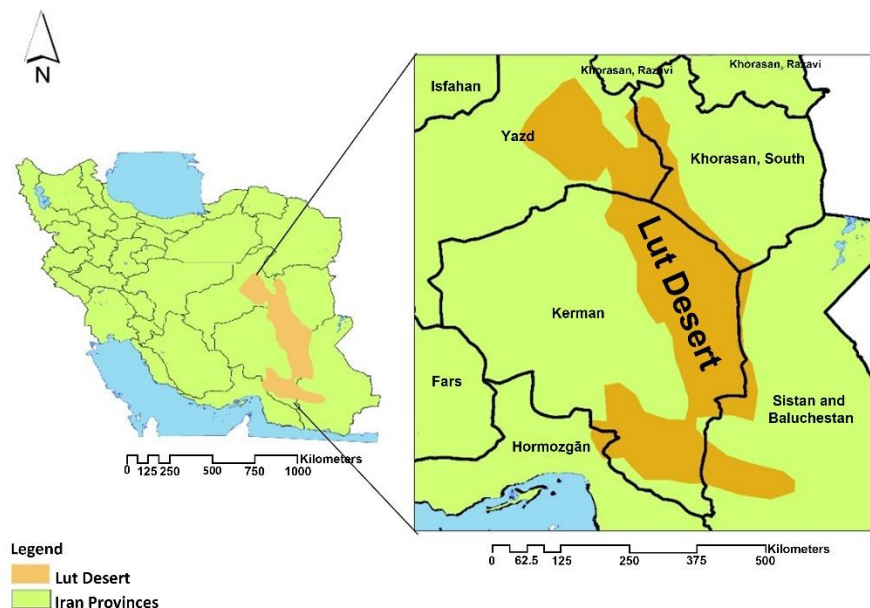


Figure 2. The study area.

5. Findings

5.1. Self-Interaction Matrix

Once the factors affecting tourism in the Lut desert were identified, the next step was to form the self-interaction matrix using the states of the conceptual associations. The self-interaction matrix was created by 30 experts in the tourism field (tour leaders, academics, planners, and tourism commentators). After collecting all 30 questionnaires, the most frequent answers were selected. The logic behind this could be explained by the fact that the structural-interpretive model is logically based on non-parametric methods

that operate on the basis of mode values. Lastly, the self-interaction matrix was developed as presented in Table 2.

Table 2. Self-interaction matrix.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
C1		O	O	O	O	A	O	A	A	O	A	O	O	O	A	A
C2			X	V	O	O	V	O	A	O	O	V	O	O	A	A
C3				O	O	O	V	O	A	O	V	V	A	O	A	A
C4					X	O	V	X	A	X	A	V	A	O	A	A
C5						O	V	X	A	O	A	O	A	O	A	A
C6							O	A	A	X	X	O	A	O	A	A
C7								A	A	A	A	X	O	A	A	A
C8									A	X	X	O	O	O	A	A
C9										V	V	V	O	V	X	A
C10											V	V	O	O	O	A
C11												X	A	O	A	O
C12													O	A	A	A
C13														O	A	A
C14															O	A
C15																A
C16																A

5.2. Primary Reachability Matrix

Once having finished with developing the self-interaction matrix, the next step was to transform it into the primary reachability matrix. This was achieved by converting the self-interaction matrix into a binary matrix of 1s and 0s. For this purpose, on each row of the structural self-interaction matrix, the symbols X and V were replaced by 1s and the symbols A and O were replaced by 0s. Upon performing the conversion along all rows, the result was the primary reachability matrix (Table 3).

Table 3. Primary reachability matrix.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
C1		00	00	00	00	A0	00	A0	A0	00	A0	00	00	00	A0	A0
C2	0		X1	V1	00	00	V1	00	A0	00	00	V1	00	00	A0	A0
C3	0	1		00	00	00	V1	00	A0	00	V1	V1	A0	00	A0	A0
C4	0	0	0		X1	00	V1	X1	A0	X1	A0	V1	A0	00	A0	A0
C5	0	0	0	1		00	V1	X1	A0	00	A0	00	A0	00	A0	A0
C6	1	0	0	0	0		00	A0	A0	X1	X1	00	A0	00	A0	A0
C7	0	0	0	0	0	0		A0	A0	A0	A0	X1	00	A0	A0	A0
C8	1	0	0	1	1	1	1		A0	X1	X1	00	00	00	A0	A0
C9	1	1	1	1	1	1	1	1		V1	V1	V1	00	V1	A0	A0
C10	0	0	0	1	0	1	1	1	0		V1	V1	00	00	A0	A0
C11	1	0	0	1	1	1	1	1	0	0		X1	A0	00	00	00
C12	0	0	0	0	0	0	1	0	0	0	1		00	A0	A0	A0
C13	0	0	1	1	1	1	0	0	0	0	1	0		00	A0	A0
C14	0	0	0	0	0	0	1	0	0	0	0	1	0		A0	A0
C15	1	1	1	1	1	1	1	1	1	0	1	1	1	0	A0	A0
C16	1	1	1	1	1	1	1	1	1	1	1	1	1	1		

5.3. Secondary Reachability Matrix

With the primary reachability matrix completed, two operations must be applied in order to achieve the secondary reachability matrix. First of all, the elements on the main diagonal must be set to 1, and secondly, the internal consistency must be established for the matrix. By “internal consistency” we mean that, for example, if C1 causes C2 and C2 causes C3, then C1 must cause C3 as well. If the matrix fails to be internally consistent, it

is necessary to modify it accordingly. In this research, the internal consistency was met, requiring no modification to the matrix (Table 4).

Table 4. Secondary reachability matrix.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	Driving Power
C1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C2	0	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	5
C3	0	1	1	0	0	0	1	0	0	0	1	1	0	0	0	0	5
C4	0	0	0	1	1	0	1	1	0	1	0	1	0	0	0	0	6
C5	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	4
C6	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	4
C7	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2
C8	1	0	0	1	1	1	1	1	0	1	1	0	0	0	0	0	8
C9	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	14
C10	0	0	0	1	0	1	1	1	0	1	1	1	0	0	0	0	7
C11	1	0	0	1	1	1	1	1	0	0	1	1	0	0	0	0	8
C12	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	3
C13	0	0	1	1	1	1	0	0	0	0	1	0	1	0	0	0	6
C14	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	3
C15	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	13
C16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Dependence	7	5	6	10	8	8	13	8	3	6	10	11	3	3	3	1	

This matrix further reflected the influence (driving power) and dependence of the factors. The influence refers to the effectiveness of one factor on others; for each factor, this property was quantified by summing up the elements on the corresponding row in the secondary reachability matrix. The dependence therein refers to the extent to which one factor is affected by other factors. For each factor, this property was evaluated by summing up the elements on the corresponding column in the secondary reachability matrix.

5.4. Leveling the Factors

In this section, given the secondary reachability matrix, the antecedent set and reachability set as well as the common set were developed for each factor. The corresponding output set to a factor included the factor itself, as well as all factors by which it was affected. Once having determined the input and output sets, their common set was formed for each factor. The higher the similarity of the reachability set and the intersection set for a given factor, the higher the level of that factor in the hierarchy of the structural-interpretative model. In order to identify the next levels, the row and the column corresponding to the evaluated factor was eliminated and the operation was rerun to find the next level.

To determine the relationships and leveling of factors in the ISM model, the antecedent set and reachability set for each factor must be extracted from the secondary reachability matrix. The reachability set (effects or outputs) includes the factor itself and the factors that it affects. The antecedent set (influences or inputs) includes the factor itself and the factors that affect it. After determining the antecedent set and the reachability set, the subscription of the two sets was calculated (intersection set).

This operation was reiterated until the factors comprising all levels of the system were identified (Table 5).

Table 5. Leveling the factors.

Code	Factor	Antecedent Set	Reachability Set	Intersection Set	Level
C1	Sports approach to the Lut desert (rally, off-road competitions)	1	1	1	1
C2	Existence of ancient settlements	2-3-9-15-16	2-3-4-7-12	2-3	3
C3	Existence of historical villages	2-3-9-13-15-16	2-3-7-11-12	2-3	4
C4	Existence of special geomorphological factors (Klots, Hamada, Nebka)	2-4-5-8-9-10-11-13-15-16	4-5-7-8-10-12	4-5-8-10	2
C5	Existence of the Kal Shor river in the heart of the desert (contrast of water and land)	4-5-8-9-11-13-15-16	4-5-7-8	4-5-8	2
C6	Clean and pollution-free climate	6-8-9-10-11-13-15-16	1-6-10-11	6-10-11	2
C7	Adventure trips (difficult routes)	2-3-4-5-7-8-9-10-11-12-14-15-16	7-12	7-12	1
C8	Emergence of a new lake in the heart of the desert (young lake)	4-5-8-9-10-11-15-16	1-4-5-6-7-8-10-11	4-5-8-10-11	3
C9	Cost-effective travel expenses	9-15-16	1-2-3-4-5-6-7-8-9-10-11-12-14-15	9-15	5
C10	Health and medical attractions (hydrotherapy in the Lut desert)	4-6-8-9-10-16	4-6-7-8-10-11-12	4-6-8-10	4
C11	Environmental comfort in the desert (environmental psychology)	3-6-8-9-10-11-12-13-15-16	1-4-5-6-7-8-11-12	6-8-11-12	3
C12	Exploration trips for astronomy, zoology and archeology	2-3-4-7-9-10-11-12-14-15-16	7-11-12	7-11-12	1
C13	Increasing urbanization and escape from urban life (especially in big cities)	13-15-16	3-4-5-6-11-13	13	4
C14	Existence of different customs and traditions in the settlements on the edge of the desert	9-14-16	7-12-14	14	2
C15	Security and safety provided in the desert	9-15-16	1-2-3-4-5-6-7-8-9-11-12-13-15	9-15	5
C16	Appropriate media advertising and illustration of the Lut desert (branding)	16	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16	16	6

5.5. Modeling and Interaction Network

Once having determined the associations and level of each factor based on Table 5, the findings were graphically plotted. When graphing the model, it was necessary to consider the levels. That is, Level 1 represented the highest dependence while Level 6 referred to the lowest dependence. Put differently, the factors at Level 6 served as a foundation for reaching the factors at other levels. In actual fact, the Level 6 factors were the most effective in this model; therefore, these factors should be of particular attention to officials (Figure 3).

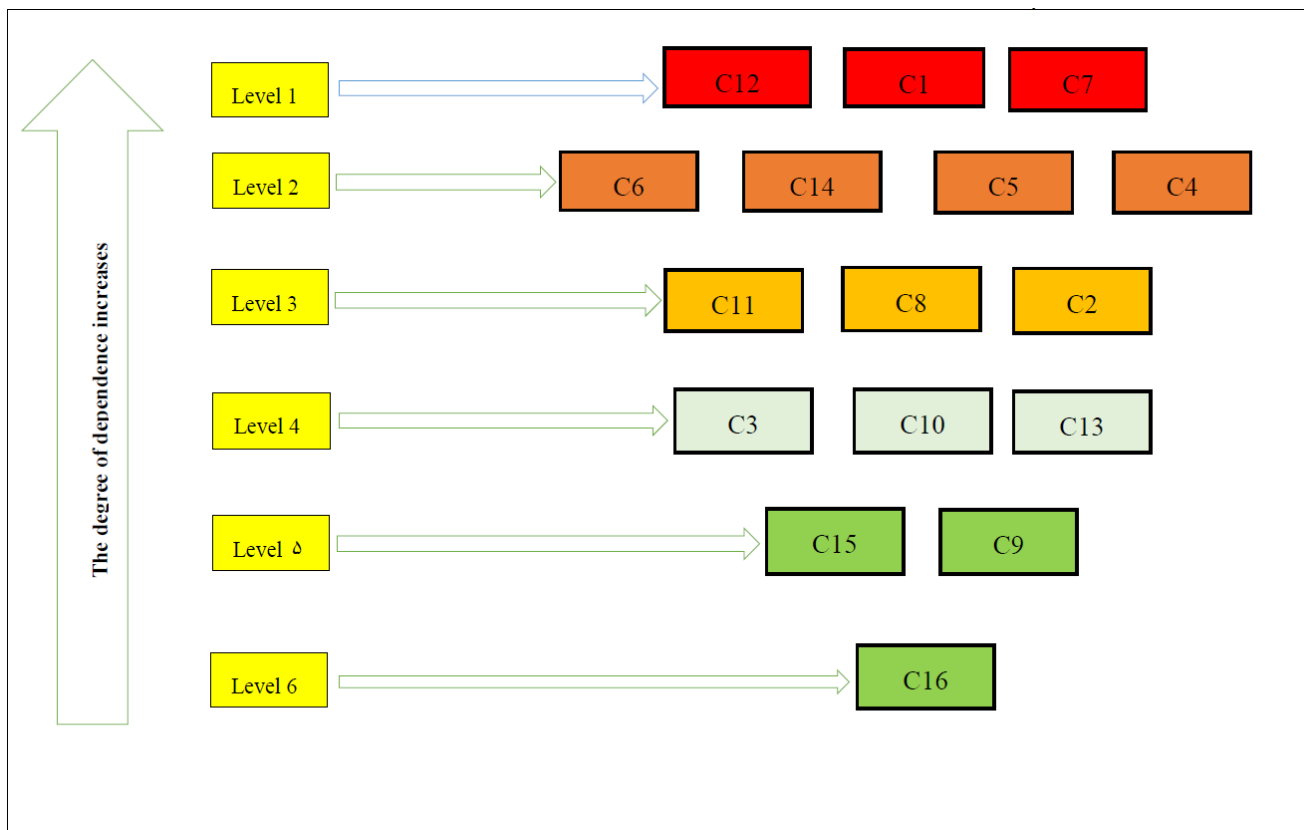


Figure 3. Modeling the factors affecting tourism in the Lut desert.

5.6. Clustering the Factors

Table 4 reports the deriving power and dependence of all factors. These were used in factor clustering through the Mic Mac analysis (Figure 4). The aim of the MICMAC analysis was to investigate the driving power and dependence of the factors that we calculated in the secondary reachability matrix. The first category included “excluded variables”; these factors had weak dependence and influence. The variables that fell into this category acted almost separately from the whole system. These variables did not have much effect on other variables and, in fact, the relationship between these variables and other variables was very limited and insignificant. The second category was the “resultant variables” that had a weak influence, although they had a higher dependence than other variables. The third category included “intermediate variables” that had strong influence and dependence; these variables were, in fact, variables that were unstable. The fourth category was “input variables” that had a strong influence, but their dependence was weak. In fact, they were key variables and, by changing them, other variables could be affected.

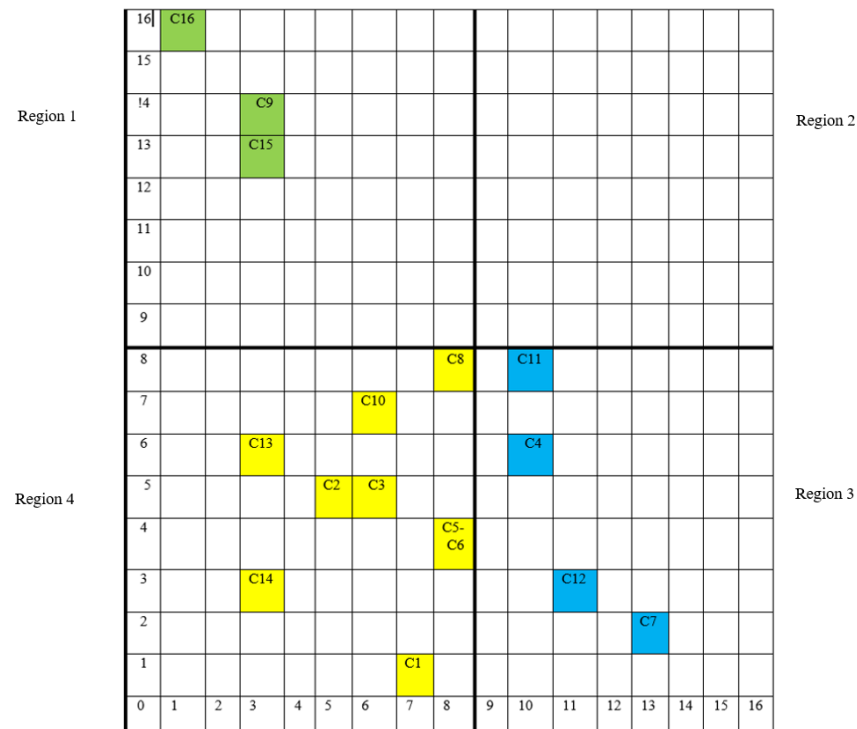


Figure 4. Results of Mic Mac analysis on the factors.

The climate, security, and safety provided in the desert and appropriate media advertising and illustration of the Lut desert (branding) fell within the first region (i.e., input variable). This means that these factors tended to be more influential rather than dependent. Accordingly, the probabilistic states of these factors determined the probable state of the other factors. These are key factors contributing to Lut tourism. There were no factors in the second region (intermediate variable), which indicates the high influence and dependence of this factor on other factors. According to the results of the Mic Mac analysis, this factor controlled the dynamics and robustness of the system. The third region (resultant variables) contained special geomorphological factors (Klots, Hamada, Nebka), Adventure trips (difficult routes), Environmental comfort in the desert (environmental psychology), and exploration trips for astronomy, zoology, and archeology. These were the factors that were less influential and more dependent.

In the fourth region (excluded variables), we found factors such as the existence of ancient settlements, the existence of historical villages, the existence of the Kal Shor river in the heart of the desert (contrast of water and land), a clean and pollution-free climate, the emergence of a new lake in the heart of the desert (young lake), health and medical attractions (hydrotherapy in the Lut desert), increasing urbanization and escape from urban life (especially in big cities), and the existence of different customs and traditions in the settlements on the edge of the desert. These factors were not only marginally influenced by other factors, but also imposed negligible influences on the others.

6. Discussion

Deserts have attracted considerable attention as a source of tourism. This study was carried out to analyze the factors influencing tourism in Dasht-e Lut. According to the structural and interpretive model (Figure 3), the three factors of cost-effectiveness of travel (C9), security and safety of the desert (C15), and media advertising and attractive depiction (branding) of Dasht-e Lut (C16) were recognized as a basis for the development and promotion of the tourism industry in the region. Furthermore, a sports attitude towards Dasht-e Lut (i.e., organizing rally competitions and off-road racing) (C1), adventure tourism (impassable routes) (C7), and scientific-exploratory trips for astronomy, zoology, and

archeology purposes (C12) are the main factors of attraction and attractiveness of the desert that should be further enhanced. Figure 2 shows that the security and safety of the desert (C15), media advertising and an attractive depiction (branding) of Dasht-e Lut (C16), and cost-effectiveness of travel expenses (C9) are the most important and influential factors in tourism.

According to the MicMac analysis, the cost-effectiveness of travel (C9), security and safety of the desert (C15), and media advertising and an attractive depiction (branding) of Dasht-e Lut (C16) are vital for the development of tourism in the Lut desert.

Choosing a travel destination is often associated with affordability. This means that tourists prefer visiting attractive locations at a lower cost. Cost is a key factor in choosing a tourist destination. The Lut desert is now an area that tourists can visit at a low cost, because to date there has been no economic view of Lut desert tourism (this is, of course, a negative point) and visiting the desert is almost free. Therefore, tourists can travel there by simply providing transportation tickets and food. As traveling to the Lut desert is cheap, in the last two years, a large number of tourists have become interested in traveling to this area.

Worldwide, safety and security are considered the most important and fundamental principles in formulating a tourism development strategy. There is a defined relationship between tourism, stability, development, and security and any lack thereof or the use of violence at any level will cause irreparable damage to the tourism industry [48]. Security in the development of tourism in the Lut desert can be analyzed from two aspects: internal security and external security. The former aspect is derived from Iranian tourists. Tourists usually prefer to travel to safer areas and to be able to enjoy their trip to the utmost. Furthermore, from the internal point of view, since domestic tourists are familiar with all of the regions of Iran, they are also aware of their security issues. Therefore, security is a key factor in their decision making. Hence, establishing sustainable security in the Lut desert can attract domestic tourists. However, the international aspect of security involves the attitude of foreign tourists. The relationship between national security and tourism must be considered so that a necessary, new definition of national security, in light of the presence of foreign tourists and the recognition of domestic capacities, is created. By continuing de-escalation policies in foreign relations and reducing international sensitivity towards Iran's foreign policies, it is possible to help create a favorable environment to attract tourists.

Advertisements would enable tourists to familiarize themselves with the area before traveling to the Lut desert. Through advertising, the tourist obtains overall information on the geographical location, attractions, infrastructure, etc. The Lut desert Tourism Management was established in 2020 and is responsible for the development of the advertising programs of the Lut desert and taking the necessary measures for their implementation. In addition, all national, regional, provincial, urban, and even rural organizations should work to highlight tourism in the Lut desert. It goes without saying that, in addition to advertising, marketing should not be neglected.

Suggestions can be made for the development of tourism in the Lut desert. These measures must have a structural aspect and, together with structural and program reforms, can lead to the development of sustainable tourism in the area. Dasht-e Lut tourism can act as a driving and active industry for the development of the regional and local economies. It can potentially attract national and international investors, introduce itself to global tourists, and help maintain social, cultural, and economic capital. Our suggestions are as follows. (1) The Iranian government should establish an independent Ministry of Tourism to cover all the potential that exists in the country. Instead of passive approaches, the government should develop practical, strategic plans for the development of the tourism industry, and provide tourism zoning in the form of a strategic tourism plan. This would help to identify the tourism potential of each region of Iran and aid in taking executive measures to develop the tourism industry. Dasht-e Lut tourism would gain new prospects within this strategic plan and would be more popular among those interested in desert tourism.

(2) The government should act efficiently in attracting tourists by building international relations. In the last decade, activities in the tourism sector have been supported by the government, although it can be said that Iranian tourism is no longer among the priorities of the government due to international sanctions and the COVID-19 pandemic. However, the government should not neglect the tourism industry, but rather focus on extensive media advertisements, nationally and internationally, on tourist attractions. (3) The government should strictly pursue media advertising and normalize international relations for the entry of foreign tourists. Today, the media has become a powerful tool in the world and can therefore introduce Dasht-e Lut to the world and attract tourists to this unspoiled region. (4) Another leading factor is to strengthen tourism competitiveness [49,50] in Dasht-e Lut. Providing necessary, world-class capabilities would enable this region to compete with other similar destinations. Strengthening the competitive advantage is a key factor in the success of Dasht-e Lut in attracting tourism. Dasht-e Lut would thus thrive on the arrival of tourists to this region. In general, according to [51,52], tourism destination competition is critical for achieving an ideal position in the global tourism market and maintaining a competitive advantage. (5) Another leading challenge is with investments. With no direct foreign and domestic investments in Dasht-e Lut, tourism is a challenge for mainstream contexts, especially in the accommodation sector, where the provision of products and services for international trade and leisure markets is inadequate. There are insignificant infrastructures and superstructures in Dasht-e Lut. The public and private sectors must cooperate to promote the tourism industry in this region. The process of attracting investors is a key step towards developing desert tourism. Domestic and foreign investors must be inspired to invest in Dasht-e Lut tourism, and the government should offer incentive packages and facilitate organizational and institutional procedures for their presence in this sector. Future studies are vital for tourism development, attracting international tourists to Dasht-e Lut, and can provide a clear vision of the tourism industry in this region. Authorities must define enlightened plans for Dasht-e Lut. (6) Branding for desert tourism areas can be of great importance in introducing the attractions of these areas and inspire tourists to enjoy wonderful experiences in the desert [33]. Dasht-e Lut commercial branding is a powerful tool that could make a difference and create a competitive advantage in the market. When Dasht-e Lut is introduced as a particular brand, it will undergo the focus of media and communication spaces and will be known among tourists so that they would be motivated to visit such an unspoiled area. Thus, Dasht-e Lut would be enhanced by branding and the creation of a media atmosphere, and would subsequently attract domestic and foreign investors.

7. Conclusions

Deserts can meet most of the recreational and spiritual needs of tourists. As the desert is a major part of Iran, it has important potential in the field of desert tourism development in the country. The existence of rare and attractive desert areas in Iran has made it important and necessary to address the issue of desert tourism development. Despite the biological limitations, the special landscapes of these areas can be considered tourist attractions and the resulting economic and social benefits could lead to better development of living conditions in these areas. According to the results, all administrators, planners, hoteliers, tour guides, and beneficiaries must develop the tourist environment of Dasht-e Lut. Unique landscapes, geomorphological phenomena, ancient heritage sites, indigenous culture, and desert ecosystems are the most important factors that attract tourists to Dasht-e Lut. Therefore, infrastructure and welfare facilities must be established in this region. Macro policies at national and regional levels are crucial for this tourist area. The Dasht-e Lut tourism policy should be such that desert tourism is viewed as a vital component of the regional economy. On the other hand, media advertisements on a national and global scale can bring sustainable tourism to this desert region. Proper representation is effective in attracting tourists to this area. At national and regional levels, branding should be performed so that domestic and foreign tourists know more about Dasht-e Lut. With

these measures, Dasht-e Lut would become one of the most important tourist destinations not only nationally, but also globally, and the region's economy would grow. In general, Dasht-e Lut tourism can act to reach international goals and work following the goals and programs of the 2030 Agenda for Sustainable Development of the United Nations. Tourism is one of the most important industries that has played a special role in economic development in recent decades and is one of the main pillars of sustainable development. Desert tourism with the approach of sustainable development, as the driving force of the economy of desert areas, diversifies the local economy and changes the economic situation of the inhabitants of desert areas. Identifying the advantages and limitations of the Lut desert and planning for them can play an effective role in the development of neighboring areas and lead to sustainable regional development. The expansion of tourism in the Lut desert can lead to a fair distribution of income at a regional level and, to some extent, contribute to sustainable development by bridging the development gap between different regions.

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