

Spatial classification of tourism routes in Isfahan Province, Iran

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Abstract: Tourism, as one of the most dynamic economic activities of recent years, plays a significant role in the economic development of human societies. One of the most essential bases of tourism development is the existence of natural and cultural-historical attractions, an efficient system of facilities services, and tourism facilities. Therefore, the current study has levelled tourism routes of Isfahan province in terms of having attractions and facilities to provide a better serving system for tourists according to the capacity of each tourism axis and its appropriate management to meet their needs. This study uses the descriptive-analytical method. The entropy weight method, cluster analysis (Ward method), and SWOT analysis were utilised. The study results indicated that the Isfahan-Semirom, Isfahan-Kashan, and Isfahan-Fereydunshahr tourism routes were the best in terms of tourism attractions and facilities. In fact, Isfahan province's central, west-north, and west tourist routes have more tourist attractions, and the need for facilities and services is felt in these routes. The final result of the SWOT analysis shows that it has more tourism strengths and opportunities than weaknesses and threats. Therefore, more services and facilities should be provided to develop tourism on this route. These findings suggest that the increase in services and facilities should occur more in the western and southern routes of the province.

Key Words: *tourism, tourism attractions, tourism facilities, cluster analysis, SWOT technique.*

Article Info: Received: June 5, 2023; Revised: November 15, 2023; Accepted: November 26, 2023; Online: November 30, 2023.

Introduction

Tourism is an essential form of leisure and recreation that has grown over the last two decades due to improved mobility through transportation and advanced

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technology (Li et al., 2022). It is a multidimensional social, psychological, cultural, economic, and spatial phenomenon (Włodarczyk & Cudny, 2022).

Tourism has formed the main part of the world's economy and is one of the greatest serving activities in the universe. Tourism is now an essential economic sector in many countries worldwide due to its rapid development and high economic efficiency (Vu et al., 2022). According to the predictions of the World Tourism Organization, the number of tourists will reach 1.8 billion people in 2030 (UNWTO, 2015). Hence, countries turning to economic diversification tend to get rid of a single material economy, seeking to recognise its solutions and creating ideas and novel methods (Eftekhari & Qaderi, 2002). Tourism is one of these crucial methods that most countries, especially those with proper locations, have included in their national development plans to speed up their national development (Khosrowjerdi & Nouripour, 2017).

It is recognised as the most significant industry in the whole world. The World Travel & Tourism Council (WTTC) noted that 2020 tourism provided 1/11 of the total number of jobs globally, generating economic income accounting for 5.5 % of the global GDP (Xu et al., 2022). Tourism growth can lead to cash inflows to local and national economies and generate increased tax revenue and employment opportunities in tourist destinations. Expanding inbound tourism can stimulate foreign currency inflows and exports of tourism products, which in turn may boost the growth of a country's gross domestic production (Liu et al., 2022). Due to its umbrella feature and providing peace and social-cultural sympathy, tourism is a proper instrument for facilitating substructure facility development, providing income for the host society and governments, and balancing regional development strategies (Taghizadehyazdi et al., 2015).

Iran is a vast land of particular importance for tourists due to its size, geographical location, communication routes, and tourist attractions (Mirzaei, 2014). It is among the top 10 countries in the world in terms of cultural and civilisational attractions, it is among the top 5 countries in the world in terms of the diversity of natural environment, and it is among the top 3 countries in the world in terms of the diversity of handicrafts, as well as having 22 artworks registered in the list of UNESCO World Heritage Sites (UNESCO, 2016). Multiple customs, Iranian hospitality, and a civilisation that spans several thousand years have enriched this ancient country with various attractions and provided suitable conditions for developing Iranian tourism as a travel destination for international tourists. Unfortunately, Iran has received only 0.6% of the world's tourist income (Dehghanpour et al., 2012), and it has been ranked 133 among 185 countries in terms of tourism (Noori and Taghizadeh, 2012).

Therefore, it is necessary to pay attention to planning issues for tourism development, considering Iran's high potential. One of the strategies that officials should consider to develop tourism is the development and expansion of tourism in areas having the necessary potential for tourism development because regardless of the quality and quantity of resources in tourism areas, the use of those resources will not always be possible due to various limitations such as time, nature, human power or capital (Hall, 1999).

On the other, tourism destinations differ in their ability and capability to attract tourists. Some of these destinations have the necessary qualifications to attract tourists at the national and international levels, and some have local capabilities. Therefore, it is impossible to formulate a similar plan for all these areas in the planning process. Thus, considering the financial and time constraints on the one hand and the difference in tourism destinations on the other hand, the conditions are set so that some tourism destinations develop

faster than others, receive more services and facilities, and more capital is invested in one region than others (Ziaei & Shojaei, 2009).

Isfahan province is the sixth largest province in Iran in terms of size, and it is the third most populous city in Iran after Tehran and Mashhad. Isfahan, the cultural capital of Iran, is a city whose history dates back almost to the creation of Iran (Safa, 2013). This province is the wealthiest province of Iran in terms of tourism. Located in the centre of Iran, this province has a privileged position compared to other provinces regarding geographical location and especially access to other points. This geographical location and historical and cultural experience have made the growth and development of tourism in this province remarkable. Isfahan province (especially the historical city of Isfahan) has potentially attracted many travellers and tourists throughout history. Many tourist routes in this province have natural, historical, and cultural attractions. This research aims to spatially classify tourism routes based on the attractions and facilities in Isfahan province. Therefore, the research questions are as follows: Which tourist routes in Isfahan province have more attractions and facilities? Which of the province's tourism routes should be provided with more services? What are the strengths, weaknesses, opportunities, and threats of tourism in Isfahan province?

Methods

Based on the object's attribute values, spatial classification assigns an object to a class from a given set of classes. It mainly considers the distance, direction, or connectivity relationships among spatial objects (Shamamai & Mosivand, 2011). Classifying tourism destinations can be viewed as a part of the spatial planning process in a region because the purpose of spatial planning is to recognise resources of the land and how to exploit these resources by predicting the future state of the optimal settlement of human beings and their performance in nature to provide reasonable, balanced and favourable economic growth on the territory and preventing the imbalance and destructive and harmful reflections in the region (Masoumiashkevari, 2008).

Classifying tourism is a different concept from the regionalisation of tourism, so at one level, several regions or destinations could have different roles and types of tourism. Concepts such as classifying, convergences, congruences, and other variables are not that effective; instead, it is the power of tourism development that puts the various goals of a region on the same level (Behnammorshedi et al., 2016). In classifying, destinations having the same value and equal tourism capabilities are placed on the same level other than being ranked only in a vertical structure. Therefore, using this method may cause more accessible and more coherent management and policy-making of tourism destinations (Ziai & Shojaei, 2019). Classifying tourism areas is a criterion for determining the centrality and the required infrastructure and adjusting the inequality between the regions. Proper use of infrastructure depends on accurately recognising and classifying facilities, services and existing capacities in each region (Shamai & Musavand, 2011).

Tourism services include all the facilities that are provided to tourists by the authorities to meet the needs and desires of tourists to attract their satisfaction (Behnammorshidi, 2013) in tourism-related activities, having an essential role in serving parts of the tourism sector (Taleghani & Fatahi, 2014). Among the hospitality activities, tourism is one of the leading and growing sectors at the

international level (Fourie, 2011). Hospitality and infrastructure issues of tourism are directly related to the increase in the quality and quantity of infrastructure and the number of tourists, so they are of utmost importance.

The expansion of communication and modern means of transportation, the development of aeroplanes and airport services, and the use of appropriate means of communication add to the tourists' interest in the destinations. Therefore, one of the most essential elements of developing tourism destinations is having an efficient system of tourism facilities and services. The high quality of services provided in this part of tourism activities directly increases the income of the region's residents, the average residence length of tourists, and, finally, their level of desirability, leading to their motivation toward revisiting the region. Tourists who return home satisfied try to encourage and motivate their relatives to visit the destination.

Tourist satisfaction is a kind of cost-free marketing for tourist places (Behnammorshidi, 2011). Therefore, tourism facilities and services, as the most fundamental principle of this activity, create the most significant volume of income for the host communities after the transportation industry and the transportation of tourists on international routes. Investigating the experiences of developed domestic and foreign tourism goals shows that some destinations have shone in this field and are equipped with an organised and capable system in terms of tourism facilities and services in their tourism product supply system.

In planning tourism routes, firstly, the abilities and capabilities of tourism routes should be identified, and each axis should find its place in the region's development process; this is where the necessity of classifying becomes essential. Tourism classification is a concept that has more practical value and can help give objectivity to the planner's thoughts in tourism areas. Among the conducted studies in this field, Meyer (2004) is essential for his idea that the tourism axis is a market-oriented approach to developing tourism destinations.

Tourism routes are an exceptional opportunity for regions that have not been developed enough in terms of tourism but have adorable cultural and tourism resources, which increase the length of tourists' stay and make them spend more time following their interests. In general, tourism routes start with one or more of the following issues in mind: the distribution of visitors and income of tourism, including lesser-known attractions and aspects in the tourism profession or products; increasing the right to request a general review of the destination; increasing the length of stay and spending time by tourists; attracting new tourists and attracting visitors to revisit the location; and increasing the sustainability of the tourism product. He also believes that the attractiveness of each tourism axis is equal to 1. the distance travelled from the geographical distance between the original region and the tourism destination (that is, the actual travel distance), 2. The time for touring the geographical distance, 3. The amount of money a tourist spends during travel, 4. Cognitive distance between original region and destination region.

Guan (2005) identified and emphasised five critical elements for tourism destinations and noted paying attention to the relationship between them when planning the destination. These five elements are specific and definable regional borders, the possibility of having access from the market and domestic transportation corridors, overall local attractions, attractive foreign areas, and entry points to the site. Saroyo & Tatic (2015) have analysed the perspective of tourism attractions based on location features and the relationship between them, such as natural attractions, cleanliness, hospitality, tourism service providers, support facilities and security factors against the attractiveness of the

beach using a non-linear regression method. Accordingly, the relative beauty of the Goa beach was investigated using the Markov chain method, indicating that 69.9% of the tourism attraction of the coastal areas was affected by the locational features and 68.9% was dedicated to the natural attractions.

Cibinskiene & Snieskene (2015) evaluated the tourism competitiveness of urban tourism destinations. They believed that two categories of internal and external environmental aspects affect the competitiveness of urban destinations. External ecological factors include political and legal factors, economic factors, socio-cultural factors, and environmental as well as natural factors. Internal environmental factors include tourism companies, tourism resources, infrastructure, and recreation. Lopez et al. (2018) analysed regional tourism competition using the Prometheus method approach. The results of this analysis showed the comparative strengths and weaknesses of the destinations and allowed them to identify other similar destinations in addition to determining their actual competitors.

Michael et al. (2019) evaluated the competitiveness of tourism in the United Arab Emirates from a business perspective. The results of this research showed that destination resources, infrastructure and support services of the destination and general business environment significantly impacted the competitiveness of UAE tourism. Goffi et al. (2019) investigated the role of 62 features in describing ten indicators of the competitiveness of tourism destinations. These features were grouped into 8 factors or components, including the main attractors, tourism services, supporting elements, general conditions, destination management, tourism policy and planning, public infrastructure, and the demand factors as the tourism destination competitiveness model variables. Roman et al. (2020) conducted a study in which they levelled the European Union countries in terms of accommodation base, tourist traffic and costs, and tourism-related incomes. The aim of this research has been confirmed using data from the United Nations World Tourism Organization (UNWTO) and Eurostat.

Delshad (2021) used the descriptive-analytical method to determine the components of competitiveness and their measurement indicators first and validated them, using experts' opinions. He then utilised an online questionnaire and a survey of 320 tourism experts at the level of 12 selected tourism destinations to measure the level of competitiveness and the effectiveness of each component of competitiveness. In the third step of the research, he used a one-way analysis of variance and Tukey's test to analyse the difference between the competitiveness of selected urban tourism destinations as a whole and separate the elements.

Based on the results of the research, eight components and 42 indicators were determined to measure competitiveness; the final results showed that four elements of public infrastructure, destination management, tourism policy and planning, and strengthening and supporting factors were ranked first to fourth based on their effectiveness on the competitiveness of urban tourism destinations playing a very crucial role in turning natural advantages such as resources and critical attractions to the competitive advantage of urban tourism destinations. Cruz et al. (2022) concluded that Drive tourism (DT) has become an attractive way for an increasing number of visitors to visit tourism destinations along driving routes. This flow of visitors has made sustainability a major issue, that is, the way by which tourism development ensures economic benefits for local communities and preserves local identity along the route without compromising on environmental resources. Many studies focused on the topic of DT, mainly the analysis of a particular angle, economic sustainability, e.g., advantages of the

ones related to economic and environmental sustainability, such as the impact of tourists along the route environment.

Nevertheless, little attention has been paid to the social consequences of DT in the local entrepreneurial climate and the resulting exaggeration of their cultural representativeness in authenticity. The Research aim is to summon these points of view and achieve, through a systematic literature review, a clear and integrative picture of the driving tourism impacts in terms of sustainability along the routes throughout local communities. Also, gathering existing knowledge around the three components of sustainability highlighted the importance of community involvement and collaboration among DT stakeholders to address the trade-off between the protection and promotion of DT routes. Qi & Wang (2022) employ an improved genetic algorithm (IGA) to find the best tourist route based on this requirement. With the increase in tourist attractions, routes, and demands, the traditional genetic algorithm (GA) has problems such as premature convergence and poor local search ability when planning the tourist route. The existence of these problems will affect route planning. IGA proposes three improvements to traditional GA. One is to introduce the ant colony algorithm (ACA) to initialise the parameters in the GA. This algorithm is introduced to alleviate the over-reliance of GA on initialising the population and the poor adaptability of individual people. Second, because the crossover probability parameter in GA significantly influences the final solution, this study proposes an adaptive strategy for adjusting the crossover probability to improve population fitness. Third, considering the weak local search ability of GA and the problem of premature convergence, this study introduces the 2-opt optimisation algorithm to improve the quality of the solution. The results of the experimental analysis confirm the effectiveness of the proposed method.

This study was applied research using the descriptive-analytical method. The data was collected using library-field studies and the spatial data of the study area. The entropy weight method, cluster analysis model, swot technique and GIS and SPSS software were used for data analysis.

Study area

Isfahan province is one of Iran's central provinces with a desert climate. About 10% of Iran's deserts are located in Isfahan. In this province, the snow-covered mountains of Zagros are in the west, and the central desert is in the east and north. Isfahan province's highest mountains and heights are Shahan Koh, Dinar Mountains and Dalan Mountain, respectively, in Fereydunshahr, Semirom and Fereidan. The height of the mountains gradually decreases towards the centre of the province, so there are Kolah Ghazi and Soffeh mountains, Damla mountains, and Panji mountains with low heights around the cities of Isfahan.

Due to the existence of regions with different heights above the sea level in this province, there are various climatic conditions. In general, in this province, as the sea level decreases from the west to the east, the temperature increases with the decrease in rainfall. This city enjoys full sunlight and is sunny almost three-quarters of the year.

Therefore, spring and autumn are the best time to visit Isfahan. This province is the sixth largest in terms of size and the third largest in terms of population in Iran, having an area of about 106,786 km². The centre of this vast province is the historic and beautiful city of Isfahan. The city of Isfahan is one of the exemplary cities in the world with its very ancient history and numerous ancient

monuments. Due to the many arts of this city, it is famous to half of the world. This historical land, most of which is desert, has many ancient works due to its historical cities. In addition to historical and ancient places, this province is considered one of Iran’s largest handicraft production centres. In the UNESCO World Heritage List, among the 21 sites registered for Iran, 4 cases, including Naqsh Jahan Square, Iranian Garden (Chehel Sotoon Garden and Fin Garden), Isfahan Grand Mosque and Aqueducts (Mozdabad Aqueduct, Vezvan in Mimeh and Ardestan Double Aqueduct) are in Isfahan province.

Results and discussion

Natural attractions of Isfahan province

According to the National Tourism Development Program, Iran is divided into seven tourism regions. Based on this division, the 5th region, including the provinces of Isfahan, Fars, Kohgiluyeh, Boyer-Ahmad and Bushehr, is called the heart of Iran or Persia. After doing investigations (SWOT), the national plan for the development of tourism in the 5th area presented the general goals of the development of tourism in the region, including the possibility of a better capitalisation on the places and tourism service facilities throughout the year, as well as a more balanced distribution of tourists in the region among different sectors with particular attention to the creation of tourism opportunities in the villages and small towns of the area.

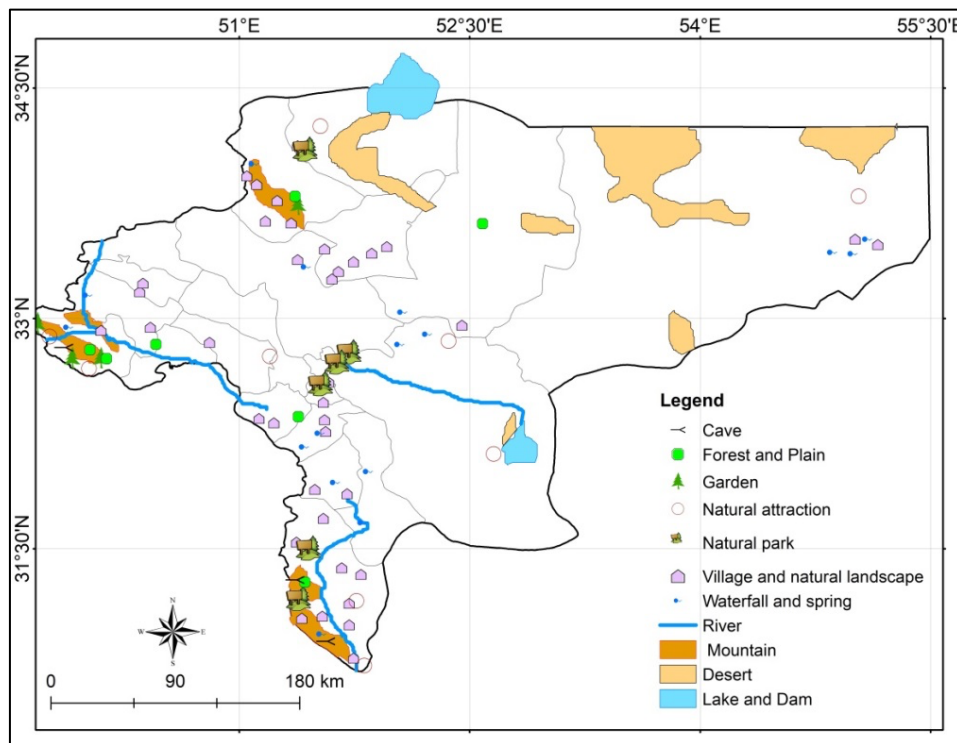


Figure 1. The distribution map of natural attractions of Isfahan province

Source: Author’s analysis

Isfahan province is one of the most important provinces in the country in the field of tourism industry activities, having a unique role in Iran's tourism economy system. It is visited by thousands of domestic and foreign tourists annually as an international destination (Safa, 2013).

In fact, due to its geographical and natural conditions and having a desert, mountain, as well as water-related attractions, and beautiful landscapes such as vegetation and plains, its location in the centre of Iran and the ease of access by road, air and rail lines, Isfahan has a particularly favourable position. Among the important natural attractions of the province are several sources (e.g. Afus in Fereidan City), plains (e.g. Lalehayeh Vazhgoun in Peshandegan City), springs (e.g. Nul & Shir Berenji), rivers (e.g. Qebleh & Khansar in Khansar City), etc.

Attractions and desert landscapes mainly dominate the eastern and northern parts of the province. Beautiful landscapes, salt domes, and dunes are among these areas' most essential natural effects. These desert areas are prone to development, including a part of the desert areas of the province that have high suitability in terms of accessibility, desert attractions, wind erosion, and distance from regions with high protection priority (Shamai & Musavand, 2011).

Among these areas, Mesr desert area with attractions such as sand dunes, Mesr reed bed, Chal Selkenon, Takht Abbasi and Takht Arous in Khor and Biyabank, the beautiful desert areas of Gen desert in the area of Ashtian village and the Abbas-Abad wildlife sanctuary having a suitable access road and beautiful landscapes and the habitat of unique desert animals and plant species in Nayin city, Maranjab desert and its limited attractions including the salt lake and the historical caravanserai of Maranjab, Kanjeh well and Sanbak pit in Aran and Bidgol city and Degh Sorkh region as an international attraction in Ardestan city, parts of Varzaneh or Rig Sera sand areas being in 11 kilometers southeast of Varzaneh city, the target village of Qortan, Gavkhoni salt field and Hassan-Abad desert along with the beautiful nature of Varzaneh having moderate to high wind erosion, being far from industries and mines and having convenient access in Isfahan city are known as areas prone to desert climbing and physical development. Such a development, especially in the towns of Naeen, Khor and Biyabank, having high potential and lack of sufficient facilities, can provide a suitable situation for conducting research and scientific studies on plant and animal species compatible with the desert and provides the opportunity for tourists to benefit from virgin attractions of deserts and have a significant impact on the employment of desert dwellers.

In addition to the desert attractions, water-prone areas and rivers of the province are located in the western and southern parts of the province, especially in the cities of Fereydunshahr and Semirum, which are potent areas in terms of development. Zayandeh Rood, the most original river of the province, also has a west-east direction and starts from Zayandeh Rood Dam and ends at the Gavkhouni Swamp. Because greenery plants surround this river and the presence of forests and sometimes hills overlooking it, such as the forests and summer areas of Bagh-e Bahadoran, Vernamkhasit, Berenjikian, Zardkhshioiyeh, Sararoud area, Flavarjan coastal areas, Baba Mahmoud and Sohrofirozan bridge has created a natural tourism corridor on its way having two water areas at the beginning and end with remarkable ecotourism capabilities and potentials.

Cultural and historical attractions of Isfahan province

Iran is one of the most important tourism centres in the world, having a history of thousands of years as well as tourist and pilgrimage attractions. The

province of Isfahan and the city of Isfahan have a particular position in history and culture.

This city was chosen as the political capital of Iran from the Seljuk period. Nasir Khusraw states: "In all the Persian-speaking cities, I have not seen a city more beautiful, more extensive and more prosperous than Isfahan" (Dehghannejad et al., 2006, p. 25). Sarban minaret, Sofe Sahib, Malik Shah's tomb, Shahrستان Bridge and Forty Girls minaret are historical monuments of this period in Isfahan. Later, Isfahan was chosen as the political capital of Iran during the Safavid period. It was developed between 1050 and 1772 A.C., especially in the 16th century. During the time of Shah Abbas I until the death of Shah Abbas II, Isfahan was the best of all cities in the East. During this era, with the addition of four quays (Abbasabad, Jolfa, Girabad and Ispahan), the view of the Safavid capital was more extensive and more beautiful than Constantinople. In its heyday, Isfahan had 137 palaces, 162 mosques, 48 schools, 273 baths and 12 cemeteries. Although Isfahan was chosen as the political capital, it was also considered the capital of Iran in the cultural sense and was very important. Even today, Isfahan has preserved its past glory. Several historical monuments of this province have been registered with UNESCO. These characteristics caused Isfahan to be selected as the cultural capital of the Islamic world in 2006, and it was chosen as the capital of culture and civilisation of Islamic Iran in 2008. This shows the province of Isfahan and the city's historical and cultural importance in the Islamic world.

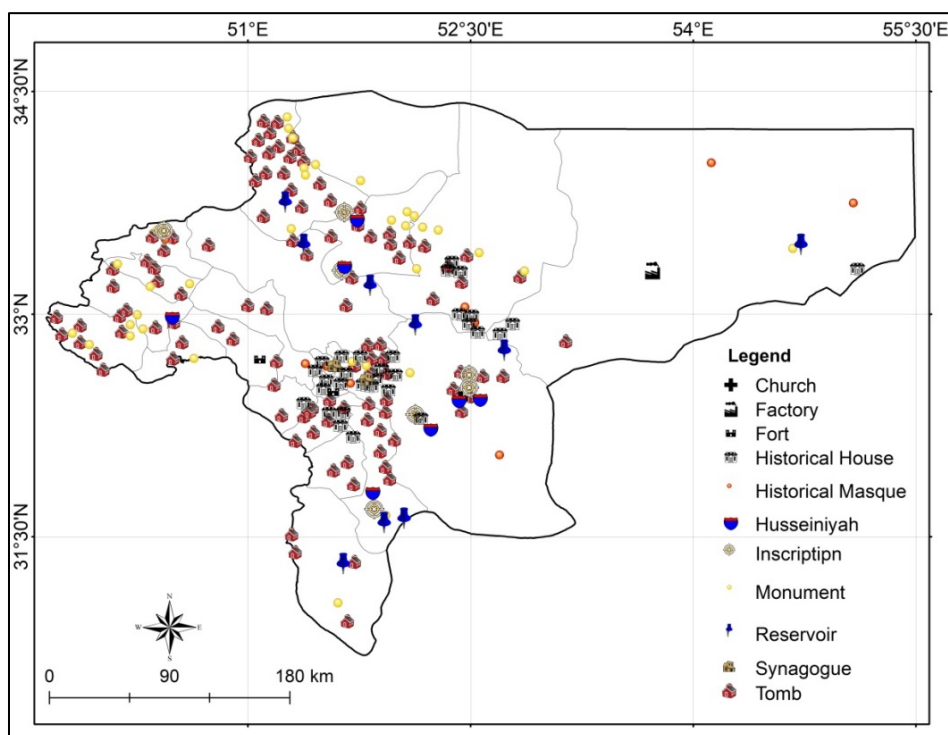


Figure 2. The distribution map of cultural and historical attractions of Isfahan province

Source: Author's analysis

Tourism routes of Isfahan province

Isfahan province's tourism routes have been explained in Table 1, along with their tourist attractions and facilities.

Table 1. Identification of Tourism Routes of Isfahan Province

Tourism routes	Distance (km)	Natural, cultural-historical attractions	Facilities of the route and destination
Isfahan-Talab	60	Gavkhuni wetland, dunes, Abbasi Caravansary, Kabutarkhane arg-e Gougestan, tourism Gehi and Ghurtan village, Jil tourism region, Emamzadeh Shah Naser	Restaurant, delicatessen, gas station, petrol station, temporary accommodation centre, roadside complex, traffic police, car service, W.C., clinic
Isfahan-Ardestan	127	Neyestan tourism village, Arvand aqueduct Ab anbar, Sarhangabad historical complex, Mishab castle, Litanak caravanserai	Hotel, delicatessen, grilling, restaurant, transit complex, terminal, W.C., temporary accommodation centre, medical emergency, clinic, information office
Isfahan- Khour va Biabanak	413	Garmeh, Mehrjan and Mesr villages, Aroosan hot water fountain, Iraj fountain, Museum of Anthropology, Siah kuh region, Siah Madan desert	Delicatessen, gas station, car service
Isfahan-Naeen	150	Old Mohammadiyah Glacier, Pirnia House, Fatemi House, Nogunbad Caravanserai, Belabad Caravanserai, Museum, Narin Qala	Restaurant, delicatessen, gas station, petrol station, hospital, clinic, ATM, information office, terminal
Isfahan-Shahreza	73	Kolah Ghazi Wildlife Area, Agh Cheshme, Zarcheshme, Burj Kabootar	Hotel, temporary accommodation centre, guest house, petrol station, gas station, traffic police, car service, clinic, medical emergency
Isfahan-Dehaqan	95	Podeh village, Asfarjan village, Dizaj spring Heidar spring, Jahangir Khan Qashqai house	Hotel, guest house, restaurant, medical emergency, W.C., car service, ATM
Isfahan-Samirom	150	Khizr Dengezlu Village, Suyandeh Summer Area, Bibi Sidan waterfall, Ateshkadeh, Abmalakh, Hunjan Spring, Zarchashmeh, Mahyar Caravanserai, Shah Reza Imamzadeh, Amin Abad Caravanserai, Kahrouye Castle	Hotel, restaurant, delicatessen, grilling, petrol station, gas station, car service, shopping centre, temporary accommodation centre, terminal, midway complex, medical emergency, clinic, prayer room
Isfahan-Najafabad	25	Najovan, Minarjanban, Borj Kabootar, historical houses, Okhovat Hammam, Sefid Castle, Sare Maryam Imamzadeh	Restaurant, guest house, shopping centre, clinic, ATM, gas station W.C., car service
Isfahan- Tiran and Karvan	50	Dalmankouh, Khamiran Lake, ski resort, wildlife sanctuaries	Restaurant, clinic, medical emergency, W.C., car service
Isfahan-Golpayegan	170	Jelogir Caravanserai, Tirjan Fire Temple, Gogad Citadel, Golpayegan Dam and Koch area, Ulomiche Cave, Chehel Cheshmeh, Damab Dehagh Castle, Hasnenepche Caravanserai	Restaurant, delicatessen, clinic, ATM, traffic police, guest house, car service, gas station, medical emergency
Isfahan-Chadegan	107	Zayandeh Roud Dam, Beshezarha, Jaja Cheshme tourism village, Analui House, Kaveh Ahangar tomb, Shir Sangi statue, Mashhad Kave Chadegan tourism village	Restaurant, delicatessen, gas station, clinic, ATM, traffic police, guest house, car service
Isfahan-Fereidan	119	The natural and beautiful area of Bepe Bala Valley, Cheshme Efos ski slope, Imamzadeh Abdullah	Restaurant, delicatessen, gas station, clinic, ATM, traffic police
Isfahan-Fereydunshahr	146	Forest Park, Cheshme Sarab, Kabootar Cave, Kis Keb Cave, Dasht Lalehhaye Vazhegoon, Sarab Waterfall and Spring, Ashkaf Cave, Gogan Cave, Cheshmeh Cave, Ski Resort, Tarzeh Waterfall, Lezgan	Restaurant, delicatessen, grilling, gas station, clinic, hospital, W.C., car service, ATM, traffic police, guest house

Isfahan-Khansar	139	Spring, Poonezar Waterfall, Bir Chin, Dorak, Armenian cemetery, Sureshjan church, Khoysan church and cemetery	Restaurant, clinic, W.C., car service, traffic police
Isfahan-Baghe Bahadoran	49	Darreh Babr Natural Area, Golestan Kooh, Lalehh Tavgye Vazhgun Plain, Maryam Begum School, Pirbaba's Tomb	Restaurant, gas station, W.C., car service, ATM
Isfahan-Zarinshahr	35	Landscapes of Zayandeh Rood, natural groves, Bagh Badaran Castle, Kabootar Khaneh	Hospital, restaurant, delicatessen, W.C., gas station, car service
Isfahan-Mobarakeh	46	Cheshme Tali Poor Charmin tourism village, Shaloza waterfall, Kale bridge, Kokoloi cave of Pir Bekran, Kabootar Khaneh, Ashtrojan Jame Mosque, Zarinshahr beach recreation complex, Qoran pilgrimage ceremony, Kazcham Asman castle, Flowerjan bridge	Restaurant, delicatessen, W.C., car service, clinic
Isfahan-Murchehkhort, Natanz	122	Beach Park, Hoz Mahi Spring, Borj Kabootar, Alpi Abad Castle, Yavari Castle, Kazemi Castle, Kochir Castle, 24-meters Well, Imamzadeh Ibrahim, Imamzadeh Suleiman, Safai House	Restaurant, W.C., car service, traffic police
Isfahan-Badrud	108	Ashyar Tameh village, Abdul Samad tomb, Milajard ancient area, Madar Shah caravanserai	Restaurant, guest house, W.C., hospital, traffic police, car service, ATM,
Isfahan-Kashan	189	Riq Tappeh Maseie, Abbas Abad hunting ground and palace, Arsiman ancient area, Adineh mosque, Takht Shah, Nogheh bath, Moazi house, Mostahagh al-Dawlah house	Hotel, restaurant, guest house, grilling, W.C., traffic police, gas station, hospital, railway station, ATM, shopping centre, information office
Isfahan-Aran va Bidgol	205	Abyaneh village, Parihel Abyaneh cave, Borujerdi and Tabatabai houses, Tabriziha mosque, Ameri house, Jalali castle and Abdul Razzaq bathroom, Fin bath	Hotel, restaurant, hospital, sanitary service, clinic, car service, traffic police, ATM
Isfahan-Qamsar	208	Maranjab desert and salt lake, Tape Mase, Noushabad underground city, Abu Zeyd Abad caravanserai, Naqshineh Jame Mosque, Weigal ancient site	Hotel, delicatessen, restaurant, hospital, clinic, gas station
Isfahan-Niyasar	230	Qamsar Mineral Spring, Akbarabad Caravanserai, Shah Abbasi Dam, Pir Davood Tomb	Guest house, delicatessen, grilling, gas station, hospital, clinic, ATM
Isfahan-Barzok	48	Weiss Cave, Atash Kadeh Garden, Sohrab Sepehri Tomb, Qali Shouyan Ceremony, Imamzadeh, Mashhad Ardahal	Hotel, restaurant, W.C., clinic, gas station, traffic police, ambulance
		Flower gardens, Abbasi caravansaries, Kalahrud tourism village, natural landscapes	

Source: Cultural Heritage, Handicrafts and Tourism Organization of Isfahan Province

Cluster analysis

Cluster analysis is a statistical method for determining homogenous groups or clusters (Asayesh & Estelaji, 2013); it includes a comprehensive set of techniques designed to find a group of similar items in a data set (Holand, 2006). The purpose of cluster analysis is to divide the statements into homogeneous groups in which the observations of each group are similar, and the statements of different groups are not similar (Hekmatifarid, 2003). In other words, it is a multivariate analysis that seeks to organise the information related to variables in which the components of each cluster are similar to each other, and the members of each cluster are not similar to the members of other clusters (Kalantari, 2008; Hajipour & Zabardast, 2014). Accordingly, areas with the most similarities in terms of factor scores are grouped in one cluster (Melki & Sheikhi, 2018). In

other words, cluster analysis divides the observations into homogeneous groups so that the observations of each group are similar and the observations of different groups are not that similar to each other (Goldasteh, 2011). The purpose of cluster analysis is to divide a set of data into discrete clusters with common characteristics (Vermunt & Magison, 2002). Classifying homogeneous areas of this method is done in different ways. Determining the correlation coefficient and measuring the distance, especially the Euclidean distance, are among the most important methods of determining homogeneous regions (Bayat, 2018). Therefore, different methods exist for combining components in clusters, including hierarchical cluster analysis. Hierarchical analysis is performed using condensing or discriminating methods (Salehi et al., 2016). The steps of cluster analysis can be summarised as follows: 1. Collecting the data matrix in which the regions are placed in a column and are subjected to cluster analysis. Its rows are also made up of attributes that the desired areas are zoned on this basis, 2. Standardising the data, 3. Calculating the similarity between the pairs of original data matrix areas and standardised data, 4. Using a cluster method for categorising the similarities and forming a tree diagram or dendrogram. This diagram shows the similarity between all people, both in pairs and hierarchically (Pourtaheri, 2019).

Classifying tourism routes of Isfahan province based on tourism attractions using cluster analysis model

In this research, the hierarchical cluster analysis method has been used for further application in geographical studies. Accordingly, considering the purpose of the research and the data, the average link method was utilised to form agglomeration clusters in the hierarchical cluster analysis method. This technique groups the routes that have the most similarity in terms of scores into a cluster. In this way, the scores of each factor indicate the degree of importance of each axis.

The utilised classification in the cluster analysis showed that the places located on one level were very similar to each other, but they were significantly different from the places on other levels. The result of using cluster analysis technique in grouping routes in terms of their attractions has been as described in Figures 3 and 4: No. 7 (Isfahan-Samirom), No. 13 (Isfahan-Fereydunshahr), No. 16 (Isfahan-Zarinshahr) and No. 20 (Isfahan-Kashan) were on the same level which is called the first level (having many and essential natural and human-made attractions), routes No. 1 (Isfahan-Talab), No. 3 (Isfahan- Khor and Biyabanak), No. 10 (Isfahan-Golpayegan), No. 11 (Isfahan-Chadegan), No. 17 (Isfahan-Mobarakeh), No. 19 (Isfahan-Badrud), No. 21 (Isfahan-Aran and Bidgol) were on one level, which is called the second level (having less natural and human-made attractions less than the first level) and routes No. 2 (Isfahan-Ardestan), No. 4 (Isfahan-Naen), No. 5 (Isfahan- Shahreza), No. 6 (Isfahan-Dehaghan), No. 8 (Isfahan- Najaf Abad), No. 9 (Isfahan-Tiran and Kron), No. 12 (Isfahan-Freidan), No. 14 (Isfahan-Khansar), No. 15 (Isfahan-Bagh-e Badaran), No. 18 (Isfahan-Murcheh Khort Natanz), No. 23 (Isfahan-Niyasar) and No. 24 (Isfahan-Barzak) were on one level which is called the third level in terms of having human-made and natural attractions.

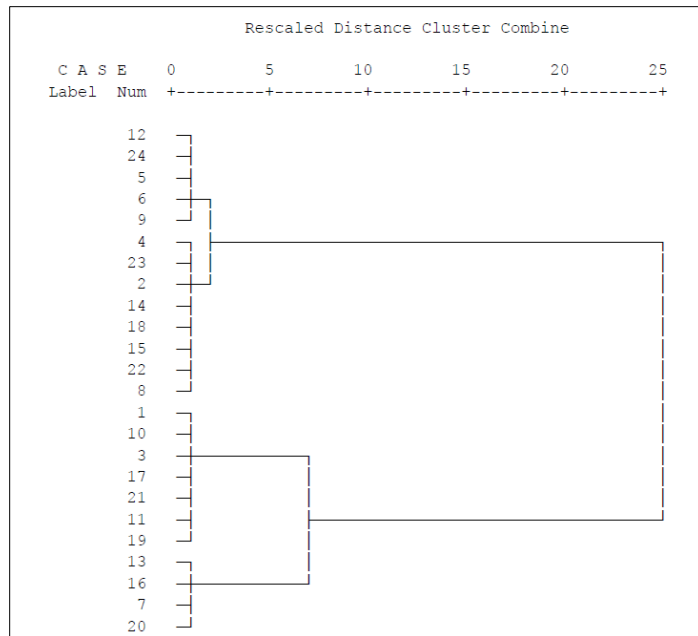


Figure 3. Tree diagram of tourism routes based on tourist attractions using the Ward method
Source: Author's analysis

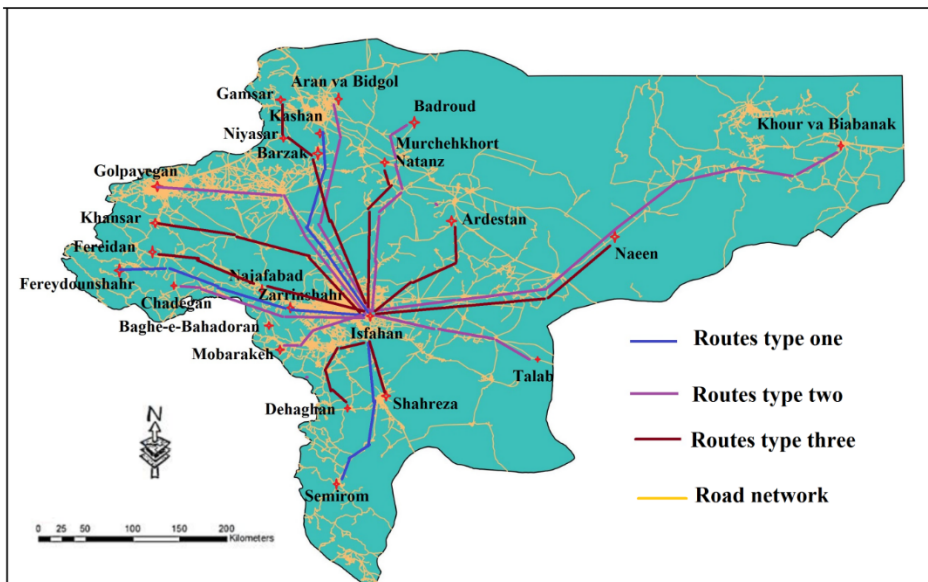


Figure 4. Types of tourism routes in terms of having natural and cultural attractions
Source: Author's analysis

Classifying tourism routes of Isfahan province based on facilities and services using cluster analysis model

The result of using the cluster analysis technique in grouping routes in terms of having attractions has been described in Figures 5 and 6. This translates into No. 7 (Isfahan-Samirom), No. 13 (Isfahan-Fereydunshahr) and No. 20 (Isfahan-Kashan) were on one level, which is called the first level (in terms of facilities and services), routes No. 1 (Isfahan-Talab), No. 2 (Isfahan-Ardestan), No. 4 (Isfahan-Naeen), No. 5 (Isfahan-Shareza), No. 6 (Isfahan-Dehaghan), No. 9 (Isfahan-Tiran and Koron), No. 10 (Isfahan-Golpayegan), No. 11 (Isfahan-Chadegan), No. 12 (Isfahan-Freidan), No. 19 (Isfahan-Badrud), No. 21 (Isfahan-Aran and Bidgol) and No. 23 (Isfahan-Niaser) were on one level (the second level in terms of facilities), routes No. 3 (Isfahan-Khor and Biyabank), No. 5 (Isfahan-Shahreza), No. 8 (Isfahan-Najaf Abad), No. 14 (Isfahan-Khansar), No. 16 (Isfahan-Zarinshahr), No. 17 (Isfahan-Mubarkeh), No. 18 (Isfahan-Morche Khort Natanz), No. 22 (Isfahan-Qamsar) and No. 24 (Isfahan-Barzak) were on the same level (the third level in terms of facilities).

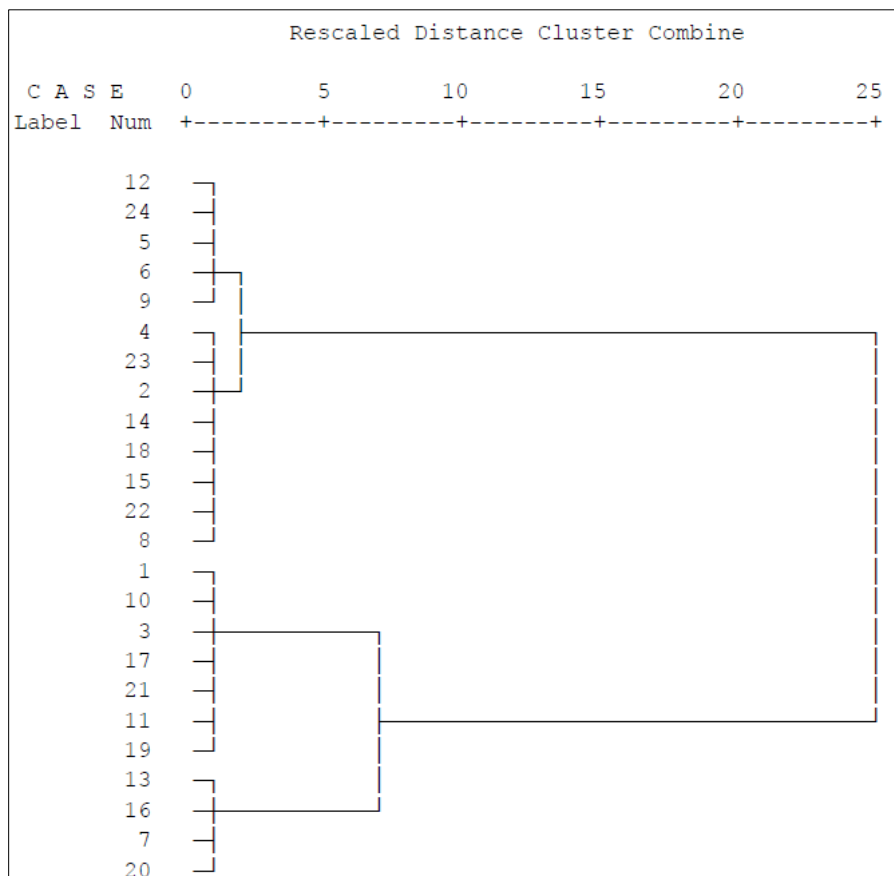


Figure 5. Tree diagram of tourism routes based on services and facilities using the Ward method

Source: Author's analysis

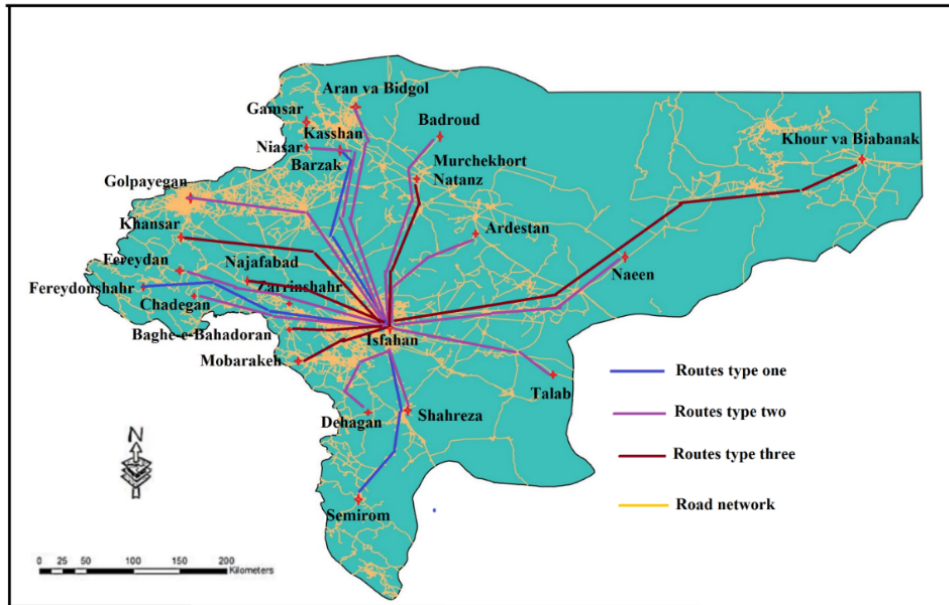


Figure 6. Map indicating the type of tourism routes in terms of having services and facilities

Source: Author's analysis

SWOT technique

SWOT analysis systematically identifies factors regarding which strategy should have the best compatibility. The logic of the mentioned approach is that the practical strategy should maximise the strengths and opportunities of the system and minimise the weaknesses and threats. Using this logic correctly would have the desired results for choosing and designing an effective strategy (Hekmatnia and Mousavi, 2015; Ziyari, 2015). SWOT technique is one of the strategic tools to match internal system strengths and weaknesses with external system opportunities and threats. This model provides a systematic analysis for identifying these factors and choosing a strategy that fits appropriately with them. The critical point of this model is the analysis of a range of all situational aspects of the system, thus providing a valuable framework for strategy selection.

Planning for tourism development depends on a detailed investigation and knowledge of the studied area and requires access to outstanding models for planning analysis. The swot analysis includes the capabilities of the tourism routes of Isfahan province, indicating the existence of many powers of this province in the field of tourism development, which have been described in Table 2 as the internal factors (strengths and weaknesses) related to the tourism routes.

The result of this research is that paying attention to tourism as the most sustainable means of job creation and economic growth can be the factor of endogenous development in Isfahan province, and this can only be achieved with a purposeful, forward-looking, integrated program and paying attention to the elements that shape this industry, i.e., transportation, attractions, services, information, and advertising. As a result, the following strategies are presented for the sustainability of the tourism industry and its integrated development in the province (Table 4).

Table 2. Internal Factors (Strengths and Weaknesses) of Tourism Routes in Isfahan Province

Strength	Weaknesses
1. Isfahan province is famous for having natural and cultural-historical monuments and attractions	1. Scorching weather in some tourism routes in summer
2. The existence of beautiful natural landscapes	2. Weak facilities and services in some tourism routes
3. Suitable geographical location of Isfahan province in Iran	3. Weak advertising and lack of knowledge of target tourism markets
4. Ground transportation is suitable for tourism routes of Isfahan province	4. Weakness in rail and air transportation
5. The hospitality of people with local and traditional customs in tourism areas	5. Weak management of tourism attractions by organisations and institutions
6. The existence of caravanserais and historical houses	6. Lack of private-sector investment
7. Numerous springs and waterfalls	7. Lack of necessary training to provide services to tourists
8. Climatic diversity in tourism routes of the province	8. Destruction of tourism resources and attractions of the province due to improper use and using more than the tolerable capacity of natural and valuable environments
9. Vast deserts with ecotourism attractions (caves and salt lakes, dunes)	9. Limitations and weaknesses in the handicrafts marketing system of the province
10. Biodiversity (in terms of plants and animals)	-
11. Numerous tourist villages	-
12. The existence of suitable tourism facilities and services in some tourism routes of the province	-
13. Officials' attention to the importance of tourism and its role in employment	-

Source: Author's analysis

Table 3. External Factors (Opportunities and Threats) of Tourism Routes in Isfahan Province

Opportunities	Threats
1. The ability to turn Isfahan province into a vital tourism polar in the country	1. Environmental pollution and the destruction of natural resources
2. The proximity of Isfahan province to large population centres (Tehran, Shiraz, Qom)	2. Inability and inefficiency of the organisations in charge of tourism in superior positions
3. Increasing the desire to benefit from tourism development to create jobs and prevent migration	3. The existence of administrative bureaucracy and lack of government permission for tourism development
4. Increasing the motivation of the urban population to spend their leisure time in the tourist centres of Isfahan province	4. Inappropriateness and inadequacy of transportation infrastructures
5. Great motivation and interest of domestic and foreign tourists to visit the tourist attractions of Isfahan	5. The existence of metropolises of Tehran, Shiraz and Qom as competitors for Isfahan in attracting tourists
6. The ability of the province to attract domestic and foreign investments in the tourism sector	-
7. Creating a suitable platform for holding exhibitions and booths for the supply of cultural products	-
8. Creating facilities in the field of issuing visas for foreign tourists	-
9. The tendency of the cultural atmosphere of the society to attract foreign tourists	-
10. Mutual exchange and promotion of cultures	-

Source: Author's analysis

Table 4. Strategies for Tourism Development in Isfahan Province

ST (Competitive strategy)	SO (Aggressive strategy)
<ol style="list-style-type: none"> 1. The expansion of air and rail transportation in the province 2. Diversification of tourism facilities, activities, and services to satisfy tourists 3. Programming for culturalising the reception of foreign tourists 4. Capacity and determination of the desired population density in tourism areas to reduce the pressure, and prevent their destruction 5. Developing and equipping tourist routes of the province and creating and installing signs and establishing local guides and establishing laws and regulations in these routes 	<ol style="list-style-type: none"> 1. The expansion of communication and information systems, advertisements and holding national and international conferences to know the tourism potential of the province as much as possible 2. Trying to have more relationships with international tourism polar and using their experiences 3. The development of industrial and commercial tourism and the establishment of public and private investment in tourism industry 4. Conservation and preservation of the natural and historical attractions of the province 5. Development of tourism facilities and services in tourism routes 6. Improvement of peripheral historical and cultural attractions
<p>WT (Defensive strategy)</p> <ol style="list-style-type: none"> 1. Establishing an independent unit called ecotourism in the cultural heritage and tourism organisation as the guardian of natural tourism 2. Controlling and preventing the destruction of natural and historical-cultural attractions 3. Setting the groundwork for encouraging people to participate in the development of infrastructures and equipment 4. Increasing the awareness level of tourists to control and prevent polluting the environment 5. Investing in the use of new technologies in tourism marketing activities 	<p>WO (Conservative strategy)</p> <ol style="list-style-type: none"> 1. Studying the way of advertising to introduce tourism attractions 2. Reviewing the distribution of facilities and prioritising areas with high potential 3. Using the opinions of local people and experts to plan tourism development in the regions 4. Reducing administrative bureaucracy for tourism projects 5. Providing various incentives to investors in the field of tourism

Source: Author's analysis

Conclusion

In planning tourism routes, the abilities and capabilities of tourism routes should be identified first so that the place of each axis in the tourism development process can be specified. Identifying this position can help in having reasonable expectations and logical behaviours with tourism routes while investing in their assets and capacities. Accordingly, it could be possible to achieve the desired planning for the quantitative and qualitative improvement of the tourism routes of Isfahan province.

However, the discussion of transportation facilities and services, as one of the basic requirements for the development of tourism activity, makes it possible to have access to attractions for tourists; thus, the network of communication routes is one of the most important infrastructures in the development of the tourism industry since many tourism attractions are left unused due to the lack of a network of suitable communication routes. Therefore, access networks and the variety of access to tourist areas create superiority and increase the level of performance of a tourist area compared to other areas. For this reason, providing the minimum possibility of access to tourist attractions is each tourist area's primary and basic condition in exploiting attractions.

On the other hand, studying tourism routes and networks of access to attractions and tourist facilities and providing a suitable model for determining the optimal routes can increase tourists' level of satisfaction and solve tourism

issues and problems. The city of Isfahan has the largest number of sources and potential historical-cultural tourism attractions, some of which are considered the country's most prominent attractions and are famous worldwide. Therefore, this city is considered the first pole of the historical-cultural tourism section. Kashan is ranked after the city of Isfahan in terms of historical-cultural monuments and its historical background and attractions.

Therefore, one of the most important areas of resource development in the cities of Isfahan and Kashan is the development of historical-cultural attractions. Moreover, regarding natural attractions, the greatest potential is related to the cities of Semirum in the south of the province and Fereydunshahr in the west. In addition to its unique natural and historical tourist attractions, Isfahan, the central province of Iran, is considered one of the most important tourist places. It plays a significant role in reflecting tourism infrastructure and providing social, political and economic infrastructure facilities. Since the communication routes of Isfahan province, as one of the tourism infrastructures, reduce the cost and time of tourists, it could be stated that this factor effectively developed the country's tourism industry.

On the other hand, the facilities and services that are directly and indirectly responsible for the tourism sector in Isfahan and are an important factor in the growth and improvement of the economic income of tourism: the existence of infrastructure facilities such as the airport and a strong transportation network can also boost tourism in the routes of Isfahan province. Another important point is the concentration of activities on some routes and insufficient attention to other potential routes, which causes the concentration of population, facilities, services, capital, and the like. This issue can be easily observed in the state of tourism routes of the province. In general, the cause of this concentration can be the sectorial planning system and the neglect of spatial and regional planning in the province's tourism development.

The results showed that most of the routes of the province had been deprived of proper services. Therefore, the northeast, east and southeast routes, which have a longer distance and potentially lead to the boredom and fatigue of tourists and visitors after travelling such a long route, should be given more attention by the planners and workers in this field to satisfy the tourists. Finally, it can be pointed out that spatial analysis could determine the imbalance in tourism development. As it is clear, this artificial inequality is the result of unbalanced growth. Therefore, in the case of unbalanced distribution, the amount of inequality and concentration is determined, and the possibility of conscious planning for adjusting inequality, balancing the development, and benefiting all regions from the benefits of tourism could be provided. According to the above topics, balanced and sustainable development in tourism regions and destinations depends on providing all available elements and their proper distribution among regions.

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