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Research Article

A New Hybrid Fuzzy Model: Satisfaction of Residents in Touristic Areas toward Tourism Development

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This research brings a practical approach to the issue of the level of satisfaction from residents in tourist destinations by using three attractive methods together. After reviewing the theoretical foundations and the meta-synthesis method in identifying indicators, fuzzy Delphi was used for screening, fuzzy SWARA (stepwise weight assessment ratio analysis) for weighting, and fuzzy EDAS (evaluation based on distance from average solution) for 16 very important tourism areas in Iran. Six important factors (economic, cultural, environmental, perceptual, social, and health) along with 42 important criteria were identified in the meta-combination method, while also obtaining the total weight of the indicators. Finally, the sensitivity analysis of the model is performed and practical suggestions presented.

1. Introduction

Tourism in today's world is considered an industry and the third most dynamic, prosperous, and developing economic phenomenon that has overtaken other global industries after the oil and automotive industries [1]. Tourism is a service activity where satisfaction has a tremendous impact on the interests of its stakeholders [2]. The importance of this issue, especially by governments and their interest in meeting the local needs of the tourism region, provides better public and private services [3] (114, [4, 5]). One of the most effective trends in tourism development is to pay attention to the host community and their level of satisfaction with the presence of tourists in the tourism target areas [6]. Experts believe that there is a direct relationship between tourism and quality of life because tourism increases the quality of life by reducing poverty, increasing per capita income, and it also may increase environmental pollution crimes ([7]; 879). If tourism is understood as a tool for economic development for the local community by providing factors such as employment and investment opportunities, tax revenues, restaurants, accommodation services, natural and cultural attractions, festivals, and recreational opportunities, the quality of life for residents improves and promotes the development of the region ([8]; 4).

Vosughi et al. [9] believe that recognizing the factors affecting the satisfaction of the host community should be considered in the success of sustainable tourism development. Reducing costs, maximizing environmental, economic, and social benefits to attract stakeholders [10] are on the one hand, while maintaining cultural integrity, biodiversity, and support systems, building local community capacity, and monitoring them are on the other [11]. Brokaj [12] believes that giving support to the local community in

managing the tourist destination and achieving a codified plan so that the host community is fully satisfied is crucial.

Zhang et al. [13] have focused on the issue of resident commitment to respecting tourists and tourism-related activities and actions based on the specific conditions and characteristics of the area in various aspects to other activities. Jaafar et al. [14] also believe that tourism is a social-cultural attraction itself before it is considered an economic phenomenon. Researchers have linked perceived tourism influences to resident satisfaction with tourism development (STD) or analyzed the relationship between tourism influences and resident support for tourism development [15–17].

Academics and stakeholders [18–22] have increasingly accepted the issue of resident satisfaction with the purpose of tourism and attention to tourism development features. They believe that a successful tourism development program can provide economic benefits to rural communities by strengthening employment and business opportunities. The results of structural equation modeling show that the perceived effects from residents are not significantly related to their support for future tourism development. In contrast, resident satisfaction was clearly associated with their support for such progress, indicating that local resident satisfaction with existing tourism development could be an important predictor for their further support for such development.

Foroni et al. [23] analyzed a questionnaire developed by the European Commission for Local Residents by the European Tourism Index (ETIS). In this study, they present real results and suggest the relationship between tourism and host communities. Mohammad Alrwajfah et al. [23] showed that the social demographics of respondents and society's dependence on their understanding of tourism influence tourism development. Gender and distance from tourist sites are also seen as very important factors in influencing the perceptions of local residents. In addition, the perceived economic impact is the most important aspect for these respondents and the perceived negative effects that significantly satisfy them do not affect them. The tourism industry is also important in terms of its role in GDP and creates many job opportunities in many countries ([25]; 135). According to the World Travel and Tourism Council, the share of travel and tourism in the world's GDP in 2012 grew by 3%. This growth rate has been faster than the growth of the global economy (2.3%) and also faster than the growth of a number of large industries, including manufacturing, services, business, and retail. The tourism industry's direct share of the world's gross domestic product was US$ 2.1 trillion, and the industry directly supports 101 million jobs ([26]; 134). Also, according to the World Tourism Organization, tourism has become one of the three factors affecting economic development in more than 50% of the world's poorest countries, while reaching 10% of GDP in Western countries and 40% of the GDP in poor countries ([26]; 517).

As can be seen, the concept of resident satisfaction toward tourism and its impact on the development of tourism has been written from different aspects and with different models and methods. However, less attention has been paid to evaluating and ranking satisfaction indicators using multicriteria decision models. Understanding the needs and problems of the tourist target in tourism-related issues is one of the necessities of planning and management in all dimensions. In addition, the importance of the role of local residents in supporting and deciding on tourism development, and its effects on tourism are important needs that have received less attention in Iran. The important point is that, although the principles of tourism are benevolent and ensure the interests of host communities and tourists in the long run, their implementation is difficult given the political, economic, social, cultural, and health conditions prevailing in developing countries. Therefore, this research departs from previous papers by using a hybrid approach where results obtained from multicriteria decision-making models as regards to weights and priorities are conceptually cross-checked with qualitative descriptions of each alternative touristic area.

Iran is a country that has significant capabilities in the field of tourism that are related not only to its historical attractions but also to its cultural and climatic diversity. Iran is a country with four seasons of climatic and animal diversity including high mountains, vast deserts, and dense forests. Iran is a country with a history of governing for 2,500 years and has one of the largest and oldest collections of historical monuments in the world. The people of this country are also very warm-hearted, kind, and hospitable. Anyone who considers these features will make Iran one of their top tourist destinations in the world. But despite all of Iran's attractions, its share in the world tourism market is not very significant. However, this share has improved and reached a more acceptable level, especially in recent years due to the openings that have taken place in the international arena. Iran is the 89th most competitive country in the world in terms of tourism and travel and is ranked 11th among 15 countries in the Mena region [28]. One of the indicators examined in travel and tourism policies is the price competitiveness index. Changes in the exchange rate in Iran rank first in the world in this index. Due to low airport tolls, cheap fuel, and high purchasing power of foreign tourists in Iran, this country is ranked first in terms of price competitiveness with its natural and cultural resources being a strength in attracting foreign tourists to Iran.

In this article, the regular structure first identifies the satisfaction indicators of tourism target region residents with the Fuzzy Delphi approach and the opinions of tourism industry experts in Iran. Then, the weight of the indicators was measured using the Fuzzy SWARA (stepwise weight assessment ratio analysis) approach, and the Fuzzy EDAS (evaluation based on distance from average solution) approach was used for ranking the indicators. Finally, sensitivity analysis was performed with Fuzzy COPRAS (COmplex PRoportional ASsessment), Fuzzy MABAK, and Fuzzy TOPSIS (technique for order of preference by similarity to ideal solution) approaches. Figure 1 illustrates the research structure well.

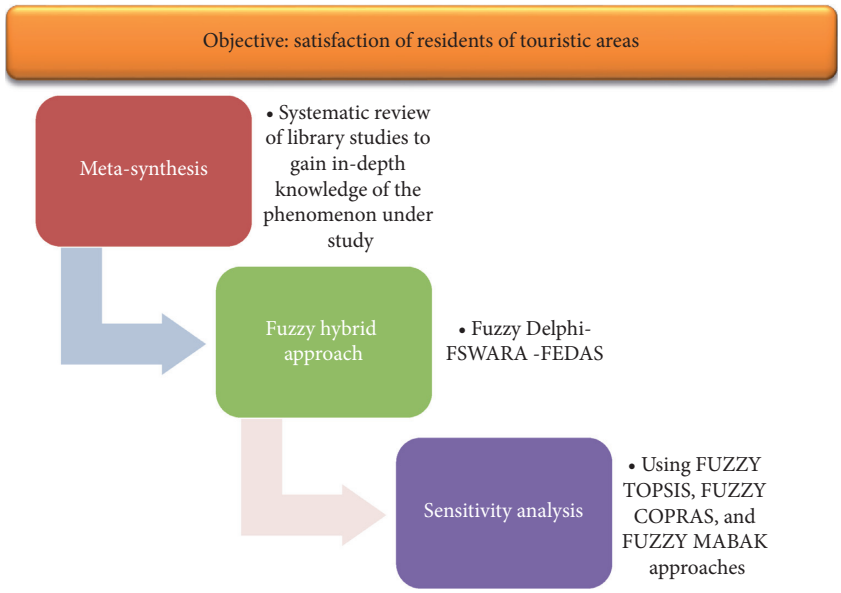

Figure 1: Research structure.

1.1. Research Gap. Tourism is one of the strongest industries in global economic development and has many positive and negative effects. One of the key factors in tourism development is the satisfaction of the locals [1]. For growth in the tourism industry, applying development principles is increasingly important for stakeholders, tourists, and host communities [10] along with maintaining cultural integrity, essential environmental processes, biodiversity, and life support systems for sustainable tourism as defined by the World Trade Organization that requires close monitoring of tourism satisfaction, capacity building of the local community, and continuous monitoring of their reactions to tourism activities [11]. Tourism development is one of the methods of reconstruction and socioeconomic development for increasing the welfare of destination residents, and in addition to tourists, it should be useful for residents and other stakeholders. The effects of tourism may cause discomfort and dissatisfaction in the host community, which in turn may cause problems in the long-term sustainability of the tourism industry and its economic benefits [29]. If the host community believes that tourism development is destroying their social and physical environment and that tourists are the cause, the quality of interactions between residents and tourists may decline [30], though revenue from tourism activities can become a real economic bridge with psychological and social effects [31]: 1807). Basically, the judgment of the host community towards tourism with the increase in the number of visitors in the destination community includes a range of satisfaction, indifference, resentment, and hostility [32]. The study of the approach to potential effects of tourism from two dimensions of costs and benefits (positive or negative effects) generally shows a negative relationship between costs and support for the development of the tourism industry and a positive relationship between benefits and support of local communities [33]. The image of local residents is a mental structure based on several selective perceptions of information about a place [34]. There are several theoretical frameworks for understanding people's reactions to tourism. The Social Exchange Theory (SET) is an underlying framework for all methods and approaches based on the host community's assessment of the costs and benefits expected from tourism. In fact, how local residents assess the set of costs and benefits of tourism will affect their attitudes ([35]:759–760). In the Life Cycle Theory (LCT), evaluating the development of destination tourism over time is important. Thus, the attitude of the host is influenced by the process of change and development in tourism ([36]; 39). Factors that influence the host community's views on tourism are often described as social, economic, and environmental effects with positive effects being benefits and the negative effects being costs. In general, theorists and researchers have stated that there is an inverse relationship between the level of tourism development and the objective and subjective criteria of social and environmental effects on the host ([37]; 83). Therefore, examining and evaluating the mental image of the host community towards tourism is a complex matter. The mental image of local residents is one of the key factors in understanding support for the development of the tourism industry, which emphasizes the unique characteristics of the place rather than the individual's psychological involvement in the place. Stable dependence, on the other hand, is a dynamic structure and is less subject to change [38]. Experts believe that there is a direct relationship between tourism and quality of life because tourism reduces poverty, increases per capita income, but may also increase the crime rate of environmental pollution, causing changes in the quality of life ([7]; 879). If tourism becomes a tool of economic development for local communities, it may be possible to provide quality services, tax revenue, restaurants, accommodation services, natural and cultural attractions, festivals, and entertainment ([8]: 4). In addition to the economic aspects, this industry brings

about cultural and social changes to the tourist destinations [1].

One of the types of tourism is rural tourism. Today, the share of this type of tourism is between 10– 25%. The expansion and development of tourism in rural areas is one of the main elements that assist rural populations suffering from poverty, low wages, and economic and socialization problems. Resident understanding of the policy of minimizing the negative effects of tourism development makes it easier to minimize its waste, which leads to the development of the community and more support for tourism. Therefore, in summary, in the case of understanding the positive effects of tourism, this industry could be transformed into a tool for economic, social, and environmental development in terms of standard of living with the effects of tourism becoming a source of satisfaction for the host community by dealing with the problems in the country through tourism industry sustainability and the resulting economic benefits.

2. Background

2.1. Contextual Setting. The World Travel and Tourism Council [39] has been collecting evidence for more than 25 years that shows the economic impact and job creation from travel and tourism (All the numbers mentioned in this section have been prepared from reliable sources in Iran.). These statistics show that despite the unpredictable and growing shocks caused by terrorist attacks, political instability, natural disasters, and pervasive diseases, travel and tourism continue to grow. According to statistics released by the World Travel and Tourism Council in 2019, the direct share of travel and tourism in the world GDP in 2018 amounted to US$ 2.751 trillion https://wttc.org/Research/Economic-Impacton or 3.2% of the world's GDP. It is also projected to rise to US$ 4.346 trillion by 2025, accounting for 3.4% of the world's GDP.

Iran has many attractions, and the diversity of these attractions has attracted domestic and foreign tourists. Tourism in Iran has a high potential for growth. The most important tourist centers in Iran are historical and cultural areas, holy and religious places, and attractions in different cities.

According to the Tourism Organization, the share of Iran's tourism industry in GDP is about US$ 119 million (2.4%), which is projected to rise to 4% by 2023. Currently 475,000 Iranians work in the tourism industry and related industries accounting for 1.2% of the total workforce in Iran, and according to government plans, it should increase to 3.2% by 2023. According to statistics released by the World Tourism Organization, Iran's tourism grew by 12% in 2016, while global tourism growth was 4%. Perhaps, for this reason, private sector investments in tourism during 2016 grew by 20 to 30%, but according to the head of the Cultural Heritage, Handicrafts, and Tourism Organization, the number of foreign tourists entering the country was only 4.6% of the world's tourists in the last two years.

In 2012, about 4,800,000 people came to Iran, in 2013, about 5,100,000 people, in 2014, about 5,250,000 people, and in 2015, this figure rose to about 5,300,000. The number of European and American tourists visiting Iran has increased by 56.6% from 2015 to the end of the first quarter of 2016. From August, 2014, to the end of 2015, 478,826 Westerners (mostly Europeans) traveled to Iran. However, before January 2012, to July 2014, only 35,852 Europeans traveled to Iran. According to the latest forecast of the World Tourism Organization, the trend of attracting foreign tourists to Iran will continue until 2027.

Also in 2018, the direct share of travel and tourism in Iran to create employment is 468,000 jobs, equivalent to 1.9% of total employment in the country, and it is expected to reach 505,000 jobs in 2025, equivalent to 2% of total employment in the country. In 2018, investment in the travel and tourism sector in Iran at the current price of $ 2.5 billion was equivalent to 3.4% of the total investment in the country, and this share is expected to increase to 4.6% by 2025. In addition, tourism revenue in Iran in 2018 amounted to US$ 4.1 billion, equivalent to 4% of total exports, which is expected to reach 7.2% by 2025.

2.2. Literature Review

2.2.1. Tourism Industry in Iran (Ministry of Tourism and Tourism of Iran (2020))

(1) Historical Attractions. History and civilization are an integral part of the identity of any country. Countries that have this gift and have made good use of its tourism potential have made significant progress in their tourism industry [40]. Iran is also one of the countries that attract the attention of every tourist with its civilization and history of several thousand years. Iran, with relics from the ancient world, has 21 historical and archeological monuments registered on the UNESCO list so far. If we want to look at the past of Iran in the form of several identities and historical perspectives, we can mention the history of calligraphy and civilization, ancient Iran, and Safavid Islam as the most important sources of Iranian historical monuments.

(2) Natural Attractions. Iran is a country with a history and civilization of several thousand years, which attracts the attention of every tourist. So far, Iran has 21 historical and archeological monuments registered on the UNESCO list. From the perspective of civilization, the ancient region of Jiroft in the Kerman province with its history of 7,000 years is the center of the first glorious civilization in the world. But apart from this region, which seems more interesting for researchers and experts, ancient Iran is known around the world for the Persepolis with its famous Iranian antiquities registered in the UNESCO list, built during the reign of Darius the Great, Xerxes, and Ardashir I. From post-Islamic Iran, its Safavid monuments and buildings are the most famous around the world with the most prominent one being Naghsh Jahan Square in Isfahan. The square, which in the seventeenth century was known as one of the largest squares in the world, has 4 unique historical monuments connected to it: the Sheikh Lotfollah Mosque, the Imam Mosque, the entrance and bazaar of Qaisaria, and the High Palace of Aali Qapu Palace.

(3) Cultural Attractions. Iranian culture is extremely rich in the production of pleasure, art, and happiness and is full of unique delicacies. Delicacies are embedded in it to increase happiness and excitement and as a result more enjoyment of life. Examples of these subtleties can be seen from Persian poetry and literature with its global fame and influence (works of Rumi, Ferdowsi, Hafez, and Saadi) to the place of humor and music in Iranian culture. Visual arts and visual pleasures also have a special place in Iranian culture. Along with Iranian carpets that are famous for their beauty in the world, enameling, inlay work, woodcarving, pottery, and dozens of other works of art show the considerable interest of Iranians in beauty and elegance. Diverse Iranian food is another symbol of the elegance of Iranian culture. Despite the similarity of Iranian stews to some Indian dishes or the similarity of Iranian kebabs to Greek and Arabic kebabs, Iranian food still has many unique elements. The elements of Iranian culture are beyond the borders of the Islamic Republic, and its strong traces can be found in the neighboring independent countries of Afghanistan, Pakistan, Tajikistan, Uzbekistan, Turkmenistan, the Republic of Azerbaijan, Armenia, Georgia, and the Kurds of Iraq and Turkey have all more or less inherited a corner of Iranian culture. Nowruz and the solar calendar are very famous up to the Shiite religion along with Iranian music and architecture as well as the Persian language and national holidays of this country.

(4) Religious Attractions. Iran has a variety of religious places due to its ancient civilization and the presence of followers of different religions. There are nearly 9,000 religious sites in various parts of the country such as tombs of imams and tombs listed in the National Monuments List, mosques, religious schools, churches, synagogues, fire temples, and shrines. Religion has played a prominent role in the formation of cities such as Mashhad, Qom, Rey, Shiraz, Qazvin, Natanz, Damghan, Shahroud, Shush, Bastam, Lahijan, Amol, Ardabil, and Gonbad Kavous, and these cities have great potential to attract religious tourists. Iran can attract international tourists to all its religious areas with their existing cultural space, making the development of religious-cultural tourism possible. Due to the existence of numerous shrines, including the holy shrine of Imam Reza (AS) in Mashhad and the shrine of Imam Masoumeh (AS) in Qom). Iran is a pilgrimage destination for many travelers from Muslim countries with its unparalleled temples and churches that do not exist in other parts of the world. For example, the oldest church in the world is located in Iran.

(5) Medical Attractions. Due to the low cost of medical treatment in Iran on a global scale, it has an extraordinary capacity to attract medical tourists from Islamic countries and the region. To the extent that, given the favorable conditions created after the lifting of sanctions, the ground has been prepared for Iran to become a leading country in medical tourism in the region. Iran is one of the five most advanced countries in the world in the field of biotechnology and 9 out of 15 widely used biotechnological molecules are produced here. In many parts of Iran (including Sarein in Ardabil, Mahallat, GNU in Bandar Abbas, and Ferdows in Khorasan), there are mineral springs that welcome many patients. Infertility treatments, stem cell therapy, dialysis, heart surgery, cosmetic surgery, and eye surgery are also performed in Iran. Medical services in Iran are safer, more scientific, and cheaper. Currently, one-fourth of the country's hospitals are active in the field of health tourism, and we have a ranking of one to five in the specialized fields of eyes, heart, infertility, and nerves with cosmetic surgery (especially rhinoplasty) also having its tourists and is one of the most lucrative fields of medical tourism in Iran.

(6) Modern and Man-made Attractions. In the current view, Iran has become a more desirable historical destination for Western tourists. Unfortunately, over the past few decades, the Western media with their political motives and negative and destructive propaganda have succeeded in creating a backward, pre-tech image of Iran in the minds of their audiences, much to the surprise of most Western tourists when they arrive. Today, not only in the capital of Iran, but also in metropolises such as Isfahan, Shiraz, Mashhad, and Tabriz, or in tourist areas such as the northern cities or Kish Island, there are modern and advanced attractions for tourists ranging from places for fun and entertainment to state-of-the-art and new shopping malls, which due to the low cost of tourism in Iran compared to neighboring countries, offering an important competitive advantage to attract foreign tourists.

2.2.2. Tourism in Iran and GDP. According to the Tourism Organization, the share of Iran's tourism industry in GDP is about US$ 119 million (equivalent to 2.4%), which is expected to increase to 4% by 2025. There are currently 475,000 Iranians employed in the tourism industry and related industries, which is 1.2% of the total active labor force in Iran, and according to government plans, this should increase to 3.2% by 2025. According to statistics published by the World Tourism Organization, Iran's tourism grew by 12% in 2016, while global tourism growth was 4%. Perhaps, for this reason, private sector investment in tourism grew by 20 to 30% during 1995. However, according to the head of the Cultural Heritage, Handicrafts, and Tourism Organization, the number of foreign tourists entering the country in the past years has been only 4.6% of the world's tourists. Figure 2 shows the total share of travel and tourism in GDP and forecasts until 2027:

2.2.3. Iran's Position in the Tourism Competitiveness Index. According to statistics from the World Economic Forum [41] on Iran's tourism competitiveness indicators and its comparison with its regional competitors in the field of tourism, it can be said that Iran has had a favorable growth in many indicators in recent years. In 2011, Iran ranked 114th out of 139 countries, but by 2013, with 16 ascents, it ranked 98th out of 140 countries, in 2015 it ranked 97th out of 141 countries, and finally in 2017, with 4 steps upward, it ranked 93rd out of 136 countries in the world. Iran's score in the 2017 Tourism and Tourism Competitiveness Index is equal to 3.4, which in 2015 was 3.4. Iran has also risen from 9th

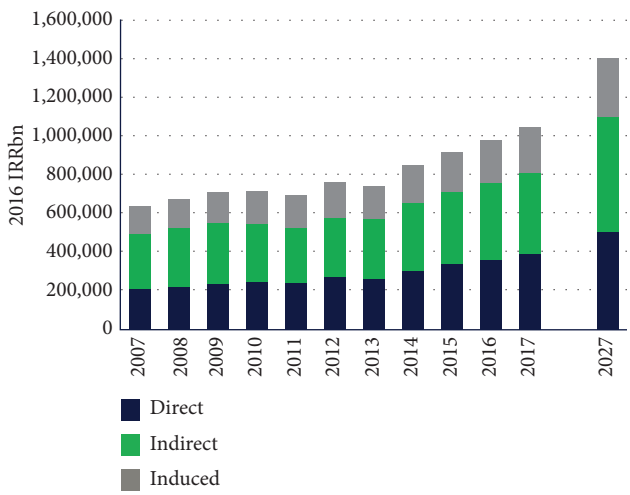

Figure 2: Total contribution of travel and tourism to GDP (WTTO, 2019).

place among Middle Eastern countries in 2015 to 8th place in 2017 in this group. The growing trend of tourists entering Iran and the very favorable situation in indicators such as competitive prices along with the growing trend in other indicators of competitiveness shows the investment attractiveness of Iran's tourism industry. Figure 3 shows the situation of Iran in terms of tourism indicators among the important countries in the region:

2.2.4. Residents of Touristic Areas and MCDM. Since tourism is strongly based on the goodwill of local residents, it needs their support for development. Therefore, it is necessary to identify the satisfaction indicators of residents in tourism targets. Various researchers have been researching this area for years because of the importance of the subject [33, 42–62]. Table 1 lists the methods studied by some researchers in recent years.

There have been six areas considered by researchers: economic, cultural, environmental, social, perceptual, and health. By examining the theoretical foundations, the most important indicators in previous research have been as follows:

(i) *Tourism creates more job opportunities for the community* (Nunkoo and Smith [76]; Mohd Hafiz Hanafiah et al. [77]).

(ii) *Tourism leads to more money in society* (Yoon et al. [78]; Gursoy and Rutherford [79]).

(iii) *Land and property prices rise due to tourism* (Yoon et al. [78]; Nunkoo and Ramkisson [15]).

(iv) *Cost of goods and services will increase due to tourism* (Yoon et al. [78]; Nunkoo and Ramkisson [15]).

(v) *Cost of developing tourism infrastructure is very high* (Yoon et al. [78]).

(vi) *Living standards in tourist areas are rising dramatically* (Mohd Hafiz Hanafiah et al. [77]).

(vii) *Tourism has economic benefits for locals and small businesses* (Yoon et al. [78]; Mohd Hafiz Hanafiah et al. [77]).

(viii) *Tourism encourages diversity of cultural activities for locals* (Mohd Hafiz Hanafiah et al. [77]).

(ix) *Tourism development moderates local culture and lifestyle* (Mohd Hafiz Hanafiah et al. [77]; Gurso and Rutherford [79]).

(x) *Tourism leads to cultural exchanges between tourists and community members* (Gursoy and Rutherford [79]; Yoon et al. [78]).

(xi) *Tourism institutionalizes development in local culture to attract more tourists* (Mohd Hafiz Hanafiah et al. [77]).

(xii) *The arrival of tourists to a region from a spatial perspective will transfer the culture to other areas and generations to come* (Azizi et al. [80]).

(xiii) *The arrival of tourists to an area from time to time will bring culture to other areas and generations to come* (Mohd Hafiz Hanafiah et al. [77]).

(xiv) *The arrival of tourists creates local and cultural cohesion in the tourist areas* (Rajabzadeh et al. [81]).

(xv) *Tourism has a positive impact on the cultural identity of a community* (Gursoy and Rutherford [79]).

(xvi) *Tourism does not generate more waste* (Azizi et al. [80]; Mohd Hafiz Hanafiah et al. [77]; Ko and Stewart [48]).

(xvii) *Tourism in the area does not cause traffic congestion, pollution, and noise* (Yoon et al. [78]; Mohd Hafiz Hanafiah et al. [77]).

(xviii) *Tourism does not lead to overcrowding of beaches, parks, and other tourist environments* (Yoon et al. [78]; Mohd Hafiz Hanafiah et al. [77]).

(xix) *Tourism does not increase the consumption of water, electricity, gas, and fuel* (Azizi et al. [80]).

(xx) *Building hotels and other tourism infrastructure destroys the natural environment* (Mohd Hafiz Hanafiah et al. [77]).

(xxi) *Tourism creates more parks and other recreational areas for the host community* (Yoon et al. [78]; Mohd Hafiz Hanafiah et al. [77]).

(xxii) *Income from tourists affects the way of life* (Mohd Hafiz Hanafiah et al. [77]; Nunkoo Ramkisson [15]; Ko and Stewart [48]).

(xxiii) *The arrival of tourists into the community is an honor. Tourism creates social relationships between individuals. Tourism makes it easier for locals to adopt new norms. Tourism is changing traditions and valuable culture* (Gursoy and Rutherford [79]).

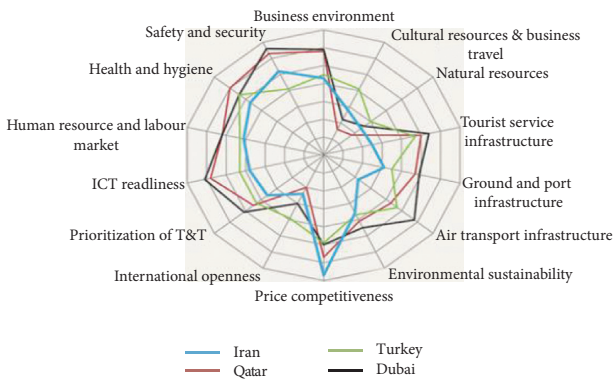

Figure 3: The travel and tourism competitiveness index [41].

Table 1: Satisfaction of the residents in tourism targets with a focus on the tourism development in terms of the method used.

Authors	Scope of research	Method/s	Country
Yang et al. [63]	Establishing a sustainable sports tourism evaluation framework	Bayesian BWM and VIKOR	Taiwan
Lim and lee [64]	Living as residents in a tourist destination	A phenomenological approach	Bulguk-Dong Gyeongju city
Gannon et al. [65]	The mediating role of resident perceptions toward tourism development	PLS	Iran
Martín et al. [66]	Resident perception towards tourism	Fuzzy-hybrid cluster and TOPSIS	Gran Canaria
Escudero Gómez [67]	Resident opinions and perceptions of tourism development	Statistical analysis	Spain
Alrwajfah et al. [68]	Resident perceptions and satisfaction toward tourism development	Regression analysis	Jordan
Ki¸si [69]	Sustainable tourism development	AHP-SWOT	Turkey
Foroni et al. [23]	Resident satisfaction with tourism and the European tourism	Statistical analysis	South sardinia
Lopes et al. [70]	Resident perceptions of tourism activity	Cluster analysis	Portugal
Sánchez-Teba et al. [71]	Resident negative perceptions towards tourism, loyalty, and happiness	PLS-LISREL	Spain
Liu and Li [21]	Sustainability and support for tourism development	Statistical analysis	India
Yu et al. [72]	Perceived tourism impacts and community quality of life perspective	LISREL	USA
Lin et al. [73]	Resident-tourist value co-creation	PLS	China
Ninh do and shih [74]	Factors influencing a traveler's destination decision-making process	DEMATEL-ANP	Taiwan
Almeida-García et al. [75]	Resident perceptions of tourism development	Statistical analysis	Spain

(xxiv) *Tourism increases sabotage and vandalism* (Nunkoo and Gursoy [82]).

(xxv) *Tourism increases the crime rate in the society* (Yoon et al. [78]; Mohd Hafiz Hanafiah et al. [77]).

(xxvi) *The arrival of tourists reduces the security of the area* (Nunkoo and Gursoy [82]).

(xxvii) *Tourism increases prostitution* (Gursoy and Rutherford [79]).

(xxviii) *Tourism destroys the natural environment* (Nunkoo and Smith [76]).

(xxix) *The development of tourism causes economic inflation in the region* (Nunkoo and Gursoy [82]; Ko and Stewart [48]).

(xxx) *The development of tourism facilities is a waste of taxpayers' money* (Yoon et al. [78]).

(xxxi) *Tourism provides new opportunities for local businesses* (Nunkoo and Smith [76]; Mohd Hafiz Hanafiah et al. [77]).

(xxxii) *Tourism contributes to the development of the region* (Nunkoo and Smith [76]; Ko and Stewart [48]).

(xxxiii) *Tourism stimulates the region's economic growth* (Rajabzadeh et al. [81]).

(xxxiv) *Tourism contributes to the development and improvement of infrastructure. Tourism promotes self-sufficiency and strengthens the*

foundation of local communities (Gursoy and Rutherford [79]).

(xxxv) *The arrival of tourists improves the region's health* (Gondos [7]).

(xxxvi) *Health care centers in the area have been provided for tourist arrivals* (Tichaawa and Mhlanga [8]).

(xxxvii) *People in the region are more diligent in providing health services than ever before* (Kim et al. [83]).

(xxxviii) *Health facilities and infrastructure have improved* (Fun et al. [84]).

When a community becomes a tourist destination, the lives of its inhabitants are affected by tourism activities ([83]; 528). However, in order to take advantage of tourism and develop rural areas through tourism, residents of tourist areas need to have a good view of tourism and support its development. According to the theory of social exchange, residents react to the development of tourism based on the perceived economic, social, and environmental costs and benefits, and the level of support is a function of the perceived benefits and costs of tourism development [1]. In fact, if residents are optimistic about the positive effects of tourism and its benefits, they will be willing to support and cooperate in this area. If they believe that the benefits of tourism outweigh its costs, they will be interested in engaging in this exchange ([85]; 669), but if the host community believes that the development of tourism is effective in destroying their social and physical environment and that tourists are the cause of this trend, the quality of interactions between residents and tourists may decline. In fact, tourism may have a negative impact on the tourist destination and the attitude of the host community ([84]; 65). In the other hand, if the perception of the positive effects (benefits) from tourism is greater than the potential negative consequences, residents are more likely to support tourism. In this way, resident perception of tourism must be considered to be successful in developing and exploiting important tourism ([57]; 262).

In order to develop tourism for various purposes, the lifestyle of the host community may be affected by structural changes in the tourism industry. The results of tourism development can be attributed to factors such as changes in the local economy [86, 87], social changes [87, 88], cultural changes [87, 89, 90], and environmental changes [87, 89, 91]. Tourism is of great importance in the global economy and is one of the important sources of foreign exchange earnings, so it has a large share of planning and investment by countries around the world ([92]; 29). With the global boom in the tourism industry, many regions in developing countries have realized the importance of tourism as an important factor for developing regional economy [93]; 144). Creating jobs, currency, and regional equilibrium, helping global peace, helping to invest in cultural heritage, building the environment, helping build wildlife habitats, developing areas with tourist attractions, and preventing population migration have been some of the benefits of this industry [94].

2.2.5. Tourism in Iran and Employment. According to global statistics (World Trade Organization, 2020), Iran is one of the five countries capable of attracting foreign tourists to various attractions (cultural, religious, natural, and historical), but Iran ranks 97th out of 141 countries in the world and 12th out of 16 countries in the Middle East and North Africa. According to the report of the World Travel and Tourism Council [95], the share of Iran's total tourism in job creation last year was 5.6% of total employment (1,398,500 jobs), which is expected to reach 1,967,000 jobs by 2026, which would cover 6.1% of total employment. According to the statistics of the Tourism Organization, about 5.015 million people entered Iran in 2016 and over 7 million people traveled abroad. The average cost of each tourist entering Iran is US$ 1,710. Despite the growth of the tourism industry in recent years, the number of foreign tourists is less than 0.4% of the number of tourists in the world. Also, Iran's income from tourism is not more than 0.5% of the total global income of tourism. According to the World Travel and Tourism Council [95], if Iran could host 10 million foreign tourists, travel and tourism participation would reach about 2 million jobs. Therefore, one of the goals for 2025 is to attract 20 million foreign tourists in order to reach about 4 million jobs.

2.2.6. Description of Selected Areas. Iran is one of the most important countries in the field of tourism in the region and the world with its numerous attractive tourist areas. The variety of attractions and important tourist areas led the researchers to select 16 tourist attractions that have attracted tourists the most over the past two years:

(1) *T-1: Qeshm Salt Cave (Namakdan Cave)*. Qeshm Salt Cave is the largest salt cave in the world and is 6,600 meters long. This cave is located 90 km from Qeshm city and 2 km from the beach, so this 570-year-old cave can be visited while touring the beach.

(2) *T-2: Zoroastrian Crypts*. Yazd Silent Tower is a mysterious place that introduces you to the world of the dead. This tower is located on a low mountain 15 km away from Yazd city and near the Safaieh area. It may be interesting to note that this burial method was common before the Pahlavi period, but was banned during this period.

(3) *T-3: Kandovan Village*. Kandovan is one of the most beautiful villages in Iran. The history of Kandovan caves dates back to 7,000 years ago, but about 700 years ago, when the Mongols invaded Iran, the people of the East Azerbaijan region fled to these caves to save their lives that now look like beehives 18 km from the city of Osko.

(4) *T-4: Kariz Underground City*. Kariz Kish is an underground city with historical architecture and one of the most stunning sights in Iran. This kariz is located in the heart of the only coral island in the world. Shells and corals dating back thousands of years have covered the city. The only coral mosque

in the world with a roof full of marine fossils has been built in this underground city.

(5) *T-5: Maharlu Lake*. The strangest tourist attraction of Shiraz is Maharlu salt lake. The amazing thing about this lake is its pink color. The lake turns red in mid-summer because of the high evaporation rate and salt concentration, which causes the formation of algae.

(6) *T-6: Dasht-e Lut*. If you want to touch the highest sand pyramids in the world, just travel to the Lut plain. These pyramids are like clumped skyscrapers in the distance and some call this area the city of ghosts.

(7) *T-7: Nasir al-Mulk Mosque (Pink Mosque)*. The Nasir al-Mulk Mosque was built near the tomb of Shahcheragh during the Qajar period. The pink color of the tiles and glass has made this place known as the Pink Mosque. The light decoration and eye-catching architecture of this mosque have created a mystical atmosphere.

(8) *T-8: Stars Valley, Qeshm*. This valley is located 5 km from the village of Barake Khalaf. Scientifically, soil erosion has shaped the valley, but villagers believe it was formed by a falling star.

(9) *T-9: Shushtar Historical Hydraulic System*. Shushtar is a small but historical city in the north of Khuzestan province and is 90 km from Ahvaz. The Karun and Dez rivers flow through this city, and the Shushtar water structures are among the sights of Iran that are registered as part of the UNESCO World Heritage List. These water structures date back to the reign of Darius the Achaemenes.

(10) *T-10: Ganj Lake*. Lake Ganj or Lake Takht-e Soleiman is located 45 km from the city of Takab in East Azerbaijan Province. The natives believe that this lake was created with the beating of Solomon's staff and that countless treasures have been hidden in this area.

(11) *T-11: Chogha Zanbil Ziggurat*. Chogha Zanbil Ziggurat is one of the first tourist attractions in Iran to become registered with UNESCO. It is located near Shush in the Khuzestan province with the ziggurat dating back to the thirteenth century BC and the Elamite civilization. When employees of the Anglo-Iranian Oil Company were digging for oil in 1935, they came across inscribed bricks that later led to the discovery of Chogha Zanbil.

(12) *T-12: Katale Khor Cave*. Katale Khor Cave is located near the city of Garmab, 155 km south of Zanjan. In Turkic areas, the low mountains are called masses. This cave is located on one of these masses and the sun rises behind it, hence it is called the sun mass or the mass eater.

(13) *T-13: Babak Fort*. Babak Fort is a historical fortress 13 km from the city of Kalibar in the East Azarbaijan Province. Babak Fort was built during the Sassanid era. When the Abbasids invaded the area, Babak Khorramdin took over the leadership of the people and fought the invaders in this fort during 20 years.

(14) *T-14: Yazd Chek Chek Shrine*. Chek chek or Chekcheko is one of the most important Zoroastrian shrines, 43 km from Ardakan city and is one of the lesser known places in Iran. The interesting name of this spectacular place is taken from the sound of water drops dripping from the rock. This shrine receives Zoroastrian worshipers every year in June for 4 days.

(15) *T-15: Hormuz Island*. Hormoz Island, 16 km from Bandar Abbas, has been called the land of colors and is one of the most beautiful and special places of interest in Iran. Red soil and yellow, white, and red mountains will give you a unique view.

(16) *T-16: Biston and Bostan Arch*. Kermanshah has 3,000 historical monuments, 716 of which have been registered as national monuments. This spectacular place is called Biston, which is located 30 km northeast of Kermanshah. The location of this spectacular place along the Silk Road has attracted the attention of many kings. Biston, with its striking beauty, has many impacting ancient inscriptions. Many historians have mentioned the description of this ancient city and the carvings of Biston and Bostan Arch in their books.

3. Research Methodology and Analysis

This study focuses on evaluating and ranking the satisfaction indices of residents in touristic areas for the purpose of tourism development. Descriptive research consists of a set of methods designed to describe the conditions and phenomena under study. Conducting descriptive research can be merely to better understand the current situation or to aid the decision-making process. Due to the specialized nature of the subject and the limitation of identifying experts, a small number of experts were selected, including 20 individuals, who were selected by convenience sampling and willingness to participate in this research. The information for selecting experts is in Table 2.

After reviewing the theoretical foundations, 42 indicators were identified (Table 2) that need to be examined by experts regarding their role or not in the subject under study in Iran with the fuzzy Delphi method being used to screen the criteria.

3.1. Fuzzy Delphi Method (FDM). The FDM was proposed by Ishikawa et al. [96] to overcome the issues surrounding membership degree and is the result of the traditional fuzzy technique and fuzzy set theory. Noorderhaben [97] shows that the use of FDM for group decision-making can solve the issue of a fuzzy common understanding of expert opinions. This study uses triangular membership functions and fuzzy theory to solve group decisions and uses FDM to solve group decisions. The fuzziness of expert common understanding

Table 2: Selection of experts.

Row	Education	Work experience (years)	Field of study	No.	Job
1	PhD	12	Tourism	2	Faculty member
2	PhD	15	Tourism	2	Faculty member
3	PhD	8	Tourism	2	Faculty member
4	PhD	22	Tourism	2	Faculty member
5	PhD	25	Tourism	2	Faculty member
6	PhD	16	Tourism	2	Faculty member
7	PhD	15	Tourism	2	Faculty member
8	PhD	14	Tourism	2	Faculty member
9	PhD	24	Tourism	2	Faculty member
10	PhD	20	Tourism	2	Faculty member

can be solved using fuzzy theory and evaluated on a more flexible scale. The efficiency and quality of questionnaires can be improved. Therefore, more objective evaluation factors can be screened through statistical results [98]. The FDM steps are as follows:

(1) Collect all possible criteria that can affect the Satisfaction of Residents in Touristic Areas. Questionnaires are provided to the specialist to determine the importance of each evaluation indicator. Because human judgments are always vague and cannot be quantified accurately, each analyst must choose the appropriate linguistic expressions in order to integrate the opinions of all experts to eliminate trivial criteria (Table 3).

(2) Determine triangular fuzzy numbers (Figure 4, Table 4) by calculating the evaluation value of the triangular fuzzy number of each criterion specified by experts. A triangular fuzzy number (TFN) is a type of fuzzy number that is represented by three real numbers as $F = (l, m, u)$. These types of fuzzy numbers are very common due to their very high computational efficiency. In addition, calculations with this type of numbers are very simple and understandable. Fuzzy logic works by introducing fuzzy sets and then fuzzy numbers and introducing triangular fuzzy numbers has played an important role in the growth of fuzzy computing.

This study uses the geometric mean model of the general mean model proposed by Klir and Yuan [100] for FDM to find a common understanding of group decision-making. Suppose that the value of the importance of element number j by the expert of number i is from among n experts that $\widetilde{w}_{ij} = (a_{ij}, b_{ij}, c_{ij})$, $i = 1, 2, \ldots, n$, $j = 1, 2, \ldots, m$. Then, the fuzzy weight $\widetilde{w}_{ij}$ of element number j is

$$\widetilde{w}_j = \left(a_j, b_j, c_j\right), \quad j = 1, 2, \ldots, m, \tag{1}$$

where

$$\begin{aligned} a_j &= \mathrm{Min}\left\{a_{ij}\right\}, \\ b_j &= \frac{1}{n}\sum_{i=1}^{n} b_{ij}, \\ c_j &= \mathrm{Max}\left\{c_{ij}\right\}. \end{aligned} \tag{2}$$

(3) De-fuzzy: using the simple gravity center method to de-fuzzy, the fuzzy weight $\widetilde{w_J}$ of each alternative element to determine the value of S_j is obtained as follows:

$$S_j = \frac{a_j + b_j + c_j}{3}, \quad j = 1.2 \ldots .m. \tag{3}$$

(4) Screening evaluation criteria: finally, appropriate criteria can be determined using a multicriteria screening by setting and α threshold. The principle of screening is as follows: if $S_j \geq a$, then factor number j is the evaluation index. If $S_j < a$, then factor j is removed.

Therefore, the output of the first phase of fuzzy Delphi is given in Table 5.

As it is clear from the first round of analyses that in 12 criteria, the threshold level is lower than 0.70, they were removed from the analyses and the second round was performed. What is clear is that in the second round, all the experts reached a consensus on the criteria, and all the remaining criteria have a threshold above 0.70. In other words, the indicators of satisfaction of the target residents of tourism in Iran were accepted by the experts of these criteria. Next, the weight of the criteria is determined using Fuzzy SWARA.

Multicriteria decision-making is a large body of operations research that helps managers make decisions based on multiple and conflicting criteria. This field of study is referred to as multiple criteria decision-making and abbreviated as MCDM. In such decisions, several indicators or goals that are sometimes contradictory are considered. If the criterion in MCDM is the attribute index, it is known as MADM multicriteria decision-making. If the multiple criteria are meant to be objective, it is called MODM with multiple objectives. The use of these methods is very appropriate in organizational issues where managers deal with criteria that have different scales for measurement. The use of multicriteria decision-making methods in solving organizational problems is well compatible with the complex nature of organizations. Decision-making is one of the most important and basic tasks of management, and reaching organizational goals depends on its quality. According to decision-making expert Herbert Simon, decision-making is the essence of management. One of the decision-making techniques using quantitative data is multicriteria decision

Table 3: Factors identified in satisfaction.

Row	Components	Validity	Reliability
1	Tourism creates more job opportunities for the community.	KMO = 0.91 Bartlett's Test of sphericity Sig = 0.000	Cronbach's alpha = 0.87
2	Tourism leads to more money in society.		
3	Land and property prices rise due to tourism.		
4	Cost of goods and services will increase due to tourism.		
5	Cost of developing tourism infrastructure is very high.		
6	Living standards in tourist areas are rising dramatically.		
7	Tourism has economic benefits for locals and small businesses.		
8	Tourism encourages diversity of cultural activities for locals.		
9	Tourism development moderates local culture and lifestyle.		
10	Tourism leads to cultural exchanges between tourists and community members.		
11	Tourism institutionalizes development in local culture to attract more tourists.		
12	The arrival of tourists to a region from a spatial perspective will transfer the culture to other areas and generations to come.		
13	The arrival of tourists to an area from time to time will bring culture to other areas and generations to come.		
14	The arrival of tourists creates local and cultural cohesion in the tourist areas.		
15	Tourism has a positive impact on the cultural identity of a community.		
16	Tourism does not generate more waste.		
17	Tourism in the area does not cause traffic congestion, pollution, and noise.		
18	Tourism does not lead to overcrowding of beaches, parks, and other tourist environments.		
19	Tourism does not increase the consumption of water, electricity, gas, and fuel.		
20	Building hotels and other tourism infrastructure destroy the natural environment.		
21	Tourism creates more parks and other recreational areas for the host community.		
22	Income from tourists affects the way of life.		
23	The arrival of tourists into the community is an honor.		
24	Tourism creates social relationships between individuals.		
25	Tourism makes it easier for locals to adopt new norms.		
26	Tourism is changing traditions and valuable culture.		
27	Tourism increases sabotage and vandalism.		
28	Tourism increases the crime rate in the society.		
29	The arrival of tourists reduces the security of the area.		
30	Tourism increases prostitution.		
31	Tourism destroys the natural environment.		
32	The development of tourism causes economic inflation in the region.		
33	The development of tourism facilities is a waste of taxpayers' money.		
34	Tourism provides new opportunities for local businesses.		
35	Tourism contributes to the development of the region.		
36	Tourism stimulates the region's economic growth.		
37	Tourism contributes to the development and improvement of infrastructure.		
38	Tourism promotes self-sufficiency and strengthens the foundation of local communities.		
39	The arrival of tourists has improved the region's health.		
40	Health care centers in the area have been provided for tourist arrivals.		
41	People in the region are more diligent in providing health services than ever before.		
42	Health facilities and infrastructure have improved.		

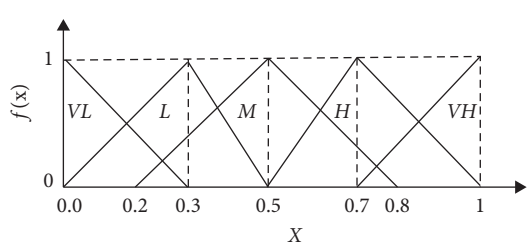

Figure 4: Linguistic scale for fuzzy Delphi.

Table 4: Triangular fuzzy numbers [99].

TFN	Fuzzy value	Verbal variables	
(0, 0, 0.25)	$\tilde{1}$	VL	Very low
(0, 0.25, 0.5)	$\tilde{2}$	L	Low
(0.25, 0.5, 0.75)	$\tilde{3}$	M	Middle
(0.5, 0.75, 1)	$\tilde{4}$	H	High
(0.75, 1, 1)	$\tilde{5}$	VH	Very high

Table 5: Percentage of consensus of results from first and second round questionnaire.

Components	Fuzzy value			De-fuzzy	Percentage of consensus first round	Percentage of consensus second round
	L	M	U			
1	3	4.609	5	4.304	70	75
2	4	4.182	5	4.341	80	80
3	3	4.031	5	4.015	85	80
4	4	4.136	5	4.318	85	85
5	3	4.641	5	4.323	80	75
6	1	3.452	4	2.976	75	85
7	3	4.751	5	4.375	90	80
8	3	3.942	4	3.721	95	82
9	1	1.555	3	1.777	45	Delete
10	4	4.676	5	4.588	70	75
11	3	3.961	5	3.980	70	80
12	2	3.907	5	3.703	90	95
13	4	4.727	5	4.614	75	72
14	3	4.289	5	4.144	70	75
15	2	3.931	5	3.715	72	75
16	1	1.597	3	1.798	50	Delete
17	1	1.657	3	1.828	65	Delete
18	1	1.813	4	2.156	40	Delete
19	1	1.629	3	1.814	50	Delete
20	4	4.676	5	4.588	70	85
21	3	4.873	5	4.436	95	80
22	4	4.835	5	4.666	85	85
23	3	3.270	4	3.385	70	78
24	3	3.183	4	3.343	79	75
25	4	4.044	5	4.272	95	90
26	1	2.023	4	2.261	40	Delete
27	1	2.187	5	2.593	45	Delete
28	1	1.952	5	2.476	35	Delete
29	1	1.578	4	2.039	50	Delete
30	1	2.027	5	2.513	55	Delete
31	1	1.634	4	2.067	45	Delete
32	2	3.159	4	3.079	70	75
33	1	1.354	3	1.677	65	Delete
34	4	4.182	5	4.341	80	85
35	3	4.766	5	4.383	85	90
36	3	3.092	4	3.296	89	90
37	2	3.995	5	3.747	80	85
38	3	3.249	5	3.624	80	80
39	4	4.889	5	4.694	90	95
40	4	4.781	5	4.640	80	85
41	4	4.044	5	4.272	95	90
42	4	4.090	5	4.295	90	90

making, and by using its techniques, the manager can make rational decisions by considering different decision-making criteria that are sometimes in conflict with each other. These methods are in the category of operations research and have many applications in industrial management and engineering.

3.2. Fuzzy SWARA. The use of fuzzy SWARA is less common in decision-making literature [101] with some researchers working on this in recent years [102, 103]. Crisp SWARA developed by Keršuliene et al. [104] is inadequate to handle uncertainty, so the fuzzy extension of this method was developed. The reason for using the fuzzy SWARA

approach is the inherent uncertainty of deciding on medical tourism destinations, and it was used due to the qualitative nature of most of the criteria and the ease of collecting the opinions of decision makers. Using a fuzzy approach will bring the results closer to the real world. SWARA gives decision makers and policymakers the opportunity to prioritize based on the current state of the environment and the economy. The ability to estimate the opinion of experts about the importance of the criteria in determining their weight is a key element of this method. In addition, this method is useful for coordinating and collecting data from experts.

Also, the SWARA method is uncomplicated and specialists can easily work together. The most important advantage of this method in decision-making is that in some issues, priorities are defined based on the policies of companies or countries and do not need to be evaluated to rank criteria.

The process of determining the relative weight of the criteria using the SWARA method according to the following steps can be shown in detail [105].

We arranged the criteria in descending order.

According to Table 6, the relative importance of factor j was determined compared to the previous factor (j-1) which is of higher importance.

(1) Calculate the value of $\tilde{k}_j$ using equation (4). It should be noted that the fuzzy parameters are shown with the symbol ~:

$$\tilde{k}_j = \begin{cases} \tilde{1} j = 1, \\ \tilde{s}_j + 1, \quad j > 1, \end{cases} \tag{4}$$

where $\tilde{k}_j$ is the value of the comparative importance coefficient.

(2) Calculate the value of $\tilde{q}_j$ using equation:

$$\tilde{q}_j = \begin{cases} \tilde{1} j = 1, \\ \dfrac{\tilde{k}_{j-1}}{\tilde{k}_j} \quad j > 1, \end{cases} \tag{5}$$

where $\tilde{q}_j$ is value of the fuzzy weights of the criteria.

(3) Calculate the weight of the criteria using the following equation:

$$\tilde{W}_j = \frac{\tilde{q}_j}{\sum_{k=1}^{n} \tilde{q}_k}, \tag{6}$$

where n is the number of criteria and $\tilde{W}_j$ is the weight of criterion j.

Table 7 shows the weighting process for the indicators:

After determining the weight of the indicators in the six areas studied, the Fuzzy EDAS technique was then used to identify 16 important tourist areas in Iran and prioritized by experts. These areas have been selected by a survey of several experts from among dozens of attractive tourist areas in Iran.

Table 6: Fuzzy and linguistic values [106].

Linguistic scale	Response scale
Equally important	(1, 1, 1)
Moderately less important	(2/3, 1, 3/2)
Less important	(2/5, 1/2, 2/3)
Very less important	(2/7, 1/3 , 2/5)
Much less important	(2/9, 1/4, 2/7)

Note. Table 6 is reproduced from Mavi et al. [106] [https://link.springer.com/article/10.1007%2Fs00170-016-9880-x].

3.3. Fuzzy Evaluation Based on Distance from Average Solution (Fuzzy EDAS). The EDAS methodology was developed by Keshavarz Ghorabaee et al. [107], and the method ranks material on the basis of the average solution [108]. The average solution is arrived at by calculating the positive distance from average (PDA) and negative distance from average (NDA). The alternative that has higher PDA values and lower NDA values are the best-ranked material alternative. In the case of the fuzzy-EDAS methodology, alternatives are ranked in accordance with the decreasing value of the de-fuzzified appraisal score. In methods such as TOPSIS or VIKOR, we measure the optimal option based on the distance from the positive and negative ideal, that is, the optimal option that has the shortest distance from the positive ideal and the maximum distance from the negative ideal.

But in the EDAS method, the best solution is the distance from the average solution (AV). In this method, we do not need to calculate the positive and negative ideals but consider two criteria for evaluating the desirability of options (PDA and NDA).

The steps involved in the fuzzy EDAS method have been delineated in the ensuing discussion.

Let $\tilde{A}$ denote the fuzzy decision matrix, i.e.,

$$\tilde{A} = \left[\tilde{a}_{ij}\right]_{n\times m} = \begin{bmatrix} \tilde{a}_{11} & \cdots & \tilde{a}_{1m} \\ \vdots & \ddots & \vdots \\ \tilde{a}_{n1} & \cdots & \tilde{a}_{nm} \end{bmatrix}, \tag{7}$$

where j is the number of alternatives and I signifies the criteria. The following steps are traced in order to solve a decision-making problem using fuzzy EDAS methodology:

Step 1: in this step of the framework proposed, objective weights are determined for each of the criteria Ci using Bellow equations. Objective weights are determined for the decision matrix supplied by all the decision-makers:

$$w_j^* = \frac{\sum_{i=1}^{m}\sum_{r=1}^{m}\left|p_{ij} - p_{rj}\right|}{\sqrt{\sum_{j=1}^{m}\left[\sum_{i=1}^{m}\sum_{r=1}^{m}\left|p_{ij} - p_{rj}\right|\right]^2}},$$
$$w_j^o = \frac{w_j^*}{\sum_{j=1}^{m} w_j^*}. \tag{8}$$

Step 2: a fuzzy average decision matrix is developed with respect to all the criteria considered using Table 8 and Bellow equation:

Table 7: Criteria obtained by fuzzy SWARA.

Main criteria	Criteria	b_j	k_j	q_j	W_j	Global weight	Total weight
1	Economic		(1, 1, 1)	(1, 1, 1)	(0.335, 0.455, 0.392)	0.395	0.0658443
7		(0.4, 0.5, 0.667)	(1.4, 1.5, 1.667)	(0.714, 0.666, 0.599)	(0.239, 0.303, 0.235)	0.259	0.0431739
6		(0.23, 1.5, 0.465)	(1.23, 2.5, 1, 465)	(0.58, 0.266, 0.408)	(0.194, 0.121, 0.160)	0.159	0.0265044
2		(1, 1, 1)	(2, 2, 2)	(0.29, 0.133, 0.204)	(0.097, 0.060, 0.080)	0.079	0.0131689
3		(0.540, 0.650, 0.23)	(1.540, 1.650, 1.23)	(0.188, 0.08, 0.165)	(0.063, 0.036, 0.064)	0.055	0.0091682
4		(0.53, 1.74, 0.37)	(1.53, 2.74, 1.37)	(0.122, 0.029, 0.120)	(0.040, 0.013, 0.047)	0.034	0.0056676
5		(0.444, 0.5, 1.36)	(1.444, 1.5, 2.36)	(0.084, 0.019, 0.050)	(0.028, 0.008, 0.019)	0.019	0.0031672
8	Culture		(1, 1, 1)	(1, 1, 1)	(0.407, 0.462, 0.501)	0.456	0.0760127
10		(0.5, 0.66, 1.12)	(1.5, 1.66, 2.12)	(0.666, 0.602, 0.471)	(0.271, 0.278, 0.236)	0.262	0.0436739
11		(1.04, 1.5, 1)	(2.04, 2.5, 2)	(0.326, 0.240, 0.235)	(0.133, 0.110, 0.117)	0.121	0.02017
14		(0.42, 0.373, 0.5)	(1.42, 1.373, 1.5)	(0.229, 0.174, 0.156)	(0.093, 0.080, 0.078)	0.084	0.0140023
15		(1, 1, 1)	(2, 2, 2)	(0.114, 0.087, 0.078)	(0.046, 0.040, 0.039)	0.042	0.0070012
12	Environmental	(0.63, 1.2, 1)	(1.63, 2.2, 2)	(0.069, 0.039, 0.039)	(0.028, 0.018, 0.019)	0.022	0.0036673
13		(0.444, 0.76, 0.1.42)	(1.444, 1.76, 2.42)	(0.047, 0.022, 0.016)	(0.019, 0.010, 0.008)	0.013	0.002167
21			(1, 1, 1)	(1, 1, 1)	(0.583, 0.600, 0.625)	0.603	0.1005168
20		(0.4, 0.5, 0.667)	(1.4, 1.5, 1.667)	(0.714, 0.666, 0.599)	(0.416, 0.399, 0.374)	0.397	0.0661777
23	Perceptual factors		(1, 1, 1)	(1, 1, 1)	(0.705, 0.741, 0.705)	0.717	0.1195199
22		(1.36, 1.87, 1.39)	(2.36, 2.87, 2.39)	(0.418, 0.348, 0.418)	(0.294, 0.258, 0.294)	0.282	0.0470078
38	Social		(1, 1, 1)	(1, 1, 1)	(0.381, 0.545, 0.428)	0.451	0.0751792
37		(0.53, 1.74, 0.37)	(1.53, 2.74, 1.37)	(0.653, 0.364, 0.729)	(0.248, 0.198, 0.312)	0.253	0.0421737
36		(0.454, 0.58, 1.38)	(1.454, 1.58, 2.38)	(0.449, 0.230, 0.306)	(0.171, 0.125, 0.131)	0.143	0.0238373
34		(1, 1, 1)	(2, 2, 2)	(0.224, 0.115, 0.153)	(0.085, 0.062, 0.065)	0.071	0.0118353
35		(0.5, 0.66, 1.12)	(1.5, 1.66, 2.12)	(0.149, 0.069, 0.072)	(0.056, 0.037, 0.030)	0.042	0.0070012
32		(1.04, 1.5, 1)	(2.04, 2.5, 2)	(0.073, 0.027, 0.036)	(0.027, 0.014, 0.015)	0.019	0.0031672
25		(0.42, 0.373, 0.5)	(1.42, 1.373, 1.5)	(0.051, 0.019, 0.024)	(0.019, 0.010, 0.010)	0.014	0.0023337
24		(1, 1, 1)	(2, 2, 2)	(0.025, 0.009, 0.012)	(0.009, 0.004, 0.005)	0.007	0.0011669
39	Health		(1, 1, 1)	(1, 1, 1)	(0.377, 0.454, 0.547)	0.460	0.0766794
42		(0.404, 0.76, 0.1.32)	(1.404, 1.76, 2.32)	(0.712, 0.568, 0.413)	(0.268, 0.258, 0.226)	0.251	0.0418403
41		(0.303, 0.5, 0.616)	(1.303, 1.5, 1.616)	(0.546, 0.378, 0.255)	(0.206, 0.171, 0.139)	0.173	0.0288381
40		(0.4, 0.5, 0.607)	(1.4, 1.5, 1.607)	(0.390, 0.252, 0.158)	(0.147, 0.114, 0.086)	0.116	0.0193366

Table 8: Linguistic terms for alternatives ratings [3, 12].

Linguistic term	Membership function
Very low (VL)	(0, 0, 0.1)
Medium low (ML)	(0, 0.1, 0.3)
Low (L)	(0.1, 0.3, 0.5)
Medium (F)	(0.3, 0.5, 0.75)
High (H)	(0.5, 0.75, 0.9)
Medium high (MH)	(0.75, 0.9, 1)
Very high (VH)	(0.9, 1, 1)

Note. Table 8 is reproduced from [108] [https://link.springer.com/book/10.1007%2F978-981-32-9072-3].

$$AV_j = \frac{\sum_{i=1}^{n} \tilde{a}_{ij}}{k}. \tag{9}$$

Step 3: the distance of optimal solution from negative feasible solutions must be maximum, whereas it should be minimum from the negative feasible solution. In this step of the Fuzzy EDAS methodology, matrices for fuzzy positive distance from average (PDA) and fuzzy negative distance from average (NDA) are calculated using Bellow equations:

$$\begin{aligned} PDA &= \left[pda_{ij}\right]_{n\times m}, \\ NDA &= \left[nda_{ij}\right]_{n\times m}, \end{aligned} \tag{10}$$

where for beneficial criteria,

$$\begin{aligned} pda_{ij} &= \left\{ \frac{\psi\left(\tilde{a}_{ij} - AV_j\right)}{k\left(AV_j\right)}, \right. \\ nda_{ij} &= \left\{ \frac{\psi\left(AV_j - \tilde{a}_{ij}\right)}{k\left(AV_j\right)}, \right. \end{aligned} \tag{11}$$

and for nonbeneficial criteria,

$$\begin{aligned} pda_{ij} &= \left\{ \frac{\psi\left(AV_j - \tilde{a}_{ij}\right)}{k\left(AV_j\right)}, \right. \\ nda_{ij} &= \left\{ \frac{\psi\left(\tilde{a}_{ij} - AV_j\right)}{k\left(AV_j\right)} \right. \end{aligned} \tag{12}$$

Step 4: in this step of the methodology, matrices are developed for fuzzy weighted positive and fuzzy weighted negative distances. Bellow equations are used for this purpose:

$$\begin{aligned} sp_i &= \sum_{j=1}^{m}\left(\tilde{w}_j + pda_{ij}\right), \\ sn_i &= \sum_{j=1}^{m}\left(\tilde{w}_j + nda_{ij}\right). \end{aligned} \tag{13}$$

Step 5: fuzzy normalized values for fuzzy weighted positive and fuzzy weighted negative distances are computed using Bellow equations:

$$\begin{aligned} nsp_i &= \frac{sp_i}{\max_i\left(k\left(sp_i\right)\right)}, \\ nsp_i &= 1 - \frac{sn_i}{\max_i\left(k\left(sn_i\right)\right)}. \end{aligned} \tag{14}$$

Step 6: in the penultimate step, fuzzy appraisal score for different alternatives is calculated using the Bellow equation:

$$as_i = \frac{nsp_i + nsn_i}{2}. \tag{15}$$

Step 7: in the last step, alternative materials are ranked in accordance with the decreasing value of de-fuzzified appraisal score. The best choice of the alternative material is the one with the highest value of appraisal score.

Finally, these 16 important tourism areas in Iran were prioritized using the opinions of experts and based on the six areas studied (Table 9):

Therefore, after identifying the priorities, it is necessary to perform sensitivity analysis in six areas. For this purpose, Fuzzy COPRAS (FC), Fuzzy MABAK (FM), and Fuzzy TOPSIS (FT) were used to provide a more detailed analysis of the accuracy of the results (Table 10):

It is clear that the model is well designed and the results of sensitivity analysis of the model proposed with alternative models show the same.

4. Discussion and Conceptual Cross-Check of Results

The present study shows good results. These results can be very effective in providing a practical and hybrid model in the field of tourism. Researchers first identified the satisfaction indicators of tourism target residents using a meta-combined model and using the discussions in previous research with 42 criteria being identified. Then, these indicators were screened using the fuzzy Delphi technique and the opinions of experts. The screening results show the elimination of 12 criteria that were identified as less in developing the satisfaction of tourists in Iran. Indicators 9, 16, 17, 18, 19, 26, 27, 28, 29, 30, 31, and 33 were removed.

Then, based on the results of the first stage, the indicators were classified into 6 areas and weighed with the fuzzy SWARA technique. The results of this stage show that in the economic field, index 1 has the highest weight with 0.395 and index 5 has the lowest weight with 0.019. In the cultural field, index 8 has the highest weight with 0.456 and index 13 has the lowest weight with 0.013. In the field of environment,

Table 9: Ranking of important tourism areas in Iran.

Alternatives	Ranking					
	Economic	Culture	Environmental	Perceptual factors	Social	Health
T-1	5	12	7	8	7	1
T-2	6	5	10	12	8	9
T-3	4	6	2	9	10	10
T-4	9	8	5	1	9	11
T-5	8	10	3	11	5	8
T-6	10	9	4	10	6	7
T-7	11	3	9	2	2	15
T-8	7	13	8	3	12	16
T-9	3	11	11	5	14	3
T-10	2	16	1	13	13	2
T-11	13	1	13	16	4	14
T-12	12	15	16	14	16	5
T-13	16	7	14	15	15	6
T-14	15	4	15	4	1	13
T-15	14	14	12	7	11	4
T-16	1	2	6	6	3	12

Table 10: Verification of the results.

Alternatives	FC	FM	FT	FC	FM	FT	FC	FM	FT	FC	FM	FT	FC	FM	FT	FC	FM	FT
	Economic			Culture			Environmental			Perceptual factors			Social			Health		
T-1	5	5	5	12	12	12	7	7	7	8	8	8	8	7	7	1	2	1
T-2	4	6	6	5	6	5	10	10	10	12	12	12	7	8	8	9	11	9
T-3	6	4	4	6	5	6	3	2	2	9	9	9	10	10	10	10	6	10
T-4	9	9	9	8	8	8	4	5	5	1	1	1	5	9	9	11	9	11
T-5	8	8	8	14	10	10	2	3	3	11	11	11	6	12	5	8	15	8
T-6	10	11	10	9	9	9	5	4	4	10	10	10	6	6	6	7	8	7
T-7	11	10	11	4	3	3	9	9	9	2	2	2	4	1	2	15	7	15
T-8	7	7	7	13	14	13	8	8	8	3	3	3	12	5	12	16	16	16
T-9	3	3	3	11	11	11	11	11	11	5	5	5	14	11	14	3	3	3
T-10	2	2	2	16	16	16	1	1	1	13	13	13	13	13	13	2	1	2
T-11	13	15	13	2	1	1	13	13	13	16	16	16	1	4	4	14	9	14
T-12	12	12	12	15	15	15	16	16	16	14	14	14	16	16	16	5	10	5
T-13	16	16	16	7	7	7	14	14	14	15	15	15	15	15	15	6	11	6
T-14	15	13	15	3	4	4	6	15	15	4	4	4	2	3	1	13	8	13
T-15	14	14	14	10	13	14	12	12	12	7	7	7	11	14	11	4	7	4
T-16	1	1	1	1	2	2	15	6	6	6	6	6	3	2	3	12	15	12

index 21 has the highest weight with 0.603 and index 20 has the lowest weight with 0.397. In the field of perceptual factors, index 23 has the highest weight with 0.717 and index 22 has the lowest weight with 0.282. In the social sphere, index 38 has the highest weight with 0.451 and index 24 has the lowest weight with 0.007. Finally, in the field of health, index 39 has the highest weight with 0.460 and index 40 has the lowest weight with 0.116. The output results of Fuzzy SWARA also generally show that index 23 has the highest weight with 0.119 and index 24 has the lowest weight with 0.001.

Finally, the indicators were prioritized into 6 areas and 16 important tourism regions in Iran. These areas are one of the most beautiful and important tourist areas in Iran. From an economic point of view, Biston and Bostan Arch, from a cultural point of view, ChoghaZanbil Ziggurat, from an environmental point of view, Ganj Lake, from perceptual factors, Kariz Underground City, from a social point of view, Yazd Chek Shrine, and from a health point of view, Qeshm salt cave. The sensitivity analysis of the model is also based on the following graph (Figure 5):

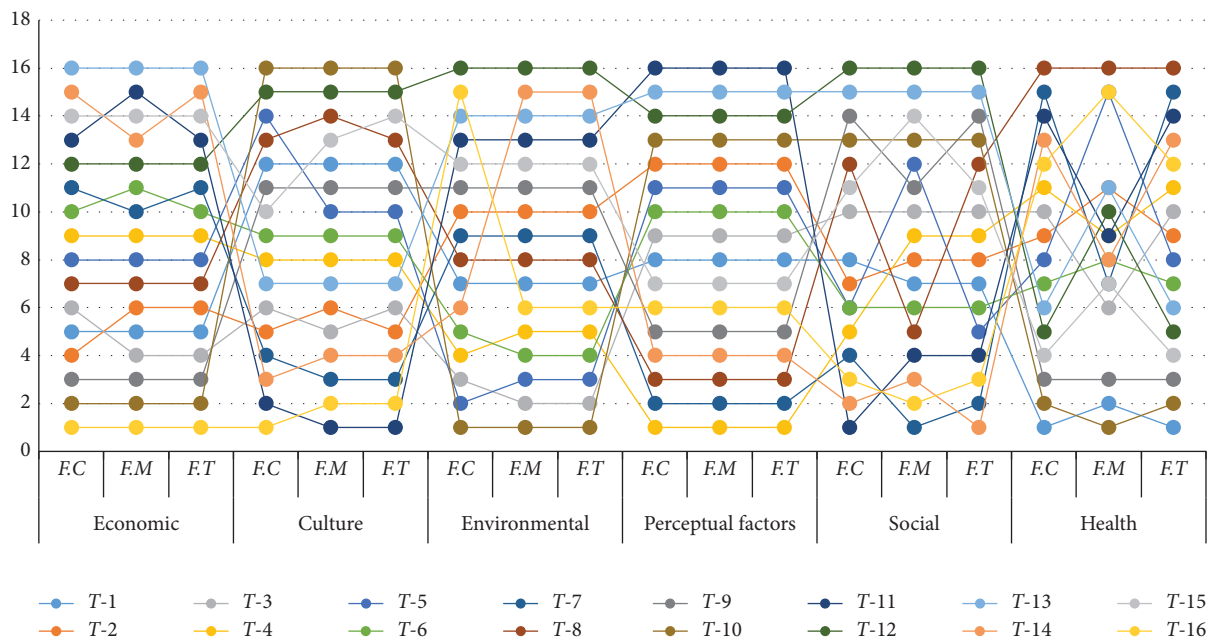

Figure 5: Sensitivity analysis.

5. Conclusion

Resident satisfaction with the purpose of tourism and the development of tourism are two sides of the same coin. Certainly, the future of tourism is closely tied to the support of the residents at the target areas on the one hand and the hospitality of local residents and their interaction with tourists on the other. In order to achieve sustainable tourism development, it is necessary to have an advantage in upstream documents for both the target population and the tourist. Ignoring the demands of the residents and not providing them with satisfaction and support will hurt the future of tourism in the country.

Resident satisfaction with the presence of tourists as well as their support for the development of tourism and their loyalty to tourism and the presence of tourists has a tremendous impact on the future of tourism in any region. Tourism requires the hospitality of local residents and their interaction with tourists. In the tourism industry, management must be such that the value, quality, and commitment of both parties are created. In other words, tourism has an advantage for both tourists and residents. If the demands of the residents and their satisfaction and support are ignored in tourism, the country will certainly not achieve the targets set in the field of tourism.

According to the research results, in order to achieve the development of the tourism industry in the communities, it is necessary to have the support of the local community for the development of tourism as one of the important stakeholders. This is also achieved through the satisfaction of the residents. In order to achieve their level of satisfaction, it is necessary for their attitude and understanding of tourism to be in the direction that the benefits of development outweigh its disadvantages and efforts need to be made in order to achieve this goal. If it turns out that the results of tourism activities are not harmful (or have limited harm) and may have benefits, each person will work together to enter and develop the industry. According to the research findings, infrastructural works should be done in the five main dimensions of tourism to create this feeling in the host communities, namely, economic, cultural, environmental, social, and health dimensions, which can be considered according to the components proposed and existing fields. As in any tourism situation, the necessary activities must be planned before their implementation, so this information can be used to prioritize the activities of the programs in question.

5.1. Research Limitations. Despite the results obtained in this study, there is an important limitation and research constraint that made it very difficult during the research, which was the issue of the coronavirus and the constraints that the researchers faced in conducting the field study. Also, the hybrid model was used to exploit the six criteria under study with perhaps the technological factors and limitations of the coronavirus crisis being ignored. Perhaps as a suggestion for future researchers is the need for the impact of these factors to be considered on the satisfaction of tourism target residents.

Data Availability

All data collected and analyzed are available within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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