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Location Decisions for Health Villages Based on Passive Defense Approach: A Case Study for Isfahan Province, Iran

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Abstract

This study aims to identify and prioritize the appropriate locations of tourist villages, which are enabled for healthcare activities, in Isfahan province, Iran. It identifies factors affecting the development of these villages and also takes into account the characteristics of passive defense. First, criteria and sub-criteria related to proposed location decision have been identified using literature together with experts' opinions, and the pairwise comparison questionnaire has been designed. A panel of experts and practitioners in the field have been invited to complete the questionnaire and subsequently the weight of each component has been calculated. Then, based on the primary geographical data prepared by different organizations and using geographic information system (GIS), data layers in the ArcGIS software have been created and the appropriate locations in Isfahan province were identified. Finally, using the analytic hierarchy process (AHP) and the weight of each location, the ranking process has been applied and the most appropriate locations have been extracted.

Keywords:

Location Decision, Health Village; Passive Defense; Geography Information System (GIS); Analytic Hierarchy Process (AHP)

1 Introduction

Tourism is often seen as a passport to development and modernization, resulting in economic and social growth [1]. In this context, the health tourism has received much attention over the past few years. The health sector in developing economies is expanding rapidly, attributable to rapid growth of health tourism, which is emerging as a lucrative business opportunity. Countries here are capitalizing on their popularity as tourist destinations by combining high quality health services at competitive prices with tourist packages. Some countries are establishing comparative advantages in service provision based on their health system's organizational structure [2].

Globally there has been tremendous growth in the health service sector, catalyzed by inadequate national public health services, the spiraling cost of health services and the availability of cheaper alternatives in developing economies. This has led to the globalization of health care worldwide, illustrated by growing cross-border delivery of health services. Growing demand for health services is a global phenomenon, linked to economic development that generates rising incomes and education. Demographic change, especially population ageing and older people's requirements for more medical services, coupled with epidemiological change (i.e., rising incidence of chronic conditions) also fuel demand for more and better health services. Waiting times and/or the increasing cost of health services at home, coupled with the availability of cheaper alternatives in developing countries, has lead new healthcare consumers, or medical tourists, to seek treatment overseas. The correspondent growth in the global health service sector reflects this demand. The globalization of healthcare is marked by increasing international trade in health products and services, strikingly via cross border patient flows [2, 3].

Governments and private actors in developing economies are promoting the health tourist industry, but the potential impact on health systems, particularly in terms of location decisions and equity in access and availability for local consumers, is unclear. Recently, the health tourism industry has gained importance in Iran, due to the advantage of having many geographically suitable locations.

Meanwhile, Iran as a country which has experienced the demolition and destroyed caused by war, has an especial attention on passive defense in order to maintain its national capital and vital recourses. It is obvious the passive defense considerations in location decisions has a large effect in reducing future losses, while leading to increase threshold of citizen resistance in attack situations and facilitate crisis management. The use of passive defense measures reduces casualties and the levels of vulnerability and damage to critical military and civilian buildings, and facilities, and protects arteries of the country against enemy attacks. It could be helpful in reducing the risks of unnatural incidents [4].

In this paper appropriate locations of tourist villages, which are enabled for healthcare activities (i.e., health villages), in Isfahan province, Iran are identified and prioritized. Taking into account the characteristics of the passive defense, factors affecting the development of these villages are identified. First, criteria and sub-criteria related to proposed location

decision have been identified using literature together with experts' opinions, and the pairwise comparison questionnaire has been designed. A panel of experts and practitioners in the field have been invited to complete the questionnaire and subsequently the weight of each component has been calculated. Then, based on the primary geographical data prepared by different organizations and using geographic information system (GIS), data layers in the ArcGIS software have been created and the appropriate locations in Isfahan province were identified. Finally, using the analytic hierarchy process (AHP) and the weight of each location, the ranking process has been applied and the most appropriate locations have been extracted.

2 Background

Tourism has been an issue of interest to human societies from the distant past and it has moved towards growth and development due to diverse needs. Tourism is now one of the world's largest service industries and it is regarded as a source of income and has moved towards prosperity at the national level in countries whose economy is based on service activities. Through application and simultaneous combination of internal and external resources, tourism can achieve socio-economic, cultural and environmental benefits. In many countries tourism is referred to as the main force of development and economic growth which can cause the local economy to be diversified by providing a strategic opportunity and giving rise to the value of income sources to the local environment. Therefore, tourism development is the first option considered in the improvement and development of any area. The importance of this industry and its impact on socio-economic and cultural development has brought about changes in the attitudes of managers and local, regional and national planners from anywhere in the world and it has made them make efforts and plans for its development. Today, tourism is one of the greatest and most lucrative activities such that it entails more sectors such as transportation, shopping centers, etc. in its area of expertise. These expenditures are made by foreign currencies which tourists bring with them and it is like the fact that tourists export the above mentioned goods to his country. This economic trend which is not precisely measurable is called the invisible export. It is anticipated that tourism will be regarded as the most profitable industry in the world in 2020. Meanwhile, according to the prediction of the World Tourism Organization, the number of international tourists will reach 6.1 billion people by 2020. This means that the average annual growth rate will be about 3.4 percent. Tourism has various influences on the economic, social and political dimensions of a country. Tourism helps improve employment, leads to economic capitals and also helps the promotion of political legitimacy of countries at an international level. Tourism, from a social perspective, is done in the context of the geographical environment which consists of the natural, cultural and social environments.

Deciding on the best location of a touristic area to offer facilities needed by tourists in a recreational complex is called the location decision of tourist villages. Among the requirements of such centers there is the fact that tourists who spend their travel time in these places should enjoy all facilities and services and also it should be planned in a special way in terms of notification and access to information in such centers. There is a variety of methods to find convenient locations for tourist villages. Geographic Information System (GIS) is one of the suitable methods to find convenient locations for tourist villages due to having input capabilities, data management, data processing and data output in which the land use management is considered as a useful tool.

Issues that most tourism planners deal with include development, preservation of existing nature, environmentally protected areas, and the location decision of service centers, tourist and coastal villages, manufacturing units, warehouses and so forth. To decide on the location of any of the above mentioned activities a series of limiting factors such as slope, height, environmental protected areas as well as reinforcing ones such as access to resources, roads, markets and lands should be taken into account. This is achieved when a researcher regarding priorities can establish a proper scientific and logical relationship between the obtained data from experts dealing with this issue.

Among modern areas of advanced tourism, health tourism can be noted known as one of the most profitable and competitive markets among advanced industries. Health tourism or medical tourism is an organized travel which takes place from an individual's living environment to another place to keep healthy and regain physical and mental health.

Health tourism is often hailed as a sector where developing countries, have huge potential due to their comparative advantage based on providing world-class treatment at low prices combined with attractive resorts for convalescence [5]. Many terms are used to describe the relationship between health and tourism in the framework of special tourism products such as health tourism, medical tourism, hospital/clinical tourism and so on [6]. The intersection between these terms is illustrated in Figure 1.

2-1 Definitions of the core constructs

(1) **Tourist**. This refers to a person who travels for a period of time to be more than a day and less than a year to a country other than his or her homeland or his or her own ordinary residence and whose goal is something other than working and earning money.
(2) **Tourism**. This refers to a set of activities which occur during a tourist's travel. This process contains all activities, including travel planning, traveling to the destination, returning and even remembering memories. It also includes

those activities that tourists do as a part of the travel, like buying various goods and the interaction between hosts and guests. Generally, any activity and interactions that occur during a tourist's travel can be viewed as tourism.

(3) **Location Decision**. Generally location decision means finding a suitable place based on the intended criteria. It includes and not limited to: the recognition stage, data collection and preparation, map preparation, integration of maps and preparation of the exiting maps.

(4) **Health Village**. A place is referred to as health village, if it has health care complexes (for both natural and medical therapies), in addition to amusement facilities.

(5) **Passive defense**. According to various sources published by the United States department of defense, passive defense is defined as a set of nonmilitary measures taken to reduce vulnerability and to minimize the potential damages caused by invading forces. In Iranian military and strategic texts, passive defense is defined as a series of nonviolent actions with the purpose of increasing resistance against the enemy's attacks on living areas, improving maintenance of essential activities in cities and villages, improving national resistance, and facilitating crisis management against the enemy's military threats and actions.

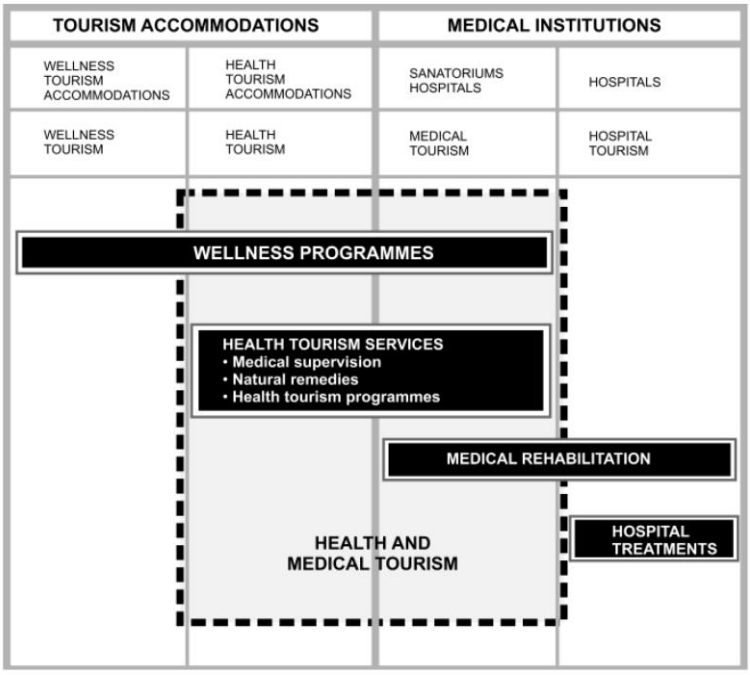

Figure 1- Outline of the health tourism characteristics and their relationship with complimentary products [6]

3 Research Methodology

In the present study, the research method is survey and the numeric data collection instrument is questionnaire. Those criteria seeming effective in location decision of health villages were identified through literature as well as interviews with experts in the field. Then, all proposed criteria were classified and some of them were omitted by using the Delphi method. Finally, main criteria and 29 sub-criteria were identified and a pairwise comparison questionnaire was designed. In order to assess the validity of the designed questionnaires, content validity was used. Content validity refers to the degree that the instrument covers the content that it is supposed to measure. Content validity is a subjective judgment of experts about the degree of relevant construct in an assessment instrument [7]. A panel of experts in the field including academic professors and tourism practitioners was invited to determine the content validity of questionnaires. Based on their feedbacks, revisions were made and the content validity of questionnaires was confirmed. Meanwhile, the designed questionnaire is considered to be reliable because all criteria in this research are related to the location decision and the experts' opinions regarding these criteria are immutable and will be the same over time. The statistical population of this study to determine the ranking of criteria for location decision of health village includes professors and experts of geographical and therapeutic areas of the Isfahan Province, Iran.

3-1 Research Domain

Isfahan Province with an area of 106,179 square kilometers covers approximately 25.6 percent of the country's total area. This province is located between 30° 42' and 34° 30' of the north latitude and 49° 36' and 55° 32' of the east longitude in the central part of Iran. Some areas of the northern part and most of western regions of the province are mountainous regions. Isfahan enjoys a variety of climates and the average temperature and rainfall follow the topography of the area. Winds that blow in Isfahan are mainly the western and southwestern winds. According to the results of 2011 census the

population of Isfahan was 4879312 people living in 1410236 households. Isfahan, with more than 79 hospitals and clinics as well as about 1203 doctors in the public sector, 1309 specialists and subspecialists and 271 dentists is among the leading provinces in the field of treatment of the country. From cultural and historical points of view, Isfahan can be considered as a very rich city. The uniqueness of a part of the tourist attractions including religious and historical ones, enjoying the highest share of attractions compared to other tourism hubs as well as having the largest share of various types of tourist facilities and equipment and infrastructure such as roads and so forth, having a variety of attractions and the possibility of attracting tourists in all seasons due to climatic variety and having recreation centers in most centers of Isfahan's counties are among strong points of this province.

4 Research Findings

4-1 Research Criteria and Sub-Criteria

This study consists of eight main criteria which are as follows: natural, topographic, climatic, geologic, economic, health, skeletal, and social factors. These criteria are divided into 29 sub-criteria as presented in Table 1.

Table 1- Research criteria and sub-criteria

Criteria	Sub-criteria	Criteria	Sub-criteria
Natural	• having beautiful natural landscapes • existence of mineral springs near the villages • suitable vegetation • distance from canals and flood-prone areas	**Economic**	• access to qualified workforces • having agricultural services • having tourist attractions • having local investors
Topographic	• altitude record • slope rate • slope direction	**Health**	• access to emergency services • closeness to blood transfusion centers • existence of specialist hospitals near the villages • access to specialist medical staff
Climatic	• air quality (presence of dust) • humidity • wind • temperature	**Skeletal**	• access to the main lines of communication • distance from the airport and railway station • access to drinking water • access to electricity • access to gas • distance from the nearest residential areas
Geologic	• distance from faults • earthquake records	**Social**	• public safety of area • distance from large population areas

4-2 Criteria Weights and Total Inconsistency Rate

Regarding the goals of the present study, the effective criteria and sub-criteria in location decision of health villages were examined by AHP technique and the experts' opinions. The pairwise comparison matrix and the weights of main criteria as well as the total inconsistency are presented in Table 2.

4-3 Sub-Criteria Weights

Each sub-criterion being studied, in turn, contributes to the optimal location decision of tourist villages, and at the same time, each one has a different effectiveness compared to others. Therefore, in this study, initial weight for each of them was calculated after pairwise comparison and identification of the effectiveness of sub-criteria. In order to use the final weight of each sub-criterion in the GIS, they were obtained separately by multiplying the weights of criteria in the initial weight of each of the relevant sub-criteria which is observed in the column of normal weigh in the final stage of the AHP.

Table 2- The pairwise comparison matrix

	Natural	Topographic	Climatic	Geologic	Economic	Health	Skeletal	Social	Weight
Natural	1	2	1	2	4	4	3	5	0.2519
Topographic	0.5	1	1	2	2	0.25	0.5	2	0.0979
Climatic	1	1	1	1	2	1	3	2	0.1457
Geologic	0.5	0.5		1	1	0.25	0.3333	2	0.0718
Economic	0.25	0.5	0.5	1	1	0.25	0.5	4	0.0692
Health	0.25	4	1	4	4	1	4	5	0.2196
Skeletal	0.3333	2	0.3333	3	2	0.25	1	2	0.1015
Social	0.2	0.5	0.5	0.5	0.25	0.2	0.5	1	0.0424
Total Inconsistency									0.0858

Table 3- Criteria and sub-criteria weights

Criteria	Weight	Sub-criteria	Weight
Natural	0.2519	having beautiful natural landscapes	0.18
		existence of mineral springs near the villages	0.67
		suitable vegetation	0.08
		distance from canals and flood-prone areas	0.07
Topographic	0.0979	altitude record	0.13
		slope rate	0.46
		slope direction	0.41
Climatic	0.1457	air quality (presence of dust)	0.34
		humidity	0.12
		wind	0.40
		temperature	0.14
Geologic	0.0718	distance from faults	0.85
		earthquake records	0.15
Economic	0.0692	access to qualified workforces	0.28
		having agricultural services	0.08
		having tourist attractions	0.26
		having local investors	0.38
Health	0.2196	access to emergency services	0.16
		closeness to blood transfusion centers	0.04
		existence of specialist hospitals near the villages	0.54
		access to specialist medical staff	0.26
Skeletal	0.1015	access to the main lines of communication	0.20
		distance from the airport and railway station	0.09
		access to drinking water	0.35
		access to electricity	0.20
		access to gas	0.07
		distance from the nearest residential areas	0.09
Social	0.0424	public safety of area	0.875
		distance from large population areas	0.125

4-4 Final Integrated Map

After preparing the maps of criteria to obtain the final map, they were integrated with regard to their weights calculated. Figure 2 is the outcome of 29 sub-criteria and 8 criteria. At first the maps of sub-criteria should be prepared by using field data and library studies and map of each sub-criterion be drawn. Then, maps of the main criteria will be obtained by integrating the maps of sub-criteria based on their weights obtained from the pairwise comparison questionnaire. Subsequently, the main maps of all criteria will be integrated based on their weights and the final map will be extracted. This final map indicates that the central regions towards the west and its extension to the north and some western regions of the province are the best places in terms of developing of tourist villages with therapeutic/health capability. These areas are highlighted with the color number 9 in the Figure 2. The more distance from these locations, the less valuable it is to develop such villages with therapeutic/health capacities.

Figure 2 indicates which areas are the best to achieve the goal of this study with regard to natural, topographic, climatic, geologic, economic, health, skeletal, and social factors. Using GIS, 66 optimal areas were calculated and the weights of each location were extracted. The exact location of areas is determined by using the Global Positioning System (GPS).

5 Conclusion

In this study appropriate locations of tourist villages, which are enabled for healthcare activities (i.e., health villages), in Isfahan province, Iran, were identified and prioritized. For this purpose, all factors affecting the development of these villages taking into account the characteristics of passive defense were investigated. All criteria and sub-criteria related to proposed location decision were identified using literature together with experts' opinions, and the pairwise comparison questionnaire was designed. A panel of experts and practitioners have been invited to complete the questionnaire and

subsequently the weight of each component was calculated. Subsequently, based on the primary geographical data prepared by different organizations and using geographic GIS, data layers in the ArcGIS software were created and the appropriate locations in Isfahan province were identified. Finally, by using the AHP technique and the weight of each location, the ranking process has been applied and the most appropriate locations have been extracted. From the results it can be observed that 66 locations have been selected as the most appropriate locations in Isfahan province.

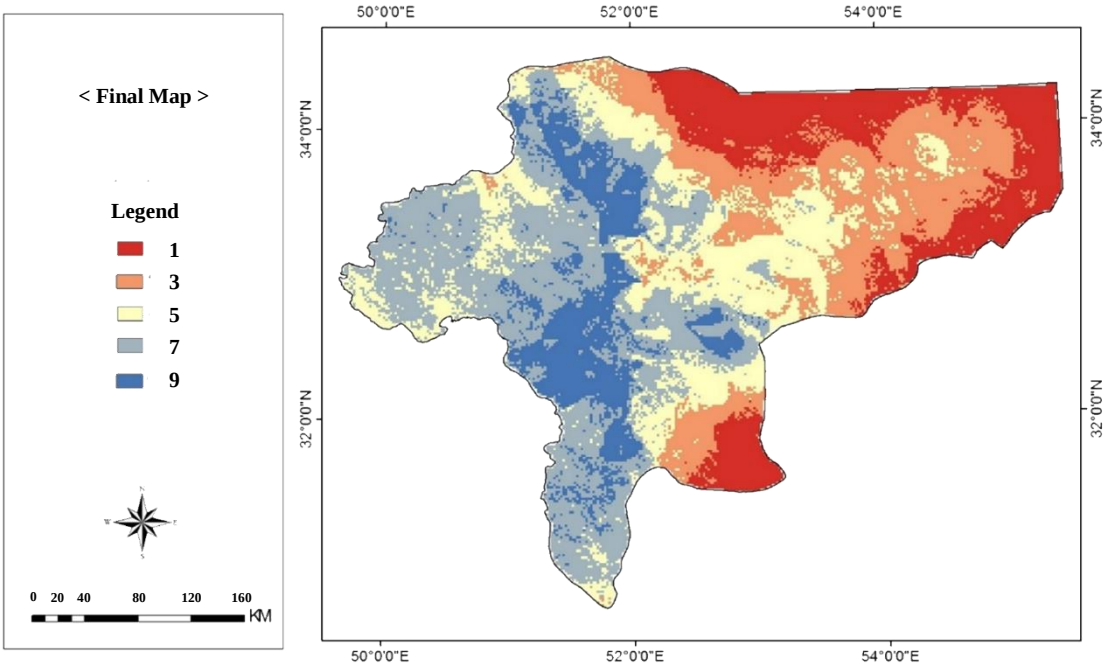

Figure 2- The final integrated map of most appropriate locations

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