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Establishment of appropriate location for international medical service aftercare center - Application of Analytic Hierarchy Process & deriving key indicators

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Abstract

The Recently, the domestic hospitals industry changed a lot in January 2009 when the National Assembly passed the Law to Attract Foreign Patients. Domestic hospitals, which had original restrictions on the patient 's activities, gradually became free of the visitor' s activities for foreign patients and put much effort into overseas marketing. Eventually, as of 2015, 260,000 overseas patients have flown into the country as a result of these efforts. Despite these efforts, however, foreigners' entry into the domestic foreign patient market has largely decreased due to the Sad situation in China, the border conflict with Japan, and the appreciation of the Russian ruble. Despite a lot of policy support, the growth slowed. In this situation, the domestic hospitals intend to build a local office with an aftercare center and advance counseling function in order to increase the re-visit rate of foreign patients. In particular, I was worried about the location selection and management plan for establishing a post management center for Chinese patients in China, which is visiting the most in Korea.

In conclusion, this study suggests that Chinese patients who visit Korea will return to their home countries after visiting Korea, improve their satisfaction in a wide range of post management areas such as post-operative counseling, difficulties, and medication guidance, It began with the worry about what is the most appropriate way to expand the inflow of patients. In order to achieve this goal, it is aimed to identify the most suitable priority area when establishing a post management center in China. To do this, in-depth interviews were conducted with domestic medical experts and hospital personnel in China, and Delphi analysis was applied to extract the results in three dimensions.[1]

Keywords: *Foreign patients, Delphi analysis, AHP, follow-up management*

1. Introduction

China's overseas medical tourism market is estimated to exceed 1 billion yuan this year, from 730 million yuan last year. Overseas large medical institutions are setting up offices in China to attract Chinese patients to reflect the growth trend of Chinese medical tourism market.[1] In addition, there are more than 1,000 consulting companies in China that mediate foreign medical services. The total number of foreign patients who visited Korea last year was 364,000, an increase of 23% from the previous year, of which the number of Chinese patients reached 127,000 (35.1%).[2] However, considering that this scale is

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the scale of Chinese medical tourists visiting Korea due to the high altitude missile defense system (THAAD, Sad), the proportion of Chinese patients in Korea medical tourism industry is considerable. As a result, in order to expand the public relations activities and advance post-management functions in order to revitalize the Chinese patients, we have established a post management center to spread the positive awareness about the Korean international medical services and to establish an efficient delivery system in the local area. [3] [4] It is becoming a key agenda for the development of Korean medical tourism industry. [5]

2. Research Methodology

2.1 Preliminary research and literature review

We collected data from domestic and foreign medical institutions and governmental medical tourism promotion center, Chinese government and media, and reviewed them. [6] [7] After reviewing the policies and strategies of the Chinese government and examining the possibility of development and application of the advance model, the basic data and location for selecting the location of the Korea Medical Center in China and the reasons for selection. [8] [9] In addition, in order to select the basic indicators for the selection of the location of the international medical service post management center, detailed indicators such as local transportation qualities, medical market size, medical personnel level, community attitude, taxation and related laws. We collected and analyzed the latest data for 20 cities in the region since 2014. [10] [11]

2.2 Delphi Survey

Three delphi surveys collected expert opinions on the functioning and operation mode of the International Center for Health Care Management and the conditions for selecting the location. The procedure was as follows. First, it consisted of 31 specialists such as local hospital operators, clinicians, local medical practitioners, municipal medical tourists, attracting companies, and academics related to Chinese and foreign patients. Secondly, the first questionnaire for experts was prepared, and it was provided as brainstorming, item classification, and closed questionnaire. Then, the first opinion was collected. After revising the questionnaire to open question, As a three-dimensional question. Third, the second questionnaire was used to check the score of each factor and check the importance (weight).

2.3 AHP(Analytic Hierarchy Process)

At the Delphi survey, the AHP (Analytic Hierarchy Process) survey was conducted, and the weight of the detailed indicators of the factor assessment method was grasped and reflected in the site selection, thereby giving objectivity to the selection of the location of the International Center for Health Care Management. In addition, the expert Delphi survey was used to determine the answers to the priorities of the selected indicators. The results of the two comparisons were used to evaluate the contribution of each variable, and the relative importance of each item was judged from the point of view of experts. And to provide objective opinions on the selection of the post management center site. In addition, according to the factor rating method, the variables were restructured into six internal and external question groups, and weighted items were applied according to expert opinions of domestic and foreign experts.

2.4 Factor rating Method

A total of 60 detailed indicators were selected for the six categories of factor assessment methods, and the indicators that can be secured through prior reviews and field surveys were selected first. The weighting factors for the six categories of ease of transportation, the size of the nearby medical market, the level of physicians and medical personnel, the attitudes of the local community, the taxation and related laws, and the convenience of procurement of medical materials And then the maximum value was determined as the final candidate. The results of this study are summarized as follows. First, the final selected indicators are applied to the final location selection through the priority and weight setting steps. The weighting factors are determined by the AHP analysis. And the validity of the analysis was secured.

$$TS_j = \sum_{i=1}^{m} W_i S_{ij} \; ; \quad i = 1, 2, \cdots, n$$

TSj = total score of location j
Wi = weight of factor i
Sij = score for factor i of location j
m = number of factors
n = number of locations considered

3. Research contents

3.1 Results of Delphi survey and AHP application

Most of the weights set by domestic and foreign experts panel groups were similar, but there was a relative gap between experts in the national policy sector and economic indicators. In particular, in the case of economic indicators, the maximum of the set weight of the experts showed a difference of 20 points or more from the average, and the minimum difference was about 19 points.

Table 1. International Medical Service Follow-up Center Expert Weighted Results

Dision	Fixed rate	Gneral Domestic report	National policy	Healthcare	City Infrastructure	Economy
Expert 1	5.00	5.00	20.00	25.00	25.00	20.00
Expert 2	15.00	10.00	20.00	20.00	20.00	15.00
Expert 3	5.00	5.00	10.00	20.00	30.00	30.00
Expert 4	10.00	10.00	30.00	15.00	15.00	20.00
Expert 5	20.00	10.00	20.00	20.00	20.00	10.00
Expert 6	15.00	10.00	35.00	20.00	15.00	5.00
Expert 7	20.00	5.00	20.00	5.00	10.00	40.00
Expert 8	15.00	5.00	30.00	5.00	15.00	30.00
Expert 9	10.00	10.00	30.00	20.00	15.00	15.00
Expert 10	10.00	20.00	10.00	20.00	30.00	10.00
Average	12.50	9.00	22.50	17.00	19.50	19.50

Based on the first Delphi survey, the factor classification method was classified into the first tier and the experts' opinion on the weight of each category was collected with a score of 100. The weighting factors of the factors by the factor delineation method derived from the first Delphi were in order of the medical personnel level (23.12),

convenience of transportation (20.91), medical market size (17.94) and convenience of material procurement (10.76). Considering the relatively high weighting of the level of medical personnel and the convenience of transportation, the selection criteria for the number of healthcare personnel, beds, transportation infrastructure. [12] [13] [14]

Table 2. Result of AHP Weighting of International Medical Service Follow-up Center

NO	Factor rating classification	Weight
1	Convenience of transportation	20.91
2	Medical Market Size	17.94
3	Level of medical personnel	23.12
4	Community attitude	15.39
5	Detergents and related laws	11.87
6	Material Procurement Convenience	10.76

3.2 Factor analysis and analysis

Through the first Delphi survey, the data were classified into six major categories of indicators by prioritizing the detailed indicators of the factoring method, and classified into 60 detailed indicators by field survey. First of all, it was classified into 11 indicators of transportation characteristics, 12 indicators of medical market, 6 indicators of medical personnel, 17 indicators of community attitudes, 6 indicators of taxation and related regulations, and 6 indicators of convenience of material procurement. The gap between the metropolitan area and metropolitan area and the distance from the CBD in the nearby metropolitan area, the medical market size index consisted of medical expenditure per capita and the number of city basic medical insurance subscribers. In addition, the level of healthcare workforce was composed of city location, city population, GRDP, etc. The indicators of taxation and related laws and regulations include the status of medical special zones, the status of medical treaties, and designated cities in national new and old areas. The index of ease of material procurement consists of medical expenditure expenses, personal medical expenses, railroad extension status, port status. [15] [16] [17]

Table 3. International Medical Service Post-Care Center Location Selection Index

Priority	1 Rank	2 Rank	3 Rank	4 Rank	5 Rank
Convenience of transportation	Distance between metropolitan area and big city	Distance from nearest metropolitan CBD	Subway / city railway service	Near Airport	Route bus access
Medical Market Size	Per capita consumption expenditure by sector	Medical expenditure per capita	Consumer market size by sector	Population ratio	Social Consumption Revenue
Level of medical personnel	Doctors per thousand	Healthcare	Per thousand people	Number of hospital beds by type of medical institution	Number of healthcare institutions

Community attitude	location	Urban population	GDP per capita	GRDP (Gross Domestic Product)	Consumption expenditure
Detergents and related laws	Special Medical Area	Medical agreement	A nation-class shrine	Free Trade Zone	Urban Development
Material Procurement Convenience	Proportion of medical expenditure among medical expenditures	Medical expenditure against regional GDP	Medical expenditure portion of medical expenditure	Proportion of Social Medical Expenditure among Medical Expenditure Expenditures	Airport Status

4. Conclusion

As a result of applying the classification weighting to the sum of the scores according to the scores of the six main indicators and the sixteen indicators by applying Delphi analysis, AHP, and factor assessment method, the most appropriate location selection result of the Korea International Medical Service Post- Was derived as follows. First of all, it was found that the most effective place to be selected was the medical personnel (weighted = 23.12), which was ranked first in the order of Beijing (69.35), Chengdu (67.96) and Zhengzhou (63.04). Secondly, the transportation characteristics (weighting value 20.91) had excellent location effect in the order of Nanjing (57.26), Guangzhou (55.34), and Shenzhen (54.89).

In terms of medical market size (weighting = 17.94), Shanghai (53.00), Beijing (52.19) and Tianjin (50.10) were the third priority variables and the fourth community attitude (weighting = 15.39) (42.58), and Suzhou (42.09). The fifth detergent and related regulations (weighted = 11.87) were in the same location effect with 10.98 points in Chengdu, Xian and Dalian. Lastly, the convenience of material procurement (weighting = 10.76) was well established in the order of Zhengzhou (26.69), Wuhan (26.69), Changsha (25.92) and Changchun (25.92).

Table 5. Ranking of Priority of Placement in China International Medical Service Aftercare Center

Divison	Class Weight						Total	Rank
Index	Convenience of transportation	Medical Market Size	Level of medical personnel	Community attitude	Detergents and related laws	Material Procurement Convenience		
Weight	20.91	17.94	23.12	15.39	11.87	10.76		
Shanghai	47.25	53	56.2	44.65	8.52	21.65	231.27	2
Guangzhou	55.34	41.57	58.77	39.97	9.74	19.55	224.94	4
Beijing	40.99	52.19	69.35	42.58	7.7	22.42	235.23	1
Hangzhou	51.15	46.35	60.36	40.29	8.93	22.97	230.05	3

Shenzhen	54.89	37.35	36.44	40.96	8.52	19.55	197.72	12
Chengdu	45.51	33.73	67.96	29.48	10.98	25.71	213.36	8
Qingdao	44.5	33.56	54.15	33.84	10.15	22.45	198.66	11
Tianjin	48.03	50.1	49.99	41.05	8.52	21.22	218.92	6
Nanjing	57.26	44.85	54.15	35.93	7.98	19.74	219.91	5
Xi'an	37.7	42.41	53.24	26.25	10.98	25.69	196.26	14
Chongqing	38.3	43.34	53.63	28.76	7.66	24.25	195.95	15
Changsha	50.06	31.94	58.6	33.04	10.15	25.92	209.7	9
Suzhou	53.92	38.04	38.32	42.09	5.94	19.31	197.63	13
Dalian	42.06	40.93	39.92	35.11	10.98	24.64	193.64	17
Zhengzhou	50.21	31.93	63.04	26.25	8	26.69	206.11	10
Shenyang	39.34	43.37	44.47	35.52	6.76	24.64	194.11	16
Wuhan	54.21	32.6	61.86	31.01	8.52	26.69	214.89	7
Xiamen	48.63	32.48	39.92	30.3	8.52	18.35	178.18	19
Ningbo	49.02	38.89	39.92	30.52	5.94	22.97	187.25	18
Changchun	35.5	38.61	40.03	27.23	7.16	25.92	174.45	20

As a result, the best candidates for the first place in Korea's follow-up management center for the international medical service in Korea were Beijing (235.23) followed by Shanghai (231.27), Hangzhou (230.05), Tianjin (224.94), Guangzhou (219.91), Nanjing , Chengdu (214.89), Wuhan (213.36), Changsha (209.70) and Zhengzhou (206.11).

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