

## DETERMINATION OF THE THERMAL HOTEL LOCATION: APPLICATION OF ANALYTIC HIERARCHY PROCESS

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### **Abstract**

**Purpose** – In recent years, as other sectors, there is an increasing trend of competition in thermal hotel sector. The aim of this study is to determine the importance of the factors on thermal hotel location via Analytic Hierarchy Process (AHP). The study is conducted in one of the most famous thermal cities, Afyonkarahisar-Turkey.

**Methodology** – AHP is used to determine the best location among all alternative-locations.

**Findings** – According to the results of AHP, Environmental Factors are found to be the most important factor in determining the location of the thermal hotel. The other factors according to their importance are; Features of the Construction, Costs of Investment, Location of the Construction, Competitive Factors and Demographic Structures respectively. Within Environmental Factors, the sub-factor Closeness to Thermal Water was found to be the most important.

**Value/originality** – Determination of the location of a new hotel is very important for thermal tourism investors and also it is one of the most difficult factors for them. While they determine the most suitable location, they have to think about different criteria and all other alternatives. Other factors like features of the construction, environmental factors, competitive factors and demographic structures are almost as important as the location of the hotel which also has some sub factors. This study focused on how to determine the best hotel location via AHP.

**Keywords** Analytic Hierarchy Process, Thermal Hotel, Hotel Location Determination

### **INTRODUCTION**

As a branch of service sector, tourism is considered to be a significant contributor of economic and social assets in the globe. With the business volume it has, it also generates economic contributions to such sectors as construction, agriculture, and textile other than itself. Besides, tourism is of great significance by providing great contribution to GNP per person especially as an important source of exports. According to the annual report released by UNWTO in 2012, over 1 billion people travelled the globe in a single year and tourism income was realized over 1 billion dollars (UNWTO, 2013). Tourist arrivals and tourism incomes vary by continents, countries, and regions. The development of tourism gained impetus following the industrial revolution. Along with the industrial revolution, increases in personal incomes, social benefits and technological developments made the tourism sector an important sector. This being the case, the tourism sector has turned into a business line with food and beverage

establishments, accommodation establishments, transportation establishments and souvenir establishments within itself.

What makes tourism different compared to other sectors is the human factor. Human factor lies at the very core of tourism. For any tourism activity, people should travel out of their usual place of stay temporarily with purposes of travelling, curiosity, resting, etc. and consume the goods and services offered by tourism establishments. To serve this purpose, people have to travel where the goods and services are offered. During this translocation, basic needs are based on accommodation, i.e. hotels. In the past, hotels were considered to meet the needs of accommodation. At present time, besides offering accommodation, they offer food and beverage, entertainment and other auxiliary services. Hotels are classified according to the location, the service capacity offered, size and running hours. As such, thermal hotels are within this classification by the service capacity and type of serve offered (Kozak et al., 2012).

Thermal hotels are certified facilities co-operated with spas, springs and thermal cure centres with treatment services and accommodation services (Andaç, 2009). Cure thermal centres offer treatment-oriented services as well as health maintenance services by means of sea water, mud and spa water or massage and physical training services via mechanical or electric tools (Kozak, et al., 2012). As the location of establishment for such facilities requires huge sums of capital, it is of great significance in terms of economic gains of the investment and the operational factors.

## 1. LITERATURE REVIEW

Deciding on the site of establishment is a problem faced by all establishments, whether small or big, and a problem they have to solve. The decision on the site of establishment is not necessarily taken at the very start-up the business but also taken as companies grow, face market-related problems, and changes in the supply resources. (Eleren, 1995). The site of establishment is where the establishment performs its operations. It is the most appropriate location selected compared to other viable sites. The most viable site is where the costs are the lowest and the profit is the highest. (Tutar and Küçük, 2003).

Establishments are always in the pursuit of maximizing their production capacity to the extent they can. Managers are in a position to choose the site of establishment that will pave the way for the maximum capacity utilization and the minimum production and marketing costs. The site of establishment is vital in terms of entrepreneurial decision. Hence, the site of establishment choice is performed through a long-range plan (Mahmut, 2004). The best site for the establishment is the place which offers the maximum returns and profit compared to other possible locations within the consideration of specific production methods and capacity in the competitive nature (Demir and Gümüšoğlu, 1998).

It is a must that a meticulous preliminary study should be conducted for the site of establishment, since the site of establishment is as important as oxygen for hotels to develop and grow (Oral, 2005). The loss brought about by the inappropriate choice of

site of establishment will remain as long as the establishment operates. Hence, the acquisition of goods and services and their quality along with the costs involved should be taken into serious consideration (Ertuğral, 1998).

There exists a variety of factors influential in deciding on the site of establishment. Anything considered to offer superiority in terms of costs and profit in the production phase is called the factors regarding the site of establishment. The factors in the choice of establishment could be divided into four categories (Barutçugil, 1989; Mucuk, 1997; Ertuğral, 1998; Ertürk, 1998; Şahin, 2000; Kobu, 2003; Sabuncuoğlu and Tokol, 2011; Özel, 2012):

- **Economic Factors:** Distance to supply resources is a point that should be taken into careful account. Depending upon the conditions of the transportation vehicles, high costs of transportation may arise. The distance of the manufactured products is another important point to deal with. Economic studies contain three parts; market survey and demand estimate, the site and location of establishment and capacity profile.
- **Natural Factors:** The climate and the land-related points affect the site of establishment considerably. The structure of the soil, natural resources like springs and underground water, the land structure, earthquake vulnerability, the climate, natural and physical environment and opportunities to expand are the natural factors to be taken into consideration in the site of establishment.
- **Social Factors:** Social factors denote the cultural and social activities offered that will meet the needs of the staff employed. Besides, the response of the locals to noise, air and environmental pollution should be paid attention. Local and central authorities with a consideration of security and health of the society take legal and administrative measures against the site of establishment. There is social good in the selection of the site of establishment on a place where cultural activities, shopping, sports activity facilities are available and locals with high educational status and with a positive attitude to tourists.
- **Psychological, physiological and political factors:** In addition to holding an important place in the choice of site selection, this may also perform a significant role from the perspectives of the entrepreneurs in order to gain respect and support. Entrepreneurs may choose to invest in the locations since they feel affinity with the people in that specific location. Sometimes, the government may set up establishment in order to promote development in the underdeveloped regions. As well as canalizing the state investment, the state may implement incentive measures to attract the private sector.

Other than the factors mentioned above, such factors as transport, the ease of supply acquisition, natural attractions, legal factors and the hotel start should be taken into account Olalı and Korzay, 1993; Medlik, 1997; Kahraman, 1997; Ertuğral, 1998).

The success or failure of a hotel is dependent on several factors: (1) the hotel manager's capabilities, (2) the level and scale of the hotel, and (3) the hotel's relationships with its local markets. It is very important to invest and focus on a hotel's location because that directly affects the hotel's success. Compared to other businesses, the hotel industry is unique because it relies heavily on location, and because

production and consumption happen simultaneously at a hotel. Therefore, a successful hotel begins with assessing the value of its location both at its inception and for its future (Lee et al. 2010)

Generally, determinants of hotel location include individual characteristics of each hotel, such as years after opening, star ratings, accommodation percentage (service diversification), ownership, and location attributes, such as agglomeration effect, public service infrastructure, road and subway accessibility and accessibility to tourism sites. Determinants are different for hotels established in different periods of time. For example, road accessibility was important for hotel location choice in the early periods but not nowadays. Furthermore, hotels with different star ratings and different ownership share distinct determinants. For instance, high-level hotels do not consider the agglomeration effect and but value accessibility considerably when choosing to locate. Apart from these, the change of subway network structure, and various agglomeration issues are also discussed. Subway network is found to be efficient in providing accessibility for peripheral hotels, and agglomeration heterogeneity, ownership related agglomeration and agglomeration zoning are confirmed (Yang et al., 2012).

The multi-disciplinary nature of hotel location research has resulted in a relatively separate body of literature that is scattered throughout a diverse mix of academic disciplines, such as tourism and hospitality management, geography, economics, marketing, finance, and urban planning. Researchers with different backgrounds tend to over-emphasize the theories and models of their own disciplines. Therefore, methodological differences and variations can be observed, albeit somewhat loosely, in different streams of hotel location research (Yang et al., 2012).

## **2. METHODOLOGY**

### **2.1. Analytic Hierarchy Process (AHP)**

The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making (MCDM) approach and was introduced by Saaty (1977 and 1994). The AHP has attracted the interest of many researchers mainly due to the nice mathematical properties of the method and the fact that the required input data are rather easy to obtain. The AHP is a decision support tool which can be used to solve complex decision problems. It uses a multi-level hierarchical structure of objectives, criteria, sub criteria, and alternatives. The pertinent data are derived by using a set of pairwise comparisons. These comparisons are used to obtain the weights of importance of the decision criteria, and the relative performance measures of the alternatives in terms of each individual decision criterion. If the comparisons are not perfectly consistent, then it provides a mechanism for improving consistency (Triantaphyllou and Mann, 1995).

AHP is flawed as a procedure for ranking alternatives in that the rankings produced by this procedure are arbitrary (Dyer, 1990). Since its invention, has been a tool at the hands of decision makers and researchers; and it is one of the most widely used multiple criteria decision-making tools. Many outstanding works have been published

based on AHP: they include applications of AHP in different fields such as planning, selecting a best alternative, resource allocations, resolving conflict, optimization, etc. (Vaidya and Kumar, 2006).

AHP as a subjective and qualitative evaluation method has been broadly used for environmental planning, evaluation of transportation alternatives, evaluation of factors influencing urban plan implementation and failures, location planning of cars haring stations in medium-sized cities, location allocation problems and site optimization, traffic tools selection and prioritization, performance evaluation, and assessment of asset level of service (ALOS) of urban infrastructure for investment decision analysis. This method shows more accuracy and adaptability in comparison with cost benefit analysis (CBA) with the views of decision makers in an urban transport investments test, which is due to the subjective consideration of the impact of socioeconomic parameters (Sayyadi and Anjali, 2013)

Facility location selection is a typical MCDM problem in which managerial preference among performance criteria plays a key role in the final decision. To assess the decision-maker's preference explicitly with a preference model, many efforts have been made to develop the theory and methodology for preference assessment. In the current literature, the most preferred approaches are multi-attribute utility theory (MAUT) and AHP (Yang and Lee, 1997)

## **2.2. Data collection**

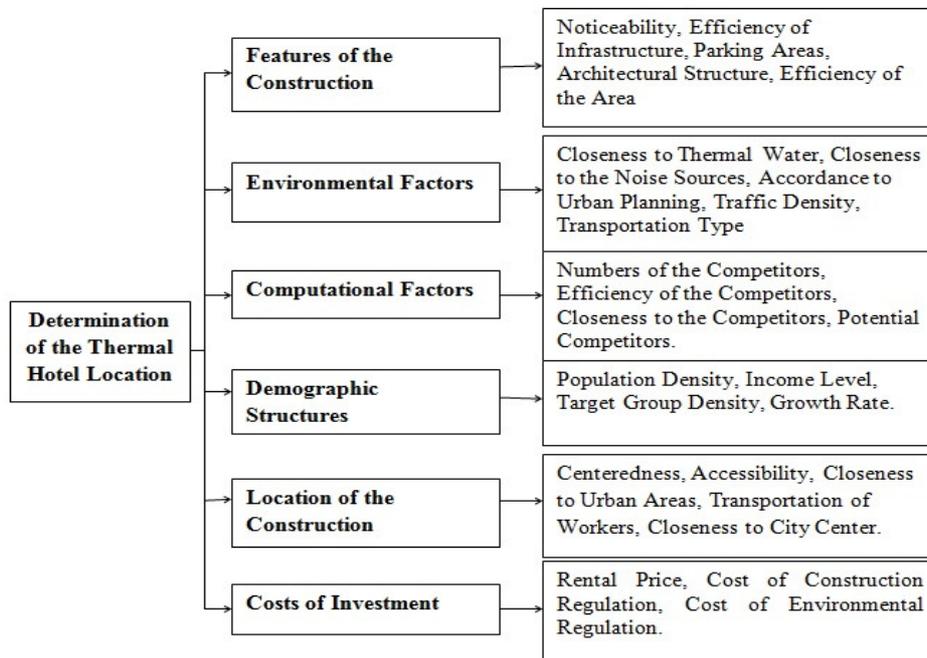
Face to face questionnaire is applied to the directors of the 4 five-star thermal hotels in city of Afyonkarahisar where is one of the most important thermal city in Turkey between the dates 15 September 2011 and 30 September 2011 to determine the efficiency coefficients of each factor on hotel location problem. The questionnaire includes the factors which are the determinations of a hotel location (specifically a thermal hotel) given in Figure 1 and we wanted responders to compare the importance levels of the related factors and circle the Intensity of Importance for each situation according to their experiences in that field to determine the relative importance . To conduct this survey we used Saaty's (1980) "*Scale of Relative Importances*" given in Table 1.

Table 1: Scale of Relative Importance

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute
3	Weak importance of one over another	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Demonstrated importance	An activity is strongly favored and its dominance demonstrated in practice
9	Absolute importance	The evidence favoring one activity over another is of the highest possible order of
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.	

Source: Saaty, 1980)

Figure1: Factors thought to be efficient on determining the location.



Source: authors

Figure 1 shows the factors which thought to have an effect on determination of the thermal hotel location in this study and the sub-factors on each these factors.

### 2.3. Data analysis

After collecting the data, using the Super Decision Software, we applied AHP and conducted the data analysis. The theoretical procedures in the analysis are as follows: The structure of the typical decision problem considered in this paper consists of a number, say  $M$ , of alternatives and a number, say  $N$ , of decision criteria. Each alternative can be evaluated in terms of the decision criteria and the relative importance (or weight) of each criterion can be estimated as well. Let  $a_{ij}$  ( $i=1,2,3,\dots,M$ , and  $N=1,2,3,\dots,N$ ) denote the performance value of the  $i$ -th alternative (i.e.,  $A_i$ ) in terms of the  $j$ -th criterion (i.e.,  $C_j$ ). Also denote as  $W_j$  the weight of the criterion  $C_j$ . Then, the core of the typical MCDM problem can be represented by the following decision matrix given in Table 2 (Triantaphyllou and Mann, 1995):

Table 2: Decision criteria and the relative importance (weight) of each criterion

Alternatives	Criterion				
	$C_1$	$C_2$	$C_3$	...	$C_N$
	$W_1$	$W_2$	$W_3$	...	$W_N$
$A_1$	$a_{11}$	$a_{12}$	$a_{13}$	...	$a_{1N}$
$A_2$	$a_{21}$	$a_{22}$	$a_{23}$	...	$a_{2N}$
$A_3$	$a_{31}$	$a_{32}$	$a_{33}$	...	$a_{3N}$
.	.	.	.	...	.
.	.	.	.	...	.
.	.	.	.	...	.
$A_M$	$a_{M1}$	$a_{M2}$	$a_{M3}$	...	$a_{MN}$

Source: Triantaphyllou and Mann, 1995

Table 2. shows the alternatives, decision criteria and the weights of each criterion the typical MCDM problem in matrix form.

#### *The Use of Pairwise Comparisons*

According to Saaty (2008) AHP is a theory of measurement through pair wise comparisons and relies on the judgements of experts to derive priority scales. Thus, AHP helps decision makers to find the assessment criteria one that best suits the previous goal(s) and their understanding of the problem. It provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, as well as for relating those elements to overall goals, and for evaluating alternative solutions (Praničević and Srića, 2013)

Pairwise comparison means comparing two factors (criteria) and it depends up the decision maker's conclusion. At this step all of the factors are compared according to a level higher each interactions (Hacıköylü, 2006).

The main problem with the pairwise comparisons is how to quantify the linguistic choices selected by the decision maker during their evaluation. All the methods which use the pairwise comparisons approach eventually express the qualitative answers of a decision maker into some numbers which, most of the time, are ratios of integers. A case in which pairwise comparisons are expressed as differences (instead of ratios) was used to define similarity relations and is described by Triantaphyllou (1993).

One of the most practical issues in the AHP methodology is that it allows for slightly non-consistent pairwise comparisons. If all the comparisons are perfectly consistent, then the following relation should always be true for any combination of comparisons taken from the judgment matrix:  $a_{ij} = a_{ik} a_{kj}$ . However, perfect consistency rarely occurs in practice. In the AHP the pairwise comparisons in a judgment matrix are considered to be adequately consistent if the corresponding Consistency Ratio (CR) is less than 10% (Saaty, 1980). The CR coefficient is calculated as follows.

- First the Consistency Index (CI) needs to be estimated. This is done by adding the columns in the judgment matrix and multiply the resulting vector by the vector of priorities (i.e., the approximated eigenvector) obtained earlier. This yields an approximation of the maximum eigenvalue, denoted by  $\lambda_{max}$ . Then, the CI value is calculated by using the formula as in (1).

$$CI = (\lambda_{max}) / (n - 1) \quad (1)$$

- Next the CR is obtained by dividing the CI value by the **Random Consistency Index (RCI)** as given in Table 3. (Triantaphyllou and Mann, 1995).

Table 3: RCI values for different values of  $n$ .

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RCI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

Source: Triantaphyllou and Mann, 1995

- After the alternatives are compared with each other in terms of each one of the decision criteria and the individual priority vectors are derived, the synthesis step is taken. The priority vectors become the columns of the decision matrix (not to be confused with the judgment matrices with the pairwise comparisons). The weights of importance of the criteria are also determined by using pairwise comparisons. Therefore, if a problem has  $M$  alternatives and  $N$  criteria, then the decision maker is required to construct  $N$  judgment matrices (one for each criterion) of order  $M \times M$  and one judgment matrix of order  $N \times N$  (for the  $N$  criteria).
- Finally, given a decision matrix the final priorities, denoted by  $A_{AHP}^i$ , of the alternatives in terms of all the criteria combined are determined according to the following formula (2) (Triantaphyllou and Mann, 1995).

$$A_{AHP}^i = \sum_{j=1}^N a_{ij} w_j, \quad \text{for } i = 1, 2, 3, \dots, M \quad (2)$$

To make a decision in an organized way to generate priorities we need to decompose the decision into the following steps (Saaty, 2008).

1. Define the problem and determine the kind of knowledge sought.
2. Structure the decision hierarchy from the top with the goal of the decision, then the objectives from a broad perspective, through the intermediate levels (criteria on which subsequent elements depend) to the lowest level (which usually is a set of the alternatives).
3. Construct a set of pairwise comparison matrices. Each element in an upper level is used to compare the elements in the level immediately below with respect to it.
4. Use the priorities obtained from the comparisons to weigh the priorities in the level immediately below. Do this for every element. Then for each element in the level below add its weighed values and obtain its overall or global priority.
5. Continue this process of weighing and adding until the final priorities of the alternatives in the bottom most level are obtained

### 3. EMPIRICAL RESULTS

According to the results of AHP given in Table 4, between all main factors, Environmental Factors are found the most important with the coefficient of 0.210. The importance coefficients of the other factors are: 0.189 for Features of the Construction, 0.182 for Costs of Investment, 0.148 for Location of the Construction, 0.118 for Competitive Factors and 0.110 for Demographic Structures.

Table 4: Hierarchical structure and the AHP results

Features of the Construction (0,189)	Environmental Factors (0,210)	Competitive Factors (0,118)	Demographic Structures (0,110)	Location of the Construction (0,148)	Costs of Investment (0,182)
Noticeability (0,242)	Closeness to Thermal Water (0,326)	Numbers of the Competitors (0,254)	Population Density (0,091)	Centeredness (0,159)	Rental Price (0,252)
Efficiency of Infrastructure (0,272)	Closeness to the Noise Sources (0,080)	Efficiency of the Competitors (0,304)	Income Level (0,207)	Accessibility (0,335)	Cost of Construction Regulation (0,367)
Parking Areas (0,110)	Accordance to Urban Planning (0,177)	Closeness to the Competitors (0,137)	Target Group Density (0,346)	Closeness to Urban Areas (0,183)	Cost of Environmental Regulation (0,326)
Architectural Structure (0,126)	Traffic Density (0,150)	Potential Competitors (0,236)	Growth Rate (0,314)	Transportation of Workers (0,143)	
Efficiency of the Area (0,183)	Transportation Type (0,176)			Closeness to City Center (0,107)	

According to the findings, in terms of features of the construction, importance of the criteria found as: 0.272 for Efficiency of Infrastructure, 0.242 for Noticeability, 0.183 for Efficiency of the Area, 0.126 for Architectural Structure and 0.110 for Parking Areas. In terms of environmental factors, importance of the criteria found as: 0.326 for Closeness to Thermal Water, 0.177 for Accordance to Urban Planning, 0.176 for Transportation Type, 0.150 for Traffic Density and 0.080 for Closeness to the Noise Sources. In terms of Costs of Investment, importance of the criteria found as: 0.367 for Cost of Construction Regulation, 0.326 for Cost of Environmental Regulation and 0.252 for Rental Price. In terms of Location of the Construction, importance of the criteria found as: 0.335 for Accessibility, 0.183 for Closeness to Urban Areas, 0.159 for Centeredness, 0.143 for Transportation of Workers and 0.107 for Closeness to City Center. In terms of Competitive Factors, importance of the criteria found as: 0.304 for Efficiency of the Competitors 0.254 for Numbers of the Competitors, 0.236 for Potential Competitors and 0.137 for Closeness to the Competitors. Finally, in terms of Demographic Structures, importance of the criteria found as: 0.346 for Target Group Density, 0.314 for Growth Rate, 0.207 for Income Level and 0.091 for Population Density.

## **DISCUSSION AND CONCLUSION**

In order to obtain the expected productivity from hotel managements, the services for infrastructure are required to be sufficient. Thus, both choosing the right location for construction and the features of the hotel building are vital for hotel managements. Features of the hotel building which are within the scope of external features affect the perceptions of customers. Therefore, factors such as appearance of the hotel building, parking places and ease of accessibility should be taken into account for hotel investors.

Thermal hotel managements are serving also healthcare services to their customers in addition to hotel services. Therefore, the healthcare services are the most important outcome of the thermal hotel managements. The generally accepted therapy period in thermal hotel managements covers a period of average 3 weeks. Particularly the thermal water that is rich for chemical values increases the attraction of such enterprises for both customers and investors. The thermal hotel managements do not serve only to people who are travelling for healthcare-purpose but also providing service to those customers who desire to be stay healthy. Thermal tourism is a kind of tourism that does not depend on the seasonal fluctuations too much. Thus, the thermal hotel managements are enterprises with attractive investment in terms of being able to provide service to their customers all the year round and to provide income to their investors.

Another point regarding the hotel investors is if there is a sufficient market size in the location where the investment will be made. Marketing of the hotel enterprises and attracting attention of tour operators to the related destination are depending only on the development level of other infrastructure and superstructure possibilities such as a certain total bed amount and transportation possibilities. On the other hand, the hotel investors will choose the locations for investment where they can compete or where

they will be the only competitor in the market. In addition to, occurrence of factors forming the competition in the location where investment will be made will cause directing both the private and public investments to the location. On the other hand, at a tourism destination where factors of competition are formed, the hotel enterprises have to renew themselves in continuous manner.

Elements forming the demographic structure play a significant role in the decision-making process of hotel investors. As the tourism is a fact that improves and grows up based on the human factor, the factors such as income levels of individuals, population and growth rate are important for investors.

One of the significant attractions factors in the tourism enterprises is the location of the enterprise. How ease of accessibility to the location of hotel enterprise has a rich transportation network, the greater will be the demand for the region. As the tourism activity is performed based on the dislocation, location of the hotel enterprise is important for the customers. The location of the hotel enterprise is not important only for customers but also for the staff and other supplier organisations.

Another issue of interest to hotel investors is the investment costs. The investor will choose the region(s) where they achieve maximum profit with minimal investment. Incentives such as land allocation to the touristic places provided by public, cheap credit and tax exemptions are attracting the attention of investors. This ensures convenience for both developing of the touristic region and investors. As the rate of fixed investments is high in the tourism field, all supportive items to be provided to investors will decrease the investment cost. This will relieve the investors from financial aspect. So that the related destination will become attractive for the aspect of investing.

There are several studies on determining hotel location. The researchers discussed the importance of a hotel location from their field of expertise (for example: economics, engineering, marketing, statistics etc.), however the common result in many studies shows that the location is the most important factor, among all others for a new hotel.

Medlik (1993) emphasized the importance of a hotel location in his study, that the three most important things for a hotel's success are (1) location, (2) location, and (3) location according to a renowned hotel man. Shoval et al. (2011) mentioned in their study that, the importance of hotel location as a critical factor, influencing consumption patterns within a destination, with broad implications for both product development and destination marketing. As a result of their study Yang et al. (2014) emphasized that there is a huge demand for the analysis of hotel location and the identification of factors contributing to a superior location. For private hotel investors, the pattern of hotel location and its evolution provide valuable information on market access to potential guests and can be further used to understand market competition and equilibrium: whether the hotel industry is over-supplied within a certain area.

In our study, we tried to find out the effective factors on specifically thermal hotel location via an important statistical approach, the AHP. As a result if a new thermal hotel is planning to be constructed in Afyonkarahisar city, it can be advised to the

tourism investors thinking about the Environmental Factors at first and as a sub criterion, mostly think about the closeness to thermal water.

### **Limitations**

The current study has some limitations in its generalization. This study was conducted in Afyonkarahisar, Turkey, where is famous for thermal water. The determinants of the hotel location may differ under different circumstances therefore; the same criterions may be used for other cities to decide the best location of a thermal hotel. When we conducted the research there were only four five-star thermal hotels that we were able to examine and collect the data, but the number of the five-star thermal hotels in Afyonkarahisar is increasing every year which shows the importance of this study.

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