

İLERİ MÜHENDİSLİK ÇALIŞMALARI VE TEKNOLOJİLERİ DERGİSİ

Evaluation of Studies on Health Tourism in Türkiye with AHP-TOPSIS Methods

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Abstract

The importance and extent of health tourism are increasing day by day globally. This sector provides an important source of income particularly for developing countries, making a serious contribution to the country's promotion and revitalization of other sectors. Although health tourism has emerged as a major sector in Türkiye in recent years, the existing literature in this field is far from complete. This paper aims to discuss and analyse relevant publications regarding the health tourism sector in Türkiye via the use of multi-criteria decision-making (MCDM) techniques. In the first part of this paper, the studies in the field of health tourism in Türkiye between 2007 and 2022 are examined and categorized providing a comprehensive guide for researchers about the subfields emerging in the area. In the second part of the article, the publications examined in the first part are evaluated by using MCDM techniques according to five criteria. These are the weight of the quartiles range, the index the journal was scanned, the publication year, the use of data and whether it was an application article or not, and the content. The weights of these five criteria are calculated by the Analytical Hierarchy Process (AHP) method. Afterwards, the articles are sorted by using the Technique for Order Preference Similarity to Ideal Solutions (TOPSIS). The listed articles are divided into groups A, B, and C, ranging from the most impactful to the least. Thus, the publications that would primarily be of interest to the researchers aiming to work in the field of health tourism in Türkiye have been put forward with a scientific method.

Keywords: Health tourism, Medical tourism, Multi-criteria decision-making, AHP, TOPSIS.

Türkiye'de Sağlık Turizmi ile İlgili Çalışmaların AHP-TOPSIS Yöntemleri ile Değerlendirilmesi

Özet

Sağlık turizminin önemi ve kapsamı küresel olarak her geçen gün artmaktadır. Özellikle gelişmekte olan ülkeler için önemli bir gelir kaynağı olan bu sektör, ülkenin tanıtımına ve diğer sektörlerin canlanmasına ciddi katkı sağlamaktadır. Sağlık turizmi Türkiye'de son yıllarda önemli bir sektör olarak ortaya çıkmasına rağmen, bu alandaki literatür eksiktir. Bu çalışma, çok kriterli karar verme (ÇKKV) tekniklerini kullanarak Türkiye'deki sağlık turizmi sektörüne ilişkin ilgili yayınları tartışmayı ve analiz etmeyi amaçlamaktadır. Bu makalenin ilk bölümünde, Türkiye'de sağlık turizmi alanında 2007 ve 2022 yılları arasında yapılan çalışmalar incelenmiş ve kategorize edilerek araştırmacılara alanda ortaya çıkan alt alanlar hakkında kapsamlı bir rehber sunulmuştur. Makalenin ikinci bölümünde, ilk bölümde incelenen yayınlar ÇKKV teknikleri kullanılarak beş kritere göre değerlendirilmiştir. Bunlar çeyrekler aralığının ağırlığı, derginin tarandığı indeks, yayın yılı, veri kullanımı ve uygulama makalesi olup olmadığı ve içeriktir. Bu beş kriterin ağırlıkları Analitik Hiyerarşi Süreci (AHP) yöntemi ile hesaplanmıştır. Daha sonra, makaleler İdeal Çözümlere Tercih Benzerliği Sıralama Tekniği (TOPSIS) kullanılarak sıralanmıştır. Listelenen makaleler en etkili olandan en az etkili olana doğru A, B ve C gruplarına ayrılmıştır. Böylece Türkiye'de sağlık turizmi alanında çalışmayı hedefleyen araştırmacıların öncelikli olarak ilgisini çekecek yayınlar bilimsel bir yöntemle ortaya konulmuştur.

Anahtar Kelimeler: Sağlık turizmi, Medikal turizm, Çok kriterli karar verme, AHP, TOPSIS.

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1. INTRODUCTION

Health tourism is defined as people traveling from one place to another to receive better quality and more affordable health services (Birader and Ozturen, 2019). Traditionally, wealthy people travelled from developing countries to Western countries such as Europe, America, and the United Kingdom to seek healthcare. However, this situation has changed in the 21st century causing health tourism travel routes to shift from developed countries to developing ones (Collins et al., 2019). Cardiovascular surgery, radiotherapy, organ transplantation, infertility, and in vitro fertilization (IVF) treatments, aesthetic and plastic surgery, dialysis treatment, along with dental and eye operations can be stated among the most popular treatment types that are sought within the scope of health tourism (Karadayi-Usta and Serdar-Asan, 2020).

Health tourism, with a market size value of 115.6 billion dollars as of 2022, is one of the fastest-growing tourism sectors in the world. In addition, the sector is expected to grow by approximately 11.59% annually and a turnover contribution of approximately 346.1 billion dollars is foreseen until 2032 (Precedenceresearch, 2023). It is estimated that the expenditure made by a health tourist is about 12 times that of a typical tourist (Uner et al., 2020). Considering that approximately 11 million cross-border patients exist worldwide, and each patient spends an average of 3,500 to 5,000 US dollars per visit, health tourism is a very lucrative field for several countries (Kurtulmus and Ozturk, 2015). In addition to these figures, health tourism is beneficial as it improves the local, national, and international reputations of health institutions. Furthermore, the development of health tourism causes an increase in the value of human capital in parallel with the development of human resources and expertise. At this point, health tourism does not only benefit health institutions and their employees, but also other commercial organizations such as cinemas, cafes, restaurants, sports clubs, and many others. In short, it is clearly in the interest of the host countries to increase the resources available to health tourists and to facilitate access to these resources (Uygun, 2022).

On a country basis, the most important health tourism locations can be stated as the United States of America, South Korea, India, Israel, Costa Rica, Malaysia, Mexico, Singapore, Thailand, Taiwan, and Türkiye (Birader and Ozturen, 2019). Combining universality with marketization with a major reform in 2003, Türkiye started to become an important destination in the global

health tourism sector. The effects of efforts to promote health tourism in recent years are enormous. While the number of patients coming to Türkiye for health tourism was 15,000 in 2007, this number increased to 746,000 health tourists in less than 10 years in 2015 (Yilmaz and Aktas, 2021). Türkiye is viewed as a popular location for health tourism. The most important reasons for its attractiveness can be listed as follows: Türkiye has historical and natural beauties, offers a quality service at an affordable price, does not have long waiting lists, and the visa processes of health tourists are easier compared to competing countries (Omay and Cengiz, 2013). In addition to these, the changes and investment reforms in the health system in Türkiye in recent years contributed to the advancement of the country in this field (Sag et al., 2022). On the other hand, Türkiye still faces some challenges. One of them is the inability of most hospitals and tourism companies to enter the medical tourism market and manage operations. This newly developing industry in Türkiye lacks a strategic marketing roadmap that includes market segmentation shaped with the right marketing mix (Sag and Zengul, 2019). As Ulas and Anadol (2016) indicate, economic factors such as infrastructure, capacity, and orientation of human resources are also among the most important factors hindering the development of health tourism in Turkish private hospitals. Furthermore, although Türkiye is rich in thermal springs, these resources are not used effectively within the scope of health tourism. According to the Turkish Health Tourism Association, there are more than 1,800 thermal springs in Türkiye, but only 6% of them are used for touristic purposes.

Despite the rapid growth in the field of health tourism in the last twenty years due to globalization, research studies in this field are still insufficient (Uygun, 2022). The health tourism literature suffers from a limited number of comparative and systematic data-based research, and the lack of applications of the conceptual framework on the health system (Yilmaz and Aktas, 2021). Most of the studies on health tourism focus on issues such as the characteristics of patients seeking treatment in a foreign country, the factors affecting the development of health tourism, the factors affecting the choice of health tourism location, the perceptions of health tourists about quality and safety, and the satisfaction of health tourists from different countries of the world (Yildiz and Khan, 2019). Markets (demand and behavior), objectives (development and promotion) and development environments (policies and effects) have been defined as three research topics emerging in health tourism (Zhong et. al., 2021).

Studies regarding health tourism in Türkiye are even more limited and suffer from the same discrepancies. Thus, this study aims to guide researchers who want to conduct research in the field of health tourism in Türkiye by providing a comprehensive literature review of Turkish health tourism and identifying studies that would primarily be of interest to the researchers aiming to work in this field. For this purpose, the articles found by scanning the most important databases were examined and evaluated. First, they were categorized based on their content and main orientation in the Literature Review Section. Next, the

publications were ranked from the “most impactful” to the “least impactful” in terms of their contribution to the overall knowledge in the Turkish health tourism field via using a blend of multi-criteria decision-making methods. The details of the utilized methodology are discussed in Section 3 and the results of the analysis are presented and discussed in Section 4. Finally, Section 5 concludes with further recommendations on the emerging trends in the literature on Turkish health tourism. All these processes are summarized in Figure 1 below.



Figure 1. A visual summary of the study

2. LITERATURE REVIEW

There have been several studies between 2007 & 2022 that span various aspects of health tourism in Türkiye. Although the methods utilized are widespread in each group, we define a broad categorization for all relevant pieces of literature as follows:

- 1) Studies that identify the factors for patient preferences and the key points that contribute to the development of health tourism in Türkiye,
- 2) Studies that focus on the evaluation of a particular healthcare service or evaluation of healthcare providers' capabilities in Türkiye,
- 3) Studies that consider the historical stages of Turkish health tourism, or policy evaluation and development in Türkiye,
- 4) Studies that evaluate health tourism from a global perspective, with a specific reference to the Turkish case.

Among the first group, Altin et al. (2012) state that Türkiye is a country with serious potential in the field of medical tourism with such features as its geographical

location, climate, thermal resources, natural beauties, and qualified health personnel. In this study, health tourism in Türkiye has been evaluated from economic and marketing perspectives.

Omay and Cengiz (2013) state that factors such as high healthcare fees and long waiting times direct people in developed countries to a developing country like Türkiye, offering very attractive opportunities for healthcare services. In this context, researchers outline the opportunities and challenges of health tourism in Türkiye.

In Ozan-Rafferty et al. (2014)'s work, the authors aim to find the factors (push and pull factors) that lead health tourists to receive health tourism services in Türkiye or prevent them from receiving health tourism services in Türkiye. The researchers focus on blog posts and articles where the patients explain their experiences and opinions. As a result, the researchers find that the factors that lead patients to choose Türkiye as health tourists are low costs, expertise and sensitivity of physicians, familiarity, and interest in Türkiye. Meanwhile, communication difficulties, food dissimilarity,

transportation, and customer service are noted as challenges to overcome.

Esiyok et al. (2017) evaluate the health services received by the citizens of 109 countries who came to Türkiye between 2012 and 2014. After considering factors such as religious similarity, the effectiveness of the Turkish diaspora in the country of origin, the physical distance between the country of origin and Türkiye, the gross domestic product per capita (GDP), and the number of incoming tourists, the study proved that the cultural distance between the countries has a significant impact in the selection of the destination country in health tourism.

Aydin and Karam Mehmet (2017) analyse the selection of international health facilities by determining the factors that affect health tourism and proposing a holistic model in their studies. Noting that there are a limited number of studies focusing on international health tourism in Türkiye, the researchers state that their study fills an important gap.

Yildiz and Khan (2019) conduct a series of surveys in which they interview Arab health tourists coming to Türkiye to determine why they wanted to receive health services abroad, why they wanted to receive this health service in Türkiye, what is important and what is less important in these services. The authors evaluate these surveys using the Importance-Performance Analysis (IPA) method, and in the light of the results found, they reveal what should be done to increase the satisfaction of Arab tourists in Turkish health tourism.

Sag and Zengul (2019) reveal the determining factors in choosing a destination country and consider the correlations among these factors. For this purpose, the data of 288 patients from different nationalities who visited Türkiye is evaluated using descriptive statistics and Kruskal-Wallis difference tests. This study is important in terms of seeing what affects the perceptions and orientations of health tourists, aiding marketing managers who aim to seize the competitive advantage in health tourism and prepare a marketing strategy accordingly.

Collins et al. (2019) investigate how Americans choose a country and medical facility for treatment based on the tourism destination, medical tourism activities, medical facilities, and services. At this point, 541 cases are examined through an online questionnaire, also CFA and EFA (Confirmatory, Exploratory Factor Analysis) methods are used to confirm the findings.

Birader and Oztüren (2019) present a survey study aiming to find out why 430 citizens living in the Turkish Republic of Northern Cyprus (TRNC) receive health tourism services in Türkiye instead of the island. Analysis of Variance (ANOVA), median, mean, and t-tests were used to analyze the survey results correctly. According to the results, Türkiye has been a center of attraction for people living in the TRNC, especially because it offers better quality health care at a lower cost than the TRNC.

Karadayi-Usta and Bozdağ (2020) focus on the "healthcare provider selection problem" of health tourists. Intermediary companies are obliged to make the most appropriate patient-hospital match for each health tourist. In this context, a model that takes all aspects of healthcare provider selection into account (i.e., accuracy, uncertainty, and inaccuracy) based on neutrosophic fuzzy sets is proposed in the study.

Boguszewicz-Kreft et al. (2020) conduct a study to understand the applicability of planned behaviour theory in health tourism. To this end, the data of 521 medical tourists from Jordan, Poland, and Türkiye is analysed using multiple regression and analysis of variance methods, and the usability of planned behaviour theory in health tourism is proven.

Pekersen et al. (2021) investigate which factor is important in the field of health tourism in Istanbul. To this end, a questionnaire is applied to health tourists who received service from 15 different health institutions in Istanbul. The data is evaluated by the importance-performance analysis method. Waiting time, providing correct information and instructions, service quality, legal audits, and treatment follow-up stand out as the key points that should be emphasized.

Ozisk et al. (2022) utilize the data of patients, mostly from Iraq, over 3.5 years. Their analysis reveals that Türkiye is an important destination for medical applications such as surgical operations and health screenings. They recommend keeping the quality of health workers and the quality of institutions at a certain standard by accreditation and inspection methods.

Among the second group of papers, it is possible to state Sayili et al. (2007) who consider the treatment of psoriasis with doctor fish in the Kangal Fish Spring in Türkiye. The study describes Kangal Fish Spring as a health tourism centre and deals with the socio-economic and visitor characteristics of those who come to this region. In this context, a survey is conducted on 104 health tourists who visit this destination, and the

perception of the tourists is revealed. Demir and Saribas (2012) evaluate the connection of geothermal energy with health tourism since health tourism is included in the Izmir Expo 2020 program.

Kurtulmusoglu and Esiyok (2017) investigate two groups, aged 54 and under and those aged 55 and over, who received thalassotherapy (sea bath) and health tourism services in Türkiye. In this study, which was conducted on citizens from 78 countries, it was seen that the 55-year-old and older group was less sensitive to income levels than other age groups, while more sensitive to distance and education.

Yildiz and Khan (2016) compare Turkish and American hospitals in the field of in vitro fertilization (IVF). The quality, cost, and success rate indicators in the Turkish hospital were better than the corresponding indicators in the USA (United States of America) hospitals. The cost difference of IVF services between the USA and Türkiye is so great that the total cost of getting services from Türkiye remains lower even with additional expenses for travel and accommodation. Their findings indicate that the two most important factors affecting the demand for healthcare services of international patients in Türkiye are cost and quality (Yildiz and Khan, 2016).

Savasan et al. (2016) focus on the stakeholders working in the health, tourism, and education sectors in the Turkish Republic of Northern Cyprus (TRNC) within the scope of medical tourism. The authors define the roles and responsibilities of stakeholders, and training needs, and state that there is a lack of systematic and programmed training for health tourism. Savasan et al. (2017) develop a "Health Tourism Education Attitude Scale" to determine the attitudes of health tourism stakeholders towards health tourism and other issues in the TRNC. In addition, the researchers believe that it will contribute to the emergence of original scientific research to prepare a compulsory education program for health tourism education with an interdisciplinary approach such as a blend of tourism, psychology, sociology, business, and engineering practices. Savasan et al. (2018) again consider the education model to be developed for health tourism. In the study, qualitative, descriptive, documentary source analysis, sampling, statistical methods, and face-to-face interview data collection techniques are used. The authors indicate that the proposed health tourism service training should be given to all service providers working as intermediate staff in health, accommodation, transportation, and other related sectors.

Kopmaz et al. (2019) evaluate whether health institutions operating in dental health tourism use web pages as an effective media tool. For this purpose, the web pages of 555 institutions operating as dental health institutions are examined. As a result of the study, the presentation of contact information and the layout of the web page are specified as the prominent features in the execution of public relations activities. The availability of language options is also seen as an additional advantage.

The aim of Eris and Kemer (2020) is to determine the awareness of health professionals working in public hospitals in the South-eastern Anatolia Region in the field of health tourism. In this study, with a participation of 392 health workers, it was found that the medical tourism awareness of health workers was low.

Among the third group, Ozkurt (2007) discusses the development of health tourism in Türkiye through the correct planning of financial resources. The author discusses why and how the "guaranteed-privileged bonds" to be published under the leadership of the capital market institution can contribute to the development of this sector in Türkiye.

Terzioğlu (2014) points out the problems in the field of health tourism in globalizing Türkiye. The author states that Türkiye has shown a significant improvement in health tourism in terms of focusing on economic and technological infrastructure, while the socio-cultural aspects of medicine were not much focused on.

Kurtulmus and Ozturk (2015) state that Türkiye is a preferred location in health tourism with the rapid increase in the number of hospitals with Joint Commission International (JCI) accreditation. This study draws attention to how the government performs marketing and legislative activities to develop health tourism in Türkiye using secondary data. The findings of the study reveal the capacity and potential of Türkiye in the field of health tourism and offer policy recommendations to stakeholders who want to increase their economic gains in the sector.

Ulas and Anadol (2016) conduct a case study in which primary data is collected through 2 hospital managers and 12 medical professionals to analyse what strategies should be developed in Türkiye for a private hospital to enter the health tourism sector. They find that factors such as government support, infrastructure, cost, capacity, and human resources are of the utmost importance in determining the success of hospitals in health tourism.

Ucak (2016) tests the impact of health and social service growth on inbound health tourism flows between 2014 and 2016 by using the Granger causality and Johansen cointegration approach.

With the increase in quality thermal spas in recent years, Türkiye has become a preferred country in the world in terms of thermal tourism. In his book chapter, Kervankiran (2016) discusses Türkiye's past, present, and future in terms of thermal tourism from a historical framework, and also presents the results of his research on its spatial distribution and problems. Tonga et al. (2021) find the records of foreign patients who came to Konya for treatment during the Ottoman Empire and state that health tourism was carried out before the 20th century.

Uner et al. (2020) discuss the strategies of large hospitals in Türkiye, which aim to reach potential patients abroad, by making use of the dynamic capabilities theory. In addition, they offer implications for improving information and management practices.

Buyukozkan et al. (2021) use hesitant fuzzy linguistic (HFL) AHP-HFL MABAC (multi-attributive border approximation area comparison) methodology and SWOT (strengths, weaknesses, opportunities, and threats) analysis to choose the best strategy for the effective implementation of health tourism in Istanbul. The proposed methodology first identifies the SWOT factors required for the analysis. These factors are then weighted with the help of HFL and AHP. These results are evaluated to select the best health tourism strategy using HFL MABAC.

Yilmaz and Aktas (2021) describe the details and aftermath of the health reform that began in 2003. They also describe the rise of an enterprising health state emerging in 2013 and later. The article states that the positive continuation of the government-business relationship at this point may lead to a similar development in health tourism.

Collins et al. (2022) submits a qualitative study from the perspective of service providers. In this context, 27 stakeholders from 5 different groups (hospitals/medical centers, medical travel agencies, medical-legal regulators, government, and non-governmental organizations) are interviewed, and as a result, 4 coherent policy implementation areas are created. These are the promotion of health tourism, logistics, and development initiatives, hospital quality accreditation, medical-legal issues, government incentives for the

Turkish diaspora, and promotion of Turkish health tourism abroad.

In his study, Uygun (2022) aims to evaluate Turkish health tourism policies within the framework of stakeholders. At this point, the author, who blends theory and practice, uses social network analysis to examine the relationships between stakeholders. Sag et al. (2022) similarly inquire about the opinions of professionals in the health tourism field regarding how to develop health tourism in Türkiye.

Among the fourth group, one could note Florea and Ciovica's (2013) work which emphasizes that health tourism is a much more effective source of income compared to traditional tourism in times of economic crisis. At this point, the authors cite Türkiye as an essential health tourism centre.

Kiss (2015) analyses the difficulties of developing health tourism in the Balkans. The author inquires into 11 Balkan countries and identifies the challenges of these countries as instability and conflict, poor political management and corruption, lack of funding, limited infrastructure development, inadequate service levels, and inadequate marketing. Moreover, a two-stage Delphi study is conducted with health tourism experts. The author also presents suggestions to overcome the obstacles and to develop health tourism in the region.

Karakoc (2016) discusses the history of global health tourism in general, together with the potential and place of Türkiye in health tourism worldwide. Gurcu and Tengilimoglu (2016) state that health tourism leads to a significant competition with a global market volume of billions of dollars. According to the authors, knowing the market, identifying customer requests and needs, analysing the advantages and disadvantages of competitors, and positioning oneself correctly in the market have considerable importance.

Tontus and Nebioglu (2018) investigate the drivers of the globalization of healthcare services and their effects on selecting medical tourism destination. This study presents the effects of globalization on medical tourism in a list.

Kowalewski et al. (2019) reveal the global health experiences of bariatric surgeons. For this purpose, the types and numbers of surgeries performed by bariatric surgeons, the nationalities of patients, complications, and the market share of world nations in this field from health tourism were examined.

Dogramaci (2020) draws attention to the telemedicine sector, which has come to the fore, especially with the pandemic. The author states that the proper preparation of the legal infrastructure is very important for the future development of this field.

Karadayi-Usta and Serdar-Asan (2020) examine medical tourism in terms of the supply chain in their studies. At this point, they use the triangulation method by considering various stakeholders in health tourism. Besides, they propose a conceptual model. This model consists of 7 business processes; service design, service recovery management, customer relationship management, demand management, capacity and resource management, and service delivery method. This study contributes to the medical tourism services management theory and updates the knowledge by explaining the medical tourism service supply chain (MTSSC) concepts and business processes.

Chmielewski et al. (2021) focus on health tourism in Poland and Türkiye in terms of cost optimization. The behaviour patterns of the customers are examined in the project. Gantt chart and cost gradient concept, which are frequently used in project management, are used to determine the most important factors in cost and time optimization.

Murphy et al. (2022) measure the interest in plastic surgery before, during, and after the pandemic period with the help of Google Trends. Seeing that there was a great interest in this field, especially before and after the pandemic, the researchers note that Türkiye and Lithuania are the two countries that stand out in these searches.

Merdivenci and Karakas (2020) used the Fuzzy DEMATEL (Decision making trial and evaluation laboratory) method to determine the factors affecting health tourism. There is no standard evaluation structure for evaluating the management of the performance of health tourism. However, the authors try to find a fuzzy logic-based ranking by introducing a standard evaluation structure with the fuzzy DEMATEL method.

3. THEORETICAL METHOD

To identify the relevant publications in the field of "Medical/Health Tourism in Türkiye", three important databases, namely Web of Science, ScienceDirect, and Scopus were examined, and a total of 250 publications were obtained. The keywords that were utilized in the search algorithm were "medical tourism OR health tourism AND Türkiye". As a result of the detailed and

extensive analysis of these publications, 53 publications were selected as the most relevant, which are later examined in detail to be included in the literature review. Finally, 7 of these 53 publications were excluded from the study because their full texts could not be reached, and the remaining 46 publications were evaluated.

Specifically, in the Web of Science (WoS) database, the keywords that were utilized in the search algorithm were "medical tourism OR health tourism AND Türkiye". As a result, 9,489 articles were found, which were listed on 190 pages. 150 articles on the first 3 pages were examined (by selecting the Sort by: Relevance option to rank the most relevant articles first) and 39 of them were marked as being possibly relevant. After detailed examinations, 31 articles were ultimately selected to be used in the literature review, and the remaining 8 articles were eliminated because they were not in fact relevant to the subject.

Similarly, the same keywords were written in the ScienceDirect database and 20,123 articles were found listed on 240 pages. Again, the most relevant 50 articles were identified in the first 2 pages and 4 of them which were not observed before were marked as possibly relevant. After detailed examinations, all 4 articles were ultimately selected to be used in the literature review.

Finally, the same search procedure was conducted in the Scopus database, and 12,952 articles were found. Among the first 50 articles on the first 2 pages after sorting according to relevance, 32 new articles were marked as possibly relevant. After detailed examinations, 18 articles were ultimately selected to be used in the literature review.

3.1. Criteria

The next step was to determine the criteria to evaluate the selected articles. After searching for relevant evaluation in the literature, five appropriate evaluation criteria were identified as quartiles range, scanned index, publication year, data usage & application, and content. Detailed explanation of these criteria is given below for each criterion. There are literature-based reasons for choosing these criteria. For example, Usubutun et al. (2010) evaluate articles from Türkiye in Pathology according to journals of publication and publication years while Mesci et al. (2020) classify articles in sports tourism based on their objectives, application areas, research methods used, journals of publication, data collection techniques and findings.

3.1.1. Quartiles Range

In addition to the impact factor or impact index, the ranking of journals in each subject category is quartered by both JCR (Journal Citation Reports) and SJR (SCIMAGO Journal and Country Rank). These quartiles rank journals from highest to lowest according to their impact factors or impact indexes. There are four quarters: Q1, Q2, Q3, and Q4. Q1 is filled by the first 25% of the journals on the list; Q2 is filled by journals in the 25% to 50% group; Q3 spans the journals in the 50% to 75% group and finally Q4 involves the 75% to 100% group. The most prestigious journals in a subject area are placed in the first quarter, Q1.

According to the above explanation, publications in Web of Science received the corresponding scores of Q1=1, Q2=2, Q3=3, Q4=4. If a publication has different quartile range values in more than one field (e.g. Q2 in the management field but in Q3 in the tourism field), the best quartile value is selected. Apart from these, the publications on the Web of Science that are not included in the SCI (Science Citation Index)-Expanded or SSCI (Social Science Citation Index) indexes, those that enter the ESCI (Emerging Science Citation Index) and the publications on the Web of Science that are specified as a conference paper (proceedings) score 10 and the rest of them got the score of 100. However, the point to be noted here is that the increase in these scores has a negative effect because the quarter interval criterion is regarded as a cost criterion. Likewise, for the journals scanned in Scopus took the value 1 if they belong to 76-100 percentiles, the value 2 if they belong to 51-75, the value 3 if in 26-50 and value 4 if they belong in the first 25 percentiles. If publications are in an outlet without a percentile value, a value of 100 was noted for this criterion.

3.1.2. Scanned Index

The Web of Science database was the primary database used in this research, followed by the ScienceDirect and Scopus databases. The index in which the journals of each article were scanned was used as a benefit criterion. The studies published in a journal scanned in the Web of Science database received 9 points, the studies published in the journals scanned in Scopus received 7, and the studies in ScienceDirect received 6 points for this criterion. This evaluation was made subjectively according to the importance of the databases. All 46 selected publications were subsequently checked one by one, and for studies included in more than one database, the highest index score of all scanned databases is noted.

3.1.3. Publication Year

This criterion, which expresses the date of publication of the study, has been accepted as a benefit criterion since current studies are much more important and informative in the health tourism literature. Seeing that this study covers the studies published between 2007 and 2022, the studies have the value in the relevant column of the matrix in whichever year they were published.

3.1.4. Data Usage & Application

The selected publications were evaluated by three subject experts according to their data content, use of data, and application of data. Evaluations are performed according to the Saaty scale, on a scale of 1-9. While 1 is the lowest point in this evaluation criterion, which is accepted as a benefit criterion, 9 corresponds to the highest value that can be obtained. Apart from this, it is also possible to take 2-3-4-5-6-7-8 values in between (Saaty, 2008).

3.1.5. Content

The studies were evaluated by the subject experts according to the Saaty scale according to the originality, the practical and theoretical contribution to health tourism, and their applicability. Again, the highest score that can be obtained is 9, the lowest score is 1, and it is possible to get the numbers in between. Therefore, the specified criterion is again a benefit criterion (Saaty, 2008).

3.2. Scientific Method

Multi-criteria decision-making methods emerged from the need for decision support systems when making strategic decisions (Senyigit and Yurtgulu, 2022). In this study, this method was used to determine which studies should be prioritized by those who will conduct research in the field of health tourism in Türkiye.

After the selection of relevant publications in the field of health tourism in Türkiye in between 2007 and 2022, the scoring of each publication according to the evaluation criteria was calculated. Next, the weights of the five evaluation criteria were obtained by using the AHP method as assessed by the academics who are the authors of this article. Finally, the TOPSIS method was utilized to rank the publications according to the criteria and their weights. Thus, it has been possible to create a ranked list that prioritizes the resources to be considered primarily by the researchers who want to conduct research on "Health Tourism in Türkiye" in the future.

3.2.1 AHP (Analytical Hierarchy Process)

AHP method is a scientific method developed by a scientist named Thomas Saaty in the 70s in order to offer solutions to specific problems (Saaty, 1990). With the AHP method, numerical and verbal evaluations are made, and people specialised in the relevant field evaluate the issue in the relevant field by considering various parameters (Erdemir et al., 2022). AHP provides a strong solution to decide the importance of criterion by doing a pairwise comparison between them (Saaty, 2008; Saaty, 1990; Saaty and Vargas, 2012).

In this study, by using the AHP method, the weights of the 5 different criteria mentioned above were determined by the AHP method as a result of the joint evaluation of 3 authors who are experts in this field.

In the AHP method, firstly, the problem should be

defined, and the objective should be clarified. Secondly, a pyramid such as the one in Figure 2 is formed, which includes objectives, criteria, sub-criteria, if any, and alternatives (Erdemir, 2022; Saaty, 1990).

In step 3, pairwise comparisons of the criteria in each stage are made with each other to determine which criteria are prioritised. When the number of criteria is n , the number of pairwise comparisons to be made is found by the formula $[n(n-1)/2]$ (Erdemir, 2022; Saaty, 1990). The Saaty scale (1-9) detailed in Table 1 below is used to compare the criteria with each other. Comparison matrices are created by evaluating according to this scale (Erdemir, 2022; Saaty, 2008).

AHP is a widely used MCDM for calculating the relative weight of each criterion in a problem (Erdemir et al., 2022).

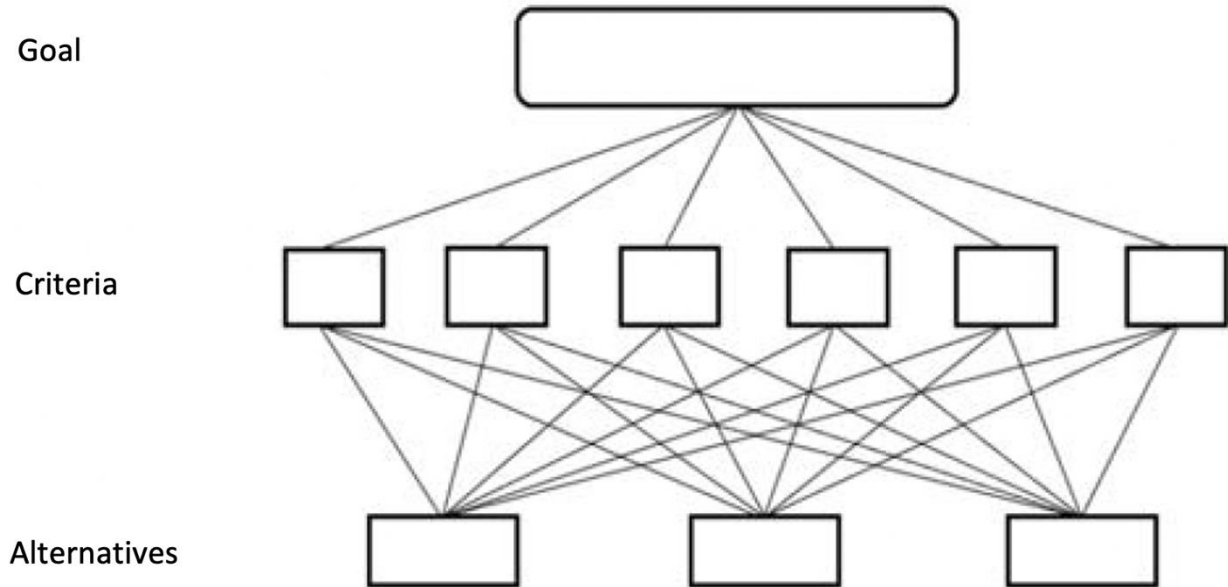


Figure 2. 3-stage Analytical Hierarchy Process Model (Erdemir et al., 2022; Saaty and Vargas, 2012)

Table 1. Saaty 1-9 Scale (Saaty, 2008)

	Intensity of Importance	
Saaty 1-9 Scale	1	Equal Importance
	3	Moderate Importance
	5	Strong Importance
	7	Very Strong

		Importance
	9	Extreme Importance
	2, 4, 6, 8	Intermediate Values

The result is a matrix A as specified in Equation 1 below (Saaty, 2008).

$$A = \begin{bmatrix} 1 & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & 1 \end{bmatrix} \quad (1)$$

In step 4, the normalised matrix is obtained by dividing each element of the matrix A obtained above by the sum of the elements in its column. Then, by calculating the average of each row of the normalised matrix, the weights of the tiers are found. Finally, the formula given in Equation 2 is used to calculate the consistency ratio (CR) between the pairwise comparisons. If this ratio is $CR < 0.1$, it can be said that consistency is achieved, on the other hand, if this value is $CR \geq 0.1$, it can be said that there is inconsistency. At this point, pairwise comparisons should be reviewed and inconsistencies should be eliminated (Erdemir et al., 2022; Saaty, 2008).

$$CR = \frac{CI}{RI} \quad (2)$$

3.2.2. TOPSIS (Technique for Order Preference Similarity to Ideal Solutions)

TOPSIS (Preference Ordering Technique by Similarity to Ideal Solution) is a well-known MCDM method was developed by (Hwang and Yoon in 1981). TOPSIS is one of the most preferred MCDM methods because it is easy to use, also it provides rational and effective solutions along with sorting alternatives clearly by giving ranks for each of them. This method works based on calculating positive and negative ideal solutions which leads to sorting alternatives according to their scores. The TOPSIS method, which can determine decision points according to more than one criterion, also offers the option of objective and subjective weighting in determining the criteria weights. The use of subjective weighting is based on the experience and judgement of the decision maker and the use of objective weighting is usually based on mathematical methods (Wang and Lee, 2009; Arsav, 2020).

The main advantage of the TOPSIS method, which has

applications in different sectors, is that it can present both the positive (best) ideal solution and the negative (worst) ideal solution at the same time. As a result of the literature review, it was determined that high and reliable results were obtained in national and international studies where TOPSIS method was applied, and TOPSIS method was preferred in this study because it allows comparison of different criteria. The subjectivity in the process of evaluating alternatives and determining the weighted average or equal ratio according to the severity of the criteria is considered among the disadvantages of this method (Gungor and Kocamis, 2018; Arsav 2020)

The basis of the TOPSIS method is to create a positive ideal solution and a negative ideal solution. In other words, the method is based on the ranking of alternatives according to the ideal solution. The TOPSIS method consists of a 6-step process. The steps of the TOPSIS method are explained below (Gungor and Kocamis, 2018; Ozdemir, 2015; Arsav 2020).

Step 1: Creating the Decision Matrix (A)

The rows of the decision matrix contain the decision points whose advantages are to be ranked and the columns contain the evaluation factors to be used in decision making. Matrix A is the initial matrix created by the decision maker. The decision matrix is shown as in Equation 3 below:

$$A_{ij} = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{bmatrix} \quad (3)$$

In the matrix A_{ij} , m is the number of decision points and n is the number of evaluation factors.

Step 2: Creating the Standard Decision Matrix (R)

The Standard Decision Matrix is calculated using the elements of matrix A and Equation 4 below.

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^m a_{kj}^2}} \quad (4)$$

The R matrix is obtained as in Equation 5 below:

$$R_{ij} = \begin{bmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mn} \end{bmatrix} \quad (5)$$

Step 3: Constructing the Weighted Standard Decision Matrix (V)

Firstly, the weight values (w_i) for the evaluation factors are determined.

$$(\sum_{i=1}^n w_i = 1). \quad (6)$$

Then, the matrix in each column of the R matrix is multiplied by the corresponding w_i value to form the matrix V shown in Equation 7 below.

$$V_{ij} = \begin{bmatrix} w_1 r_{11} & \cdots & w_n r_{1n} \\ \vdots & \ddots & \vdots \\ w_1 r_{m1} & \cdots & w_n r_{mn} \end{bmatrix} \quad (7)$$

Step 4: Generating Ideal (A^*) and Negative Ideal (A^-) Solutions

The TOPSIS method assumes that each evaluation factor has a monotonically increasing or decreasing trend.

The ideal solution set is constructed by selecting the column values of the weighted evaluation factors in the V matrix that are the largest (or the smallest if the relevant evaluation factor is minimising). Finding the ideal solution set is shown below in Equation 8.

$$A^* = \{(\max v_{ij}, j \in J), (\min v_{ij}, j \in J')\} \quad (8)$$

The set to be calculated from Equation 8 can be represented as $A^* = \{v_1^*, v_2^*, \dots, v_n^*\}$.

The negative ideal solution set is formed by selecting the column values that are the smallest of the weighted evaluation factors in the V matrix (the largest if the relevant evaluation factor is maximising). Finding the negative ideal solution set is shown below in Equation 9.

$$A^- = \{(\min v_{ij}, j \in J), (\max v_{ij}, j \in J')\} \quad (9)$$

The set to be calculated from Equation 9 can be represented as $A^- = \{v_1^-, v_2^-, \dots, v_n^-\}$.

In both formulae J denotes benefit (maximisation) and J' denotes loss (minimisation). Both the ideal and negative ideal solution set consists of the number of evaluation

factors, i.e. m elements.

Step 5: Calculation of Discrimination Measures

In TOPSIS method, Euclidean Distance Approach is used to find the deviations of the evaluation factor value for each decision point from the ideal and negative ideal solution set. The deviation values for the decision points obtained here are called Ideal Separation (S_i^*) and Negative Ideal Separation (S_i^-) Measure. The calculation of the ideal separation (S_i^*) measure is shown in Equation 10 and the calculation of the negative ideal separation (S_i^-) measure is shown in Equation 11.

$$S_i^* = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^*)^2} \quad (10)$$

$$S_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2} \quad (11)$$

(S_i^*) and (S_i^-) will naturally be the number of decision points.

Step 6: Calculation of Relative Proximity to the Ideal Solution

Ideal and negative ideal separation measures are used to calculate the relative closeness of each decision point to the ideal solution (C_i^*). The criterion used here is the share of the negative ideal separation measure in the total separation measure. The calculation of the closeness to the ideal solution is shown below in Equation 12.

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*} \quad (12)$$

Here, C_i^* takes a value in the range $0 \leq C_i^* \leq 1$ and $C_i^* = 1$ indicates the absolute closeness of the decision point to the ideal solution and $C_i^* = 0$ indicates the absolute closeness of the decision point to the negative ideal solution (Gungor and Kocamis, 2018; Ozdemir, 2015; Arsav, 2020).

4. APPLICATION

4.1. Application of AHP

In the study, the AHP method was primarily used to find the criterion weights. Each step is modelled and formulated in Microsoft Excel. First of all, as a result of the joint evaluation of the authors as experts, a comparison matrix was obtained in which the criteria were compared with each other in pairs according to the

Saaty scale. These pairwise comparisons can be seen in Table 2.

Then, the standardization process was performed on the matrix found, and the normalized comparison matrix and eigenvector values given in Table 3 were obtained.

The eigenvalue was found by multiplying the comparison matrix in Table 2 with the eigenvector in Table 3. These processes are described in Table 4.

Finally, the largest eigenvalue (λ_{max}) was obtained as 5.1296, consistency index (CI) 0.0324, and consistency ratio (CR) 0.0292. Since $CR=0.0292<0.1$, it can be said that the pairwise comparisons made by the decision-makers are consistent. The weights of all criteria are given in Table 5.

4.2. Application of TOPSIS

In the second stage of the study, the TOPSIS method was applied to rank the alternatives (publications). Note that, only the quartiles range is a cost criterion and the other criteria are benefit criteria. First, the matrix values

of the alternatives were determined according to the decision criteria. This matrix was then normalized. The weighted normalized matrix is obtained by multiplying each element in the normalized matrix by its weight. In addition, the ideal best and worst values and their distances from the ideal best are also calculated in the table. Finally, the performance scores of the alternatives were calculated with the P_i value.

Finally, according to P_i values, the publications are ordered from largest to smallest, and according to this order, they are divided into 3 classes A, B, and C. P_i values higher than 0.96 were assigned to Group A, those higher than 0.90 were assigned to Group B, and the remaining articles were assigned to Group C. There are 5 academic publications in Group A, 15 in Group B, and 26 in Group C. Group A comprises the most significant studies in the field of health tourism in Türkiye, while Group C encompasses a greater number of studies, though these are of a lesser importance. Table 6 provides the publications in Group A, Group B and Group C with their P_i values.

Table 2. Comparison Matrix

COMPARISON MATRIX					
DECISION CRITERIA	Quartiles Range	Scanned Index	Publication Year	Data Usage & Application	Content
Quartiles Range	1	2	6	5	3
Scanned Index	1/2	1	3	4	2
Publication Year	1/6	1/3	1	1/2	1/3
Data Usage & Application	1/5	1/4	2	1	1/3
Content	1/3	1/2	3	3	1
TOTAL	2.20	4.08	15.00	13.50	6.67

Table 3. Normalized Comparison Matrix and Eigenvector

NORMALIZED COMPARISON MATRIX						
DECISION CRITERIA	Quartiles Range	Scanned Index	Publication Year	Data Usage & Application	Content	Eigenvector
Quartiles Range	0.45	0.49	0.40	0.37	0.45	0.433
Scanned Index	0.23	0.24	0.20	0.30	0.30	0.254

Publication Year	0.08	0.08	0.07	0.04	0.05	0.062
Data Usage & Application	0.09	0.06	0.13	0.07	0.05	0.082
Content	0.15	0.12	0.20	0.22	0.15	0.169

Table 4. Finding Eigenvalue

COMPARISON MATRIX							
DECISION CRITERIA	Quartiles Range	Scanned Index	Publication Year	Data Usage & Application	Content	Eigenvector	Eigenvalue
Quartiles Range	1	2	6	5	3	0.433	2.231
Scanned Index	1/2	1	3	4	2	0.254	1.323
Publication Year	1/6	1/3	1	1/2	1/3	X	= 0.316
Data Usage & Application	1/5	1/4	2	1	1/3	0.082	0.413
Content	1/3	1/2	3	3	1	0.169	0.873

Table 5. Criteria Weights

Criteria	Quartiles Range	Scanned Index	Publication Year	Data Usage & Application	Content	Total
Weights	0.433	0.254	0.062	0.082	0.169	1.000

Table 6. Academic Publication Tier List

Ranking of Alternatives	Alternatives	Pi	Class
1	Collins et al. (2022)	0.9900813	
2	Esiyok et al. (2017)	0.9798353	
3	Buyukozkan et al. (2021)	0.9774683	A
4	Uner et al. (2020)	0.9774683	
5	Collins et al. (2019)	0.9774682	
6	Kurtulmusoglu & Esiyok (2017)	0.9543786	
7	Uygun (2022)	0.9542082	B
8	Karadayi-Usta & Bozdag (2020)	0.9462404	

9	Aydin & Karam Mehmet (2017)	0.9375143
10	Ucak (2016)	0.9336867
11	Yildiz & Khan (2016)	0.9311868
12	Sayili et al. (2007)	0.9188853
13	Savasan et al. (2018)	0.9130009
14	Tontus & Nebioglu (2018)	0.9076303
15	Eris & Kemer (2020)	0.9042645
16	Boguszewicz-Kreft et al. (2020)	0.9020168
17	Kowalewski et al. (2019)	0.9007425
18	Pekersen et al. (2021)	0.9000736
19	Yildiz & Khan (2019)	0.9000736
20	Sag & Zengul (2019)	0.9000736
21	Ozan-Rafferty et al. (2014)	0.8915894
22	Sag et al. (2022)	0.8909434
23	Birader & Oztüren (2019)	0.8909434
24	Merdivenci & Karakas (2020)	0.8887804
25	Kervankiran (2016)	0.8887803
26	Yilmaz & Aktas (2021)	0.8858785
27	Kiss (2015)	0.8823132
28	Ulas & Anadol (2016)	0.8781681
29	Terzioglu (2014)	0.8757024
30	Karadayi-Usta & Serdar-Asan (2020)	0.8755065
31	Dogramaci (2020)	0.8684752
32	Tonga et al. (2021)	0.8667723
33	Florea & Ciofica (2013)	0.8653879
34	Savasan et al. (2016)	0.8632244
35	Murphy et al. (2022)	0.8540367
36	Kopmaz et al. (2019)	0.8540366
37	Ozkurt (2007)	0.8533654
38	Chmielewski et al. (2021)	0.8504965

C

39	Savasan et al. (2017)	0.8479291
40	Ozisik et al. (2022)	0.8294398
41	Demir & Saribas (2012)	0.8294397
42	Altin et al. (2012)	0.8140025
43	Gurcu & Tengilimoglu (2016)	0.1193859
44	Kurtulmus & Ozturk (2015)	0.1193859
45	Karakoc (2016)	0.0925874
46	Omay & Cengiz (2013)	0.0788561

5. DISCUSSION AND CONCLUSION

This study aims to guide the researchers who would like to work on health tourism in Türkiye by providing a comprehensive literature review and evaluating the impact of these studies by MCDM methods. To this end, the databases Web of Science, Scopus, and Science Direct were scanned and a total of 46 relevant academic publications were examined in detail. These studies were categorized into four major groups. Afterwards, five evaluation criteria to be used to rank the publications were determined as quartiles range, scanned index, publication year, data usage and application, and content. The weights of evaluation criteria were determined via the AHP method, and finally, the TOPSIS method was used to rank the publications. As a result of the scores obtained here, the alternatives were ranked from the high-scoring publications to the low-scoring publications. As a result, the first 5 articles with the highest TOPSIS scores were entitled to be in the A class, the next best 15 articles were categorized as in the B class, and the remaining 26 articles were in the C class list.

When we consider the top 20 articles in this ranking, a majority of them belong to Group 1, i.e. studies that identify the factors for patient preferences and the key points that contribute to the development of health tourism in Türkiye. 5 of these publications belong to Group 2 (i.e. focusing on the evaluation of a particular healthcare service or evaluation of healthcare providers' capabilities in Türkiye) and 5 belong to Group 3 (i.e. about the historical development and policy development of Turkish health tourism). Only 2 articles are conceptual studies that make a specific reference to the Turkish case. When this categorization is considered, it is possible to assume that there is a significant research gap, especially

in comparative studies that specify the place of the Turkish health tourism sector from a global or regional perspective. Similarly, policy development and recommendations, and the evaluation of a specific health-care service are still understudied. Future researchers could consider these gaps in particular, as "more impactful" and comprehensive work is required in these areas.

It is also important to note that the number of studies in the field of "Health Tourism in Türkiye" have increased in recent years. However, the number of tourism studies that utilize the methods frequently used in the field of industrial engineering such as MCDM, mathematical modelling, simulation, artificial intelligence, artificial neural networks, machine learning, and big data are very scarce. We would like to further emphasize that future studies on "Health Tourism in Türkiye" utilizing these methods could be particularly impactful in terms of creating objective, measurable results, thereby contributing to both the academic literature and the industry.

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