

## MULTI-CRITERIA DECISION-MAKING TECHNIQUES IN MEDICAL TOURISM STUDIES: A SYSTEMATIC REVIEW

### MEDİKAL TURİZM ÇALIŞMALARINDA ÇOK KRİTERLİ KARAR VERME TEKNİKLERİ: SİSTEMATİK BİR İNCELEME

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#### ABSTRACT

Medical tourism is in an increasing trend depending on many factors. The use of multi-criteria decision making (MCDM) methods in the selection of the optimal situation rationalizes and facilitates the decision process. The aim of the study is to examine the studies in which multi-criteria decision-making techniques are used in medical tourism. Systematic review method is chosen to carry out the research. Articles which are published in English and Turkish languages between 2011- 2021, in Web of Science, Scopus and Science Direct databases are reviewed and examined. During the scanning process, 25 articles (out of 4331) are included in the study. Most of them were published in 2020 (28%), conducted in Turkey (36%), and used only one single MCDM method in their processes (72%). In addition, it is observed that most of the articles prefer to use AHP method (60%) and only 7 of the included articles proceed their studies by adopting fuzzy logic (28%). MCDM methods are widely used in medical tourism studies. It is suggested that MCDM methods should be used considering the characteristics of the method and the purpose of the study and integrated into the processes of fuzzy logic.

**Keywords:** Health Tourism, Medical Tourism, Decision-Making Techniques, Multi-Criteria Decision-Making, Systematic Examination.

**JEL Classification Codes:** I00, I19, C44, D81, C38.

#### ÖZ

Medikal turizm, birçok faktöre bağlı olarak artan bir trend içerisindedir. En ideal durumun seçiminde çok kriterli karar verme (ÇKKV) yöntemlerinin kullanılması, karar sürecini rasyonalize ederek karar sürecini kolaylaştırır. Araştırma kapsamında sistematik inceleme yöntemi kullanılmıştır. Bu kapsamda, 2011-2021 yılları arasında Web of Science, Scopus ve Science Direct veri tabanlarında İngilizce ve Türkçe olarak yayımlanan makaleler incelenmiştir. Tarama sürecinde elde edilen 4331 makaleden, dahil edilme kriterlerine uyan 25 tanesi çalışmaya dahil edilmiştir. Yapılan çalışmaların çoğu 2020 yılında yayımlanmış (%28), önemli bir bölümü Türkiye'de gerçekleştirilmiş (%36) ve genellikle tek bir ÇKKV yönteminin yalnız başına (%72) kullanıldığı görülmüştür. Ayrıca araştırmaya dahil edilen çalışmaların çoğunda (%60) AHP (Analitik Hiyerarşi Süreci) yönteminin tercih edildiği ve çalışmaların sadece 7 tanesinin bulanık mantığı (%28) benimseyerek yürütüldüğü görülmüştür. ÇKKV yöntemleri medikal turizm çalışmalarında yaygın olarak kullanılmaktadır. ÇKKV yöntemlerinin, yöntemin özellikleri ve çalışmanın amacı dikkate alınarak kullanılması ve bulanık mantığın analiz süreçlerine entegre edilmesi önerilebilir.

**Anahtar Kelimeler:** Sağlık Turizmi, Medikal Turizm, Karar Verme Teknikleri, Çok Kriterli Karar Verme, Sistematik İnceleme.

**JEL Sınıflandırma Kodları:** I00, I19, C44, D81, C38.

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## GENİŞLETİLMİŞ ÖZET

### Amaç ve Kapsam:

Son dönemin popüler sektörleri arasında yer alan sağlık turizmi, ülkelere ekonomik, sosyal ve daha birçok farklı açıdan fayda sağlamaktadır. Bu durum turizm sektörüne olan yatırımları hızlandırmış, çeşitli ülke ya da kuruluşların bu alanı önemli bir fırsat olarak değerlendirmelerine sebep olmuş ve bu durum yeni turizm alt dallarının ortaya çıkmasına olanak sağlamıştır. Tüm dünyada sağlık hizmetlerinde yaşanan; hizmete erişim, maliyet ve yasal engeller gibi çeşitli faktörler “medikal turizm” kavramını ortaya çıkarmıştır. Medikal turizm kavramı, temelinde tarihi çok öncelere dayanan “sağlık turizmi” kavramının bir alt dalını oluşturmaktadır. Önemli bir dış kaynak kullanımı olarak değerlendirilebilecek olan medikal turizmde, sağlık hizmetini ithal eden ve ihraç eden olmak üzere iki farklı taraf bulunmaktadır. Gelişmiş ve gelişmekte olan ülkeler çoğu durumda, hizmeti sunan ve aynı zamanda alan tarafta yer alabilirken, gelişmemiş ülkelerde bu durum, maddi olanağı olan küçük bir grubun ülkesinde bulamadığı ya da istediği kalitede olmayan hizmetler için, başka ülkelere seyahati şeklinde ortaya çıkmaktadır. Bireyler medikal turizmde çeşitli kriterlere göre ülke ya da kuruluş seçimi yapmaktadır. Ancak birden fazla kriter ve alternatifin olduğu durumlarda rasyonel karar vermek her zaman kolay olmamaktadır. Son dönemde birçok alanda yaygınlaşan çok kriterli karar verme tekniklerinin kullanımı, bu sorunu çözmeye yardımcı olabilmektedir. Yapılan çalışmada, çok kriterli karar verme tekniklerinin medikal turizm literatüründeki kullanım alanlarının incelenmesi amaçlanmıştır.

### Yöntem:

Yapılan sistematik derlemede, 2011-2021 yılları arasında; Scopus, Science Direct ve Web of Science veri tabanlarında İngilizce ve Türkçe olarak yayınlanan çalışmalar incelenmiştir. Sistematik incelemeye dahil edilecek çalışmaları belirlemek için “çok kriterli karar verme”, “medikal turizm”, “sağlık turizmi”, “sağlık seyahati” ve “medikal seyahat” anahtar kelimeleri kullanılmıştır. İncelenen makalelerin sonuçları, özellikle çok kriterli karar verme tekniklerinin kullanımı açısından analiz edilmiş ve elde edilen bilgiler özetlenmiştir. Elde edilen çalışmaların inceleme kapsamına alınması için öncelikle, belirlenen anahtar kelimelerin; başlık, özet ve anahtar kelimeler içerisinde yer alması koşulu aranmıştır. İkinci adım olarak araştırma makalesi olma koşulu aranmıştır. Ayrıca dil kısıtlaması nedeniyle sadece İngilizce ve Türkçe yayınlar ileri değerlendirmeye uygun görülmüştür. Son olarak çalışmaların tam metnine erişim şartı aranmış ve sadece açık erişimi bulunan çalışmalar kapsama dahil edilmiştir. Dahil edilme kriterlerine uymayanlar ve tekrarlayan yayınlar ise çalışma dışı bırakılmıştır. Seçim sürecinde PRISMA (2020) kontrol listesi kullanılmıştır. Literatür taraması sonucunda belirlenen veri tabanlarında 4.331 sonuca ulaşılmıştır. Mükerrer çalışmalar ve başlıkları nedeniyle elenen çalışmalar çıkarıldıktan sonra geriye kalan 1.025 çalışma incelemeye alınmıştır. Daha sonra çalışmaların özetleri incelenmiş ve 832 çalışmanın kapsam dışı bırakılması gerektiği belirlenmiştir. Son olarak, kalan 193 çalışmanın tam metni incelenmiş ve 25 çalışmanın yapılan sistematik derleme kapsamında ayrıntılı olarak değerlendirmeye uygun olduğuna karar verilmiştir.

### Bulgular:

Çalışmaya dahil edilen makalelerin %28'i 2020 yılında yayımlanmış, 2017 yılında dört çalışma, 2016 ve 2019 yıllarında üçer çalışma, 2013 ve 2018 yıllarında ikişer çalışma yayımlanmıştır. 2011, 2012, 2015 ve 2021 yıllarında birer çalışmanın yayımlandığı, 2014 yılında ise yayın yapılmadığı görülmüştür. Dahil edilen makalelerin dokuz tanesinin (%36) Türkiye'de, beşinin İran'da, dördünün Hindistan'da, üçünün Tayvan'da, ikisinin Çin'de, birer tanesinin ise Malezya ve Amerika Birleşik Devletleri'nde yapıldığı tespit edilmiştir. Çalışmaların onsekizinin (%72) analiz süreçlerinde tek bir yöntem kullandığı, beşinin (%20) iki yöntem kullandığı ve sadece ikisinin (%8) aynı anda üç farklı yöntemi kullandığı tespit edilmiştir. Ayrıca, derlenen makalelerin %60'ında AHP yönteminin tercih edildiği tespit edilmiş ve bu 15 çalışmanın 4 tanesinin diğer ÇKKV yöntemleri ile karma AHP yöntemine sahip olduğu gözlemlenmiştir. Ayrıca dahil edilen çalışmaların %28'inin bulanık mantığı süreçlerine entegre ettiği görülmüştür. Sistematik derlemeye dahil edilen makalelerin amaçlarının (1) medikal turizm destinasyonu seçimi, (2) SWOT analizi sunma, (3) medikal turizmi geliştirmek için optimal stratejileri seçme ve (4) medikal turizm pazarını etkileyebilecek kriterlerin belirlenmesi ve/veya sıralanması gibi başlıklar altında toplandığı görülmüştür. Dahil edilen çalışmalarda en sık kullanılan anahtar kelimeler; AHP (%33), medikal turizm (%15), SWOT analizi (%10), sağlık turizmi (%8), strateji (%7), merkez (%5), turizm (%4), sağlıkla (%3), ÇKKV (%3), yönetim (%3), karar verme (%2), sağlık oteli (%1) ve diğerleri (%6).

### Sonuç ve Tartışma:

Medikal turizm hem hizmet sunuculara hem de bu hizmetlerden yararlanan bireylere sağladığı avantajlar nedeniyle literatürde geniş yer bulan önemli bir kavramdır. Çok kriterli karar verme tekniklerinin çeşitli kriterler kullanılarak, alternatifler arasından rasyonel seçim yapabilme olanağı sağlaması karar vericilere önemli avantajlar sunmaktadır. Her geçen gün yerini sağlamlaştıran medical turizm ve ÇKKV teknikleri kavramlarının literatürde birlikte incelendiği makaleler incelenmiştir. Çalışmanın en büyük kısıtlılığı dil kısıtlamaları ve yayın yılıdır. Belirli veri tabanlarının kullanılması, sadece tam metnine ulaşılabilen araştırma makalelerinin kullanılması diğer sınırlılıkları oluşturmuştur. En fazla çalışmanın 2020 yılında yapılmasının, tüm dünyada sağlık harcamalarının giderek artması ile medikal turizmin her geçen gün artan çekiciliği ile ilişkili olduğu tahmin edilmektedir. Çalışmaların çoğunun Türkiye ve Asya ülkelerinde yapılmış olması, bu ülkelerin medical turizmi bir ülke politikası olarak görmeleri ve bu alana yatırım yapmaları ile ilişkilendirilebilir. En çok tercih edilen yöntemin AHP olması da yöntemin genel olarak en sık kullanılan ÇKKV tekniği olmasıyla ilgili olduğu düşünülmektedir.

## 1. INTRODUCTION

Tourism has been among the most popular industries for many years due to its encouraging factors such as the values it adds to the country's economic and social status (Hsu et al., 2013, p. 63; Nilashi et al., 2019, p. 1) and its economic benefits in general, and it has become a very remarkable concept with all its branches; hence, push and pull factors of tourism industry -both in organizational and individual levels- have become the focus of so many current and/or possible stakeholders' attention. It is known that individuals have wide range of motivations' reasons for travelling, especially today's world where the effects of globalization are increasing day by day (Ebrahimzadeh et al., 2013, p. 52). Particularly in the context of medical tourism, the scope of these reasons is quite broad and includes qualitative factors as well as quantitative ones. In this study, medical tourism will be examined in private of health tourism, which is the branch of the shining star -tourism- among other industries.

Medical tourism, which is the national and/or international mobility of individuals (Arslan Kurtuluş et al., 2018, p. 4717) from their residence's region to targeted destination in order to receive healthcare services, may be expressed as one of the most important types of tourism by considering its economic and social benefits (Ebrahimzadeh et al., 2013, p. 51). Through the medical tourism activities, which keep their existence thanks to the commercialization of healthcare services and the increasing effects of globalization (Sevim & Önder, 2020, p. 607), patients have the opportunity to evaluate alternatives of other regions/countries in matters such as doctors, facilities and prices of services (Görener & Taşçı, 2016, p. 15).

The main topics in the decision-making process for medical tourists are the selection of country/region, medical tourism intermediary institution, health facility, physician and treatment (Yiğit & Demirbaş, 2020, p. 174-175). Medical tourists evaluate these topics according to the parameters that are important to them (such as price, quality, technological superiority, qualified workforce, physical and cultural distance of the destination point etc.) and, make their decisions according to the long alternatives list that they have obtained as a result of this evaluation process (Görener, 2016; Sonel et al., 2019).

Destination regions and/or countries and health institutions, where medical tourism activities are one of the objectives, have to make rational choices among the alternatives that need to be evaluated in detail, in order to develop the industry further and to get the return of the investment easily. For destination countries, questions - such as which region or city worth putting efforts to stimulate medical tourism activities (Ghasemi et al., 2021), and these efforts should be made by implementing which determined strategies first- are the main topics with long listed responses that consist of numerous implementation alternatives (Najafinasab et al., 2020). For destination healthcare facilities, similar to destination countries, the subjects of this list of alternatives are the responses to these questions;

1. Which treatment procedures in which department should be promoted by which investments would be wise to develop the medical tourism activities?
2. Does the organization need more marketing activities or more educated workforce? (Görener, 2016; Yiğit & Demirbaş, 2020)
3. Would providing technological advantages or offering support services such as accommodation and transportation to medical tourists be more beneficial to the organization?(Çavmak & Çavmak, 2020, p. 33; Roy et al., 2018, p. 2)

These questions and their responses may differ and diversify according to the situation that organization has. Even though the existence of multiple criteria and the evaluation of alternatives according to them are important in decision-making process, it also complicates this process due to the multidimensionality and complexity (Sevim & Önder, 2020, p. 609) Furthermore, for decision makers who are overwhelmed due to the length of the list(s) of alternatives, it is essential to make this process more rational by using scientific approach. The concept of multi-criteria decision-making that can be defined as weighting (Lee & Li, 2019, p. 1) and listing (Yazdi & Barazandeh, 2016, p. 54) of the criteria -which the alternatives are evaluated by- according to the relative importance and thus reaching the optimal solution (Sonel et al., 2019, p. 28) can give that chance to the decision makers. Since the list of criteria and alternatives that decision makers have are quite range and the necessity of rational decision-making are known, the use of multi-criteria decision-making techniques within the medical tourism studies in the literature is examined in this study.

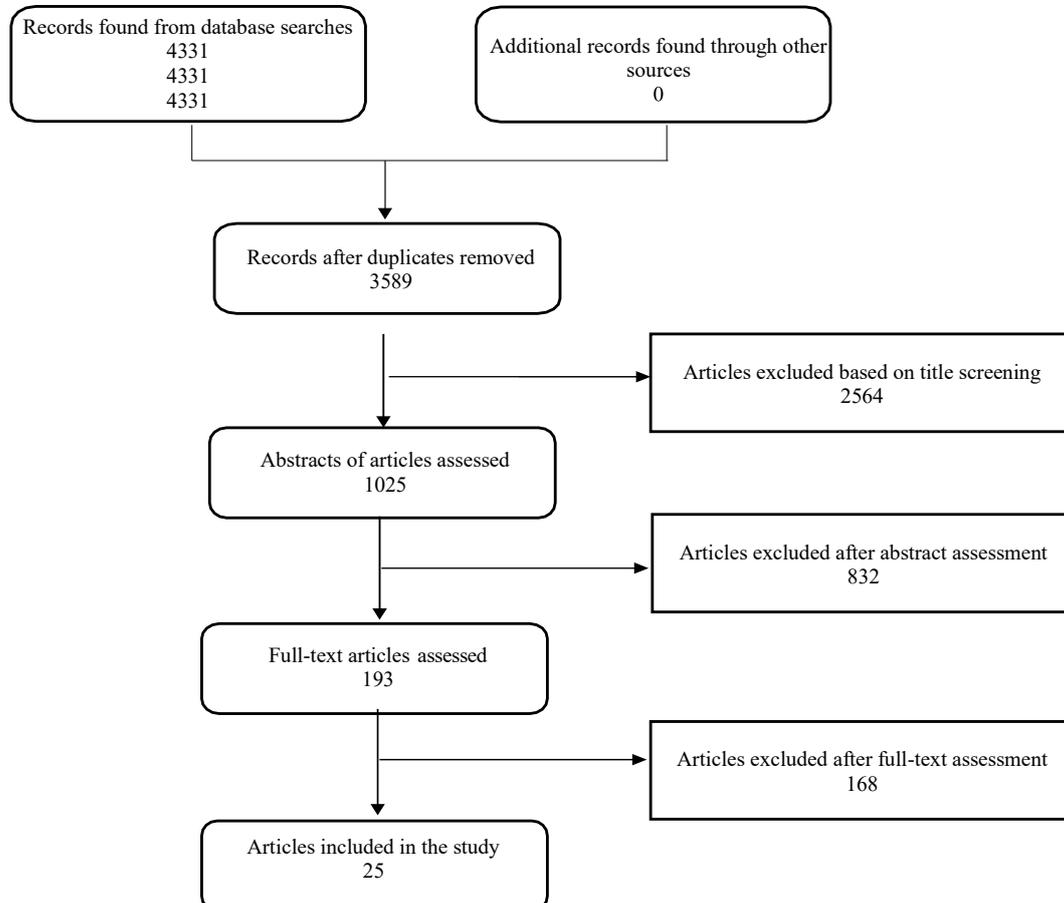
## 2. METHODOLOGY

Studies published in English and Turkish during the years 2011-2021 in the databases of Scopus, Science Direct and Web of Science were reviewed in this systematic review. The keywords ‘multi-criteria decision making’, ‘medical tourism’, ‘health tourism’, ‘health travel’ and ‘medical travel’ were used to identify the studies to be included in the systematic review.

The results of the reviewed articles are analyzed -especially in terms of the use of multi-criteria decision-making techniques- and the obtained information is summarized. In the scanning process made to include the studies into the scope of this systematic review, condition of determined keywords should be in the title-abstract-keywords was primarily sought. As a second step, the condition of being research article was sought and, due to language restrictions, only those published in English and Turkish were considered suitable for further evaluation. Finally, the condition of accessing the full text of the studies was sought and only open access studies were included in this systematic review. Those which doesn't meet the inclusion criteria and duplicates were excluded from the study.

Figure 1 illustrates the process of article selection. During the selection process, PRISMA (Page et al., 2020) Checklist has been used. As a result of the scanning the literature, 4331 results were reached in the determined databases. After duplicates excluded and the studies that were eliminated due to their title, 1025 studies remained to further evaluation. Subsequently, abstracts of the studies were analyzed, and it was determined that 832 studies should be excluded. Finally, full text of 193 remained studies were examined, and 25 of total studies were included to the detailed evaluation process of this systematic review. Studies, in which 'spa-wellness & thermal tourism', 'elderly & disabled tourism' which are sub-branches of health tourism other than medical tourism and 'tourist's health' which generally include emergency health services unlike the health tourism topics conducted to, were excluded (n=168) from the systematic review.

**Figure 1.** Process of Article Selection



### 3. FINDINGS

The detailed summary of the characteristics of the articles included in the systematic review is given in Table 1. It has been seen that majority of the included articles (28% of the total number) were published in 2020. It has been detected that four studies were published in 2017, three studies in the years of 2016 and 2019 each, and two studies in the years of 2013 and 2018 each. It has been seen that one study was published in the years of 2011, 2012, 2015 and 2021, and none in 2014.

**Table 1.** Details of Included Articles in the Systematic Review

Author(s)	Year	Country	Method(s)	Purpose of the Study	Main Finding(s)	Keywords
Levary	2011	United States	AHP	Ranking medical tourism sites	Four criteria (expected cost, language barriers, physical distance, political stability) were determined to evaluate. As a result, country alternatives were ranked in order India, Costa Rica, Poland, Thailand and Dubai.	-
Chen	2012	Taiwan	DEMATEL	Finding the strategy to accelerate the development of medical tourism	According to the results of the study, it is recommended by experts that the Taiwan government should encourage marketing activities, make good use of the resources that provide information about health tourism activities to health tourists and develop marketing policies for foreign countries.	Medical Tourism, Taiwan, DEMATEL
Ebrahimzadeh et al.	2013	Iran	AHP	Comparing the Indian and Iranian health tourism status/potentials	SWOT analysis was made and compared for both India and Iran. As a result, internal factors (for India, S:3.6 and W:2.8; for Iran, S:3.8 and W:3.5) and external factors (for India, O:3.6 and T:3.4; for Iran, O:3.8 and T:4.1) were examined and weighted. Additionally, strategy recommendations have been made.	Tourism Potentials, Health Tourism, SWOT % AHP Models, Iran, India
Hsu et al.	2013	Taiwan	AHP, Delphi Method	Selecting optimal CRM Sytem for Medical Tourism Industry to support the development	According to the criteria should be considered in choosing the CRM system are as follows respectively: level of providing services by system integrators, level of developing softwares by system integrators, level of implementing data mining, and level of implementing CRM.	Analytic Hierarchy Process, Customer Relationship Management, Evaluation Model, Medical Tourism, Modified Delphi Method
Ajmera et al.	2015	India	AHP	Presenting a SWOT analysis of Indian medical tourism status and ranking each group	Each group (S:0.3773, O: 0.3664, W: 0.1391, T: 0.1170) and determined items under them has been weighted and prioritized. (S1) Existence uof alternative treatments such as ayurveda &yoga. (O1) Comparable treatments. (W1) Lack of agreement with insurance companies. (T1) Clinical excellence.	SWOT Analysis, AHP, Strategic Decisions, Multiple Criteria Decision-Making Technique, Medical Tourism
Görener	2016	Turkey	AHP	Presenting a SWOT analysis of medical tourism status in Turkey and ranking each group	Each group (S:0.3830, O:0.3030, T: 0.1849, W: 0.1292) and determind items under them has been weighted and prioritized. (S1) Price advantage. (O1) Geographical advantage. (T1) Increased competition in international market. (W1) Lack of managers who would coordinate the medical tourism activities.	Medical Tourism, SWOT, Analytical Hierarchy Process

Author(s)	Year	Country	Method(s)	Purpose of the Study	Main Finding(s)	Keywords
Görener and Taşçı	2016	Turkey	AHP, MOORA	Presenting a SWOT analysis for medical tourism sector in Turkey and ranking the strategy alternatives	(1) Qualified manpower, effortless transportation and innovative ways during the medical interventions should be focused. (2) Development of the marketing activities related with JCI process of the organizations and past medical tourists' experiences. (3) Efficiently and consistently promotion activities for price-focused markets.	Strategy, SWOT, AHP, MOORA
Yazdi and Baranzadeh	2016	Iran	Fuzzy VIKOR	Identifying and ranking the barriers against to health tourism development	It has been determined that the most important criteria were quality, accessibility, price and proper time respectively. Additionally, improper medical quality (among sub-indices) was seen as the highest priority.	Tourism, Health Tourism, Fuzzy VIKOR
Ajmera	2017	India	TOPSIS	Presenting a SWOT analysis for medical tourism sector in India and ranking the strategies	Implementing the SO strategy (provision of the best facilitation and care, as much as developed countries, to medical tourists) was found to be the most weighted solution.	TOPSIS, SWOT Analysis, Indian Medical Tourism, MADM Technique, Strategic Decisions
Anish et al.	2017	India	AHP	Presenting a SWOT analysis of medical tourism sector in Kerala and ranking each parameter	Each group (S:0.42, O:0.29, T:0.17 W:0.12) and determined items under them have been weighted and prioritized. (S1) International reputation and fame of medical doctors. (O1) Quality of service with less cost. (T1) Strong competition from other countries. (W1) Lack of accredited hospitals.	Medical Tourism, Kerala, SWOT, Analytical Hierarchy, AHP, Strategy
Roy et al.	2017	India	AHP	Providing a standard to selection of medical tourism destinations according to different criteria	Seven evaluation criteria under the topics of strengthening medical tourism services and its infrastructure, planning and developing policies toward medical tourism were identified. 'Quality of the healthcare institution's infrastructure' was detected as the most important criterion, followed by 'supplying qualified human resources and creating new job opportunities'. In the case study, nine different cities in India were evaluated by scoring according to the criteria and their weights. Chennai was seen to be the best destination city in India.	Medical Tourism, Multiple Criteria Decision-Making, R-AHP, R-MABAC, Rough Number
Yang et al.	2017	China	Fuzzy NEPR	Developing a model to rank the alternatives of medical tourism destinations	The model proposed in the study was applied to two separate cases by considering different types of original data. The applicability and feasibility of the model has been compared and verified with other methods/approaches in the literature through the analyzes and extensive discussion conducted within the scope of the research.	Neutrosophic Fuzzy Preference Relations, Consistency, Aggregation Operators, Multiple Criteria Decision Making, Medical Tourism
Abouhashem Abadi et al.	2018	Iran	BWM	Strategic planning of medical tourism development in Yazd province	Within the scope of the study, strategic planning of medical tourism was made using the the SWOT analysis tool. In total, 10 strategies were developed and ranked. It has been determined that the three most important strategies were pertinent with necessity of the marketing centers, configuring strategic councils and enacting laws/regulations that are consistent in the field of medical tourism.	Medical Tourism Industry, Strategic Planning, Best Worst Method, SWOT, Yazd Province

Author(s)	Year	Country	Method(s)	Purpose of the Study	Main Finding(s)	Keywords
Arslan Kurtuluş et al.	2018	Turkey	AHP	Presenting a SWOT analysis of health tourism status in Turkey and ranking each group	(S1) Existence of numerous thermal tourism soruces in Turkey. (W1) Existence of unauthorized institutions and organizations in the sector. (O1) Cheaper healthcare services compared with other countries. (T1) Political unstability in the neighboring countries and their negative reflection on Turkey.	Health, Health Tourism, Medical Tourism, Wellness, SWOT, AHP
Lee and Li	2019	China	AHP	Identifying the key indicators and determining their weightings for health tourism sites	It has been found that destination choices are being affected by three main dimensions and eleven sub-dimensions. The main dimensions are ranked as (1) special demands and indications, (2) leisure activities and general demand, (3) natural environment, according to their weights.	Health Tourism Destination, Analytic Hierarchy Process (AHP), Health Environment, Health Promotion, Recreational Resource Management
Nilashi et al.	2019	Malaysia	DEMATEL, Fuzzy TOPSIS	Analyzing and ranking the factors affecting health tourism performance in Malaysia	Four factor (technological, organizational, environmentla and human readiness) and four criteria under each factor are determined and analyzed. The results of the study indicate that technological and human readiness' factors are the most significant ones. Medical technologies (within the technological factor) and specialists (withing the human factor) were determined to be the criteria on the top of the list.	Medical Tourism, Medical Hotels, Decision-Making, Health Tourism, Readiness, DEMATEL, Fuzzy TOPSIS
Sonel et al.	2019	Turkey	AHP, ANP, DEMATEL	Determining the less preferred destination in Turkey, investigating the reasons and identifying strategies for development	It was seen that the most preferred city for ophthalmology clinic was İstanbul and the least one is Mersin in terms of medical tourism. A couple suggestions were given as a result. (1) Investment should be made in healthcare sector. (2) Increasing the number of hospitals might be necessary. (3) Accommodation options should be improved. (4) After quality improvements, marketing activities should be on the agenda more.	Tourism, Health, Health Tourism, AHP, ANP, DEMATEL
Büyükoğuzkan et al.	2020	Turkey	HFL AHP, HFL MABAC, HFL TOPSIS	Presenting a SWOT analysis of health tourism status in İstanbul, and selecting the best strategies for development	It has been determined that 'restoring the health tourism field and improving the physical and technical infrastructure of it' is the best strategy.	Health Tourism, Health Tourism Strategy Selection, SWOT Analysis, Hesitant Fuzzy Linguistic Term Set, AHP, MABAC
Chen and Chang	2020	Taiwan	Entropy-Linguistic VIKOR	Determining criteria to evaluate the competitiveness of medical tourism industry and analyzing the current status of the country among China, Taiwan, Japan and South Korea	In the result of the study, Taiwan lagged behind other evaluted countries (China, South Korea, Japan and Taiwan) in terms of competitiveness. Therefore, the necessity of the Taiwan government to allocate more resources for improving the medical tourism sector has been revealed.	Medical Tourism, Hospital Management, VIKOR, Entropy, SWOT, COVID-19

Author(s)	Year	Country	Method(s)	Purpose of the Study	Main Finding(s)	Keywords
Çavmak and Çavmak	2020	Turkey	AHP	Determining the barriers against development of medical tourism	In total, 23 items were determined as barriers to the development of medical tourism and these were grouped under five main subjects. Then, in order to give the most appropriate answers to these barriers, the subjects were listed as follows: negative corporate image (0.319), healthcare quality (0.198), incompatible regulations (0.177), HR (0.163) and infrastructure lagged behind (0.142).	Health Tourism, Medical Tourism, Turkey
Merdivenci and Karakaş	2020	Turkey	Fuzzy DEMATEL	Analyzing and ranking the factors affecting health tourism performance in Antalya	Fourteen different factors/criteria having impact on health tourism were determined. These factors were listed as customer satisfaction, service quality, competition, price, financial performance, time, flexibility, supplier performance, resource utilization, innovation, safety, employee satisfaction, social perspective and environmental perspective respectively.	Tourism Performance, Health Tourism, Fuzzy Logic, DEMATEL Method
Najafinasab et al.	2020	Iran	AHP	Presenting a SWOT analysis for medical tourism sector of Iran and ranking the strategy alternatives	External (3.40) and internal (2.42) factors have been weighted, ranked and given a final score via analysis. Results of the SWOT analysis suggested that conservative (WO) strategies should prioritize to implement. Marketing activities should gain momentum, international standards should be adopted and language-communication problems should be solved.	Medical Tourism, Social Security Organization (SSO), Hybrid Analysis, Strategies
Sevim and Önder	2020	Turkey	ANP	Presenting a SWOT analysis for medical tourism sector in Turkey and determining the strategies respond to result of the investigation	Each group (S:0.2085, T:0.2014, O:0.1743, W:0.1602) and determined items under them have been weighted and prioritized. Four strategies have been developed respond to the SWOT analysis, and the most important one was determined to be 'developing the organizational and legal infrastructures for medical tourism' with 0.3499 ratio.	Medical Tourism, Strategy, Decision Making, SWOT Analysis, ANP
Yiğit and Demirbaş	2020	Turkey	AHP	Analyzing the factors affecting the development of medical tourism in Turkey, presenting a SWOT analysis and developing strategies for improvements	During the research, 32 factors affecting medical tourism were determined. While the advantage of affordable prices has the highest weight, the currency input of the patients and its contribution to the destination country's economy have the lowest level of importance. Each group (S:0.485, W: 0.178, T: 0.17.6, O: 0.159) and items under them has been weighted and prioritized. Strategies about (1) language problem, (2) marketing activities, (3) price policies and (4) cooperation status among insurance companies, healthcare organizations and travel agencies were made.	Health Tourism, Medical Tourism, Systematic Review, SWOT-AHP
Ghasemi et al.	2021	Iran	Fuzzy SWARA, PROMETHEE	Determining the criteria to evaluate the medical tourism destinations in Iran and ranking these destinations	Five main criteria were determined and weighted as follows: status of type of the services provided (0.395), the medical equipments (0.232), qualified labour (0.176), marketing activities (0.108), application of information technologies (0.089). According to the proposed approach and the criteria determined in the study, medical tourism destinations were ranked as follows respectively: India, Malaysia, Panama, Mexico, Singapore, Taiwan, Brazil, Costa Rica	Medical Tourism, Fuzzy SWARA, PROMETHEE, Sustainable Development, Consumer, Medical Tourism Destinations

It has been determined that 36% of the included articles (9 out of 25) were conducted to Turkey. It has been found out that five of the articles were conducted in Iran, and four of them were conducted in India. It has been observed that the number of studies conducted in Taiwan was 3, and the number of the studies which were carried out in

China was 2. Also, the number of the studies conducted in Malaysia and United States was detected to be 1 per each country.

It has been seen that 72% of the articles (18 out of 25), used only one single method during their processes. It has been determined that five of the articles (20%) included in the scope of the study used two methods, while only two of them using three different methods at the same time. In addition, it has been detected that the AHP method was preferred to use in the 60% of the included articles (14 out of 25 studies), and it has been observed that 4 of these 15 studies have mixed AHP method with other MCDM method(s). Furthermore, it has been seen that majority of the included articles (18 out of 25) did not integrate the fuzzy logic to their processes.

It has been observed that the purposes of the articles included in the systematic review are grouped under several headings such as (1) choice of medical tourism destination, (2) presenting a SWOT analysis, (3) selecting the optimal strategies to develop the medical tourism industry, and (4) determining and/ or ranking the criteria that may affect the medical tourism market.

The keywords used in the included articles were examined, grouped, and ranked according to the frequency of use. It was determined that there were 115 keywords used in total. The most used keywords (31.30%) were related to the method(s) used in the articles. It was found out that 33.33% of the keywords related to the method carried out were pertinent to the AHP method, and 11.11% of them were pertinent to fuzzy logic. It was observed that the second most used keyword was medical tourism (14.78%), followed by SWOT analysis (10.43%). The next most used keywords were health tourism (7.83%), strategy related ones (6.96%), province related ones (5.22%), tourism related ones (3.48%), health related ones (3.48%), MCDM & technique (3.48%), management (2.61%), decision making (1.72%), medical hotel (0.87%), and others (6.09%). In addition, 'Social Security Organization', 'Aggregation Operators', 'readiness', 'consistency' and 'covid-19' have been the keywords that are grouped under the others category.

#### 4. DISCUSSION

Medical tourism is an important concept that has been in the literature for many years due to the wide range of benefits it provides both to destinations (Park et al., 2020, p. 91) and individuals (Hopkins et al., 2010, p. 190) who benefit from this opportunity. The fact that multi-criteria decision-making techniques allow processes to operate by considering various options/situations/criteria and the importance of using these techniques in rational decision making has led to the widespread usage of these techniques, especially with the health-related issues by which effects might be vital (Ağaç et al., 2016, p. 343-344; Sevim & Önder, 2020, p. 609). Considering this, in the study, articles in which these two concepts- that strengthen their place with every passing day- are studies together in the literature, are examined.

The major limitation of the study is seemed to be the language restrictions and the year of the publication. The articles which their publication language is English or Turkish and their publication year is between 2011-2021 were included. Other limitations such as use of determined databases, availability of the full text, including the research articles only have restricted the study.

It was seen that the articles included in the study were published mostly in 2020. The reason behind this was forecasted to be the increasing attractiveness of medical tourism concept in the literature, due to the increase in health expenditures which is greater than income, and due to the results of the strategies developed as a response to this economic situation(WHO, 2019; Naranong & Naranong, 2011).

It was observed that the majority of the included articles were carried out in Turkey, and the country distribution generally was among Asian countries. It is thought that the reason why the majority of the studies were carried out in Turkey is that Turkish was chosen after English as the publication language in the article inclusion criteria. Additionally, the reason behind the fact that the countries where articles were carried out are generally Asian countries (such as Iran, India, Taiwan etc.) is thought to be that these countries have very high medical tourism potential and are included to the medical tourists' alternatives lists (Hopkins et al., 2010; Naranong & Naranong, 2011).

The use of MCDM technique(s) of the articles included in the study was examined. It was seen that 72% of the articles used a single method in their processes and the remaining studies preferred to use multiple methods during the study. In addition, 60% of the articles preferred to use the AHP method specifically. It is thought that using

multiple method(s) in a study might be more beneficial according to the compatibility of the content of the study with the purpose of the chosen method(s) use (Demir & Kartal, 2020). In the study which examines MCDM techniques use in health services and carried out by Ağaç and Baki (2016), it was determined that the AHP method was the most widely used method, similar to the research findings.

The use of fuzzy logic in the articles included in the research was also examined, and it was seen that only 28% of them integrate this approach into their studies. Fuzzy logic is an approach used for describing and modelling the uncertainty factor that exists in people's perception and cognition, and, is also used quite frequently in decision-making (Koca & Yıldırım, 2020, p. 258). Thanks to this uncertainty factor added to the decision-making processes, use of fuzzy logic relatively eliminates the risk factor in decision-making, and is supported.

## 5. CONCLUSION

Medical tourism continues to be the shining star of health services due to the benefits it provides to individuals, destination countries/regions/institutions, and it looks like it will continue for many years. In order to benefit from these benefits of medical tourism activities, it is vital to make the optimal choice among the long lists of many alternatives in every subject. The selection of the most suitable alternative among the alternatives is important in medical tourism as well as in all fields. The use of multi-criteria decision making methods in the selection of the optimal situation rationalizes and facilitates the decision process. The systematic review method was used in the study carried out to examine the studies in which multi-criteria decision making techniques are used in medical tourism.

The PRISMA (Page vd., 2020) Checklist was used in the selection process. As a result of the literature review, 4331 results were obtained in the databases determined. After excluding duplicate studies and studies that were eliminated because of their titles, the remaining 1025 studies were left for further evaluation. During the review of the summaries of the studies, it was decided to exclude 832 more studies. Finally, as a result of the exclusion of 168 studies after the full text evaluation, 25 studies were included in the detailed evaluation process of the systematic review.

Considering the problems such as the increase in health expenditures and the difficulty of accessing health services in health systems in recent years, the increase in the number of studies on decision making in medical tourism can be explained. In this context, 2020 has been the year in which multi-criteria decision-making techniques are used the most in medical tourism studies.

The fact that 36% of the evaluated study was conducted in Turkey was considered an important result. Moreover, the fact that 20% of the studies were conducted in Iran, 16% in India and 12% in Taiwan can be expressed as the expected result when these countries are evaluated in terms of investing in medical tourism and exporting medical tourism.

It was concluded that 72% of the articles used a single method in their processes and 60% of the articles preferred the AHP method. This may be related to the fact that AHP is the most frequently used multi-criteria decision-making technique in the literature.

It has been observed that the purposes of the articles included in the systematic review are grouped under several headings such as (1) choice of medical tourism destination, (2) presenting a SWOT analysis, (3) selecting the optimal strategies to develop the medical tourism industry, and (4) determining and/or ranking the criteria that may affect the medical tourism market.

It has been determined that the most used keyword is related to the AHP (33.33%) method. It was observed that the second most used keyword was medical tourism (14.78%), followed by SWOT analysis (10.43%). The next most used keywords were health tourism (7.83%), strategy related ones (6.96%), province related ones (5.22%), tourism related ones (3.48%), health related ones (3.48%), MCDM & technique (3.48%), management (2.61%), decision making (1.72%), medical hotel (0.87%), and others (6.09%).

Considering the increasing trend of medical tourism all over the world, it can be said that medical tourism studies will also increase and the use of multi-criteria decision-making methods, which is an important tool in decision-making, will become widespread. It may be recommended to conduct new studies in this area and to create a

hybrid model by using more than one method together in these studies. In addition, it can be suggested to use the fuzzy logic method together with multi-criteria decision making methods.

## DECLARATION OF THE AUTHORS

**Declaration of Contribution Rate:** The authors have equal contributions.

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