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Comparison of the Pre-Pandemi Performances of the Leading Countries in Tourism with Entropy and Waspas Methods*

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Abstract

The aim of this paper is twofold. The first aim is to deal with the impact of the COVID-19 Crisis on the tourism sector and its reflections on the economy. The other aim is to create an index covering 10 world-leading countries in tourism and to make a performance ranking for the year 2019, which was the last normal tourism year before the COVID-19 crisis. This study covers 10 countries among the top 15 world-leading countries in tourism, where the relevant dataset can be accessed. "Entropy" and "Weighted Aggregated Sum Product Assessment (WASPAS)" methods are used in the creation of this ranking. According to the ranking determined by Entropy and WASPAS methods, the performance ranking of countries is respectively; the US, Thailand, Turkey, Italy, Greece, Portugal, Germany, Japan, Mexico, and Austria. This paper shows the huge impact of COVID-19 on the tourism sector due to travel restrictions and border closures and the effects of the crisis are far bigger than the previous crises. Future studies will show how the performance ranking of tourism leading countries will change after the COVID-19 crisis.

Keywords: COVID-19, Entropy, MCDM, Tourism, WASPAS.

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INTRODUCTION

In parallel with technological developments in the globalized world, both as a result of the increase in people's income levels and the differentiation in tourism trends, in particular, after the second half of the 20th century, the tourism sector entered into a rapid change. This change has also increased global competition in the tourism sector. Because tourism is one of the most important sectors affecting all countries economically and is an important source of economic growth for most countries (Akin, Şimşek & Akin, 2012). The tourism sector has positive effects such as increasing countries' foreign exchange revenues, eliminating balance of payments deficits, and increasing employment opportunities. In other words, the tourism sector continues to be an important sector thanks to its contribution to national income, foreign exchange revenues, and the job opportunities it provides for a wide range of unemployed people (Çimat & Bahar, 2003; Dilber, 2007). Because of such positive economic effects, tourism is important for both developed and developing countries, and today tourism is seen as one of the most important sources of economic growth and development in many countries.

In order to get a greater share of rapidly changing and evolving tourism, countries must concentrate their policies and programs on the tourism sector. Because over the years, the increase in the number of people participating in the tourism sector, which changes the macroeconomic balances of countries, can be affected very quickly by economic crises due to globalization. Crises have many negative effects, affecting all sectors. However, the tourism sector is affected by crises very quickly and is one of the sectors where the negative effects of crises seem excessive due to the high elasticity of demand in tourism (Göçen, Yirik & Yılmaz, 2011).

As the tourism sector is highly sensitive to all kinds of crises, even rumors of a crisis can lead to the cancellation of most reservations. Because of this, it seems that the sensitive tourism sector is very quickly affected by crises, and negative events that occur in the macro and microenvironment of a tourism destination usually lead to fewer visitors. Even a slight risk, especially related to human health or safety, is enough to prevent a tourist area from being preferred (Bahar & Çelik İclal, 2020). It is expected that tourism demand and tourism revenues will decline with the crisis (Kiper, Saraç, Çolak & Batman, 2020).

Tourism demand can fluctuate at different rates depending on the impact and size of the crisis, and economic losses can be inevitable. The causes of crises include natural disasters, economic upheavals, internal conflict, epidemics, terrorist events, wars between countries, economic and political events (Köşker, 2017; Çeti & Ünlüönen, 2019). It is possible to divide crises into two groups as "controllable and uncontrollable crises". For example, while it is possible to control crises caused by economic and political events, it is not possible to control disasters caused by natural disasters (Albeni & Ongun, 2005).

Global crises such as natural disasters, internal conflicts, epidemics, terrorist attacks, economic, political, and political instability, September 11 attacks, the Gulf War, and the consequences of these crises have negatively affected the tourism demands of countries in recent years (Köşker, 2017). 'Foot and mouth disease' caused by epidemic diseases at the global level (FMD 2001), 'Severe Acute Respiratory Syndrome' (SARS, 2003), 'bird flu' (2003), 'swine flu' (2009) and 'Middle East Respiratory Syndrome' (MERS, 2015) outbreaks are some of the crises that occurred in the tourism sector due to epidemics (Çeti & Ünlüönen 2019).

A new epidemic that is emerging today is the COVID-19 virus. COVID-19 is considered within the framework of epidemics. This virus is described as a coronavirus that appeared on 31 December 2019 in the employees of the seafood market in Wuhan city, Hubei Province, China, and has affected the entire world and still continues its influence (Acar, 2020). This disease, named by the World Health Organization as 'respiratory syndrome coronavirus2', was identified as SARS-COV-2 in January 2020 and caused a public health emergency to be declared (Zheng, Ma, Zhang & Xie, 2020). It is not known how long this outbreak will last and in what direction it will move. This uncertainty causes a widespread concern in the tourism sector. The COVID-19 outbreak, which originated in Wuhan, China and spread around the world, has deeply affected the tourism sector as well as many other sectors (Türker & Karaca, 2020).

COVID-19 affects all tourism activities, and it is also a fact that negative effects will be felt more, especially in small and medium-sized companies operating in the tourism sector (Acar, 2020). Tourism demand can recover and return to its former position a few years after the crisis period has been overcome and a stable environment has been achieved. For example, it is stated that the SARS epidemic in 2003 caused a record decrease in the number of tourists coming to Taiwan, but the number of tourists coming to the country in 2005 exceeded three million tourists for the first time (Wang, 2009). Although it is known that the effects of the crises are not permanent, it is a fact that the Covid-19 epidemic will have negative effects on all sectors, especially in the tourism sector, for many years. The Covid-19 pandemic is a sudden, uncertain,

and volatile crisis (Zhang, Song, Wen & Liu, 2021). None of the epidemics experienced in the last 40 years in the world have caused such a long-term negative environment in the global development of tourism as much as the Covid-19 epidemic (Gössling, Scott & Hall, 2020; Kervankiran & Bağmanci 2020).

The first purpose of this paper is to deal with the impact of the COVID-19 crisis on the tourism sector and its reflections on the economy. The other purpose of this paper is to create an index covering 10 world-leading countries in tourism and to make a performance ranking for the year 2019, which was the last normal tourism year before the COVID-19 crisis. "Entropy" and "Weighted Aggregated Sum Product Assessment (WASPAS)" methods are used in the creation of this ranking.

This study covers 10 countries among the top 15 world-leading countries in tourism, where the relevant dataset can be accessed. These countries are Austria, Germany, Greece, Italy, Japan, Mexico, Portugal, Thailand, Turkey, and the United States. Variables used in the analysis are international tourism (number of arrivals), international tourism (receipts, % of total exports), tourism expenditure in the country (US$ millions), and average expenditure of international tourists (US$). All figures of the study consist of data for the year 2019. The data retrieved from the World Bank Open Data database is used in the analysis.

THE COVID-19 CRISIS AND ITS REFLECTIONS ON THE TOURISM SECTOR

In the post-World War II period, tourism was one of the fastest developing sectors globally. According to data from the United Nations World Tourism Organization (UNWTO), around 25 million international trips were made worldwide in the 1950s, and this number has grown steadily over the years. By the 1990s, the number of international travels exceeded 500 million and it surpassed the limit of 1 billion in 2011. The growth rate of the world tourism sector, which continued its stable development in the following years, was around 4% on average in the pre-pandemic period. According to UNWTO data, world tourism grew by 3.8% in 2019, while the number of international trips increased to 1 billion 461 million and revenues from international tourism increased to 1.5 trillion dollars (TURSAB, 2020).

Today, tourism accounts for 7% of the world's total investment, 5% of tax payments and one-third of world trade services (Sarkhanov & Tutar, 2021: 8). According to the data announced by the World Travel and Tourism Council (WTTC), the contribution of the tourism sector to the GDP in the world economy is 10.3%, that is, the total contribution is 8.9 trillion dollars. Its share in world service exports is approximately 28%. According to the WTTC assessment, the tourism sector accounts for 10% of the world's employment and employes 330 million people (WTTC, 2020; TURSAB, 2020). These positive indicators in tourism started to follow a negative course with the COVID-19 pandemic are continuing. The COVID-19 epidemic prevents participation in tourism activities all over the world, negatively affects employment, and lowers the level of welfare. It is understood that this tragic decline will bring along important social and economic problems all over the world, and will especially aggravate the burden of unemployment.

With the tourism movements coming to a standstill due to COVID-19, accommodation and food and beverage businesses, especially travel businesses, were adversely affected by this process. Practices such as restricting the mobility of tourists during the epidemic or closing the borders to the citizens of the countries where the epidemic occurred have led to new developments and changes in the tourism sector. COVID-19, which has different variants every day, has led to a decrease in total spending in all economies, especially in the service sectors including transport, tourism and trade since the outbreak began and has quickly spread to the entire economy. The decrease in total expenditures also led to a lagging decrease in production. In addition, with the financial shocks experienced in the economies, real economies started to shrink (Aydoğuş, 2020).

Since late 2019, COVID-19 has caused unprecedented health and welfare problems on a global scale and has had profound negative effects on the global economy. Tourism is one of the sectors most adversely affected by the COVID-19 epidemic. Due to quarantines and widespread travel restrictions in many countries, the airport and national borders have been closed and this process is still ongoing (Zhang et al., 2021). According to the World Tourism Organization (UNWTO) May 2020 assessment, there are significant tourism revenue losses in countries that have completely closed their borders in connection with the COVID-19 outbreak. The proportion of routes to closure has reached, for example, 74% of destinations in Africa, 86% in North and South America, 67% in Asia, 74% in Europe, and 69% in the Middle East. In 185 of 217 (85%) of the countries in the world, the borders are completely or partially closed (Sarkhanov & Tutar, 2021: 9).

With the COVID-19 outbreak, the supply of national and international travel services has greatly decreased due to global travel restrictions and flight

cancellations (İbiş, 2020). Along with this situation in travels, the decrease in demand negatively affected service sectors such as transportation, hotels and restaurants, entertainment, sports, cultural events, and especially air transportation for the tourism sector (Bahar & Çelik İlal, 2020; Kervankiran & Bagmanci, 2021). Due to the global epidemic environment, the World Health Organization (WHO) declared COVID-19 a "pandemic". According to the World Health Organization (WHO, 2021), as of July 6, 2021, the number of people infected with COVID-19 worldwide is 183.934.913, the number of deaths is 3.985.022 and the number of new cases is 326.231. As of 5 July 2021, a total of 2.989.925.974 vaccine doses have been administered globally.

Until the COVID-19 pandemic period, tourism activity generally followed a stable course on a global scale, despite all the risks in the sector. Before the pandemic crisis, the biggest potential threat to tourism mobility was often terrorism. However, even terrorist attacks have never reached a level that can threaten tourism to the extent of a pandemic and have not been able to prevent tourism mobility that much. In addition, obstacles arising from terrorism have always remained at the regional level and have never caused a global threat perception like a pandemic (Sarkhanov & Tutar, 2021).

Travel movements have been gradually stopped since December 2019, when the COVID-19 epidemic began. While restrictions were imposed on travel movements in the countries affected by the epidemic in the first place, almost all international flights were suspended with the spread of the epidemic. International tourist arrivals fell 74% in 2020 compared to the previous year (UNWTO, 2021) due to widespread travel restrictions and drastically falling demand (see Table 1). Countries whose economies are heavily dependent on tourism, such as Greece, Portugal, and Spain, are more affected by this crisis (Barua, 2020; Kervankiran & Bağmanci, 2021). According to the evaluation made by UNWTO; the damage caused by COVID-19 to the tourism sector has reached a level eight times higher than the 2008 global economic crisis (TURSAB, 2020).

Table 1: World Ranking of Incoming Tourists and Tourism Revenues by Top 15 Countries in 2019

Countries	Number of Incoming Tourists (Million People)	Countries	Tourism Revenues (Billion $)
France	90.2	USA	214.1
Spain	83.5	Spain	79.7
USA	79.3	France	63.8
China	65.7	Thailand	60.5
Italy	64.5	United Kingdom	52.7
Turkey	51.2	Italy	49.6
Mexico	45.0	Japan	46.1
Thailand	39.9	Austria	45.7
Germany	39.6	Germany	41.6
United Kingdom	39.4	Makao	40.1
Austria	31.9	China	35.8
Japan	31.9	U. Arab Emirates	30.7
Greece	31.3	India	30.7
Malaysia	26.1	Turkey	29.8
Portugal	24.6	Hong Kong	29.0

Source: https://yigm.ktb.gov.tr/Eklenti/81939,3103, turizmistatistikleri2020-4pdf.pdf?0 Access on: 6.23.2021.

LITERATURE REVIEW

In the literature, there are various studies on the effects of the COVID-19 crisis in the tourism sector. Some of these studies made predictions effects of the COVID-19 and focused on the differences of this crisis from the previous ones (Fotiadis, Polyzos & Huan, 2021; Gössling et al., 2020; Polyzos, Samitas & Spyridou, 2021; Skare, Soriano & Porada-Rochon, 2021). Social costs of tourism during the COVID-19 crisis is another main aspect of these studies (Roman, Niedziółka & Krasnodebski, 2020; Qiu, 2020; Wen, Kozak, Yang & Liu, 2020). In addition to these studies, some studies have addressed the impact of COVID-19 on tourism diversity and changes in tourism applications (Gürlek & Kilic, 2021; Kervankiran & Bagmanci, 2020; Seraphin & Dosquet, 2020).

Skare et al., (2020) estimate the impact of COVID-19 on the tourism sector in 185 countries. Their study proves the impact of COVID-19 would be more destructive than the previous crises. According to Gössling et al., (2020), global travel restrictions have caused the most severe disruption of the global economy since World War II. Fotiadis et al., (2021) estimate the drop in tourism activities would be between 30.8% and 76.3% and the effect would be last until June 2021. Recent developments in the COVID-19 crisis show how accurate these estimates are.

Polyzos et al., (2021) analyze the impact of COVID-19 on the arrivals of Chinese tourists to the USA and Australia. The researchers claim that adverse effects of the crisis may continue for 6 to 12 months and spread to other industries. Wen et al., (2020) examine the impact of COVID-19 on Chinese travelers consumption patterns such as lifestyle choices, travel behaviors, and tourism preferences. Roman et al., (2020) examine the impact of COVID-19 on the organization of tourist travels and new trends in tourism. Rogerson & Rogerson (2020) examine COVID-19 impacts on the demand-side of tourism and suggest some policy recommendations for South Africa.

Gurlek and Kilic (2021) find that the world's top-ranking hotels carried out 40 different Corporate Social Responsibility (CSR) activities to reduce the negative effects of the COVID-19. Qiu, Park, Li, & Song (2020) deal with the change in residents' perceptions in tourism activities and focus on the social costs of tourism during COVID-19. Seraphin & Dosquet (2020) deal with second-home tourism and mountain tourism in the COVID-19 lockdown context. Kervankiran & Bagmanci (2020) evaluate the impact of COVID-19 on tourism mobility and the new form of it in Turkey.

MULTI-CRITERIA DECISION-MAKING METHODS: ENTROPY AND WASPAS

In this paper, an index covering 10 World-leading countries in tourism is created and a performance ranking is made for 2019, which was the last normal tourism year before the COVID-19 crisis. For this purpose, firstly, the weights of the variables are determined by the "Entropy" method. Then, a performance ranking of the alternatives is obtained by using the weights of these criteria and the performance values of the decision alternatives based on criteria. The "Weighted Aggregated Sum Product Assessment (WASPAS)" method, which is one of the Multi-Criteria Decision-Making (MCDM) methods and developed by the integrated use of the Weighted Sum Model (WSM) and the Weighted Product Model (WPM), is used in the creation of this ranking.

Entropy Method

There are various methods developed to determine the weight and significance levels of the variables. Some of these methods are subjective (E.g. AHP, FUCOM) and some are objective (E.g. Entropy, IDOCRIW, CRITIC) methods (Ecer, 2020). The entropy method is an objective MCDM method in which the weights are determined in the light of the available data and the comments of the researcher are not included. Calculation of entropy values was proposed by Shannon (1948). In this method, the quantity and quality of the information obtained from the decision-making units are decisive for the accuracy and reliability of the problem (Sahin, 2019). The application of the entropy method consists of four steps (Altan, 2020: 199):

Step 1. Creation of the decision matrix,

Step 2. Normalizing the decision matrix,

Step 3. Calculation of entropy values for criteria,

Step 4. Calculation of weights.

After the creation of the decision matrix, the values of the criteria belonging to the decision-making units are normalized with the formula below.

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}} \; \forall \, i, j \quad (1)$$

Then, the entropy value (e_j) of each evaluation criterion is calculated separately with the following formula ($k = (\ln(m))^{-1}$ and $0 \leq e_j \leq 1$)

$$e_{ij} = -k \cdot \sum_{i=1}^{n} p_{ij} \cdot ln(p_{ij}) \; i = 1,2,\dots,m \;\; and \; j = 1,2,\dots,n \; (2)$$

Degree of diversification is calculated as $d_j = 1 - e_j$ and j= 1,2, …, n.

Lastly, the weight value (w_j) of each evaluation criterion is calculated separately with the following formula.

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \quad (3)$$

WASPAS Method

The purpose of MCDM is to find the best alternative among the given criteria (Garg, 2015). There are lots of alternatives in multi-dimensional methods. WSM is one of the earliest and the most widely used method. WPM is a modification of the WSM and overcomes some of its weaknesses (Triantaphyllou, 2000). WASPAS method, proposed by Zavadskas, Turskis, Antucheviciene & Zakarevicius, (2012), represents a combination of WSM and WPM. According to Brauers & Zavadskas (2012), using two different methods of MCDM is more robust than the use of a single one. Zavadskas et al., (2012) proved the accuracy of aggregated methods is larger than the single ones. In this aspect, WASPAS is an innovative, functional, effective, and newly developed MCDM method. This method has five basic steps to solve the problem. These steps are (Karabašević, Stanujkić, Urošević & Maksimović, 2016):

Step 1. Determine the optimal performance rating for each criterion,

Step 2. Construct the normalized decision matrix,

Step 3. Calculate the relative importance of each alternative based on WSM method,

Step 4. Calculate the relative importance of each alternative based on WPM method,

Step 5. Calculate total relative importance for each alternative.

WASPAS solves the problems defined on *m* alternatives and *n* decision criteria (Zavadskas, Antucheviciene, Saparauskas & Turskis, 2013b). The relative importance of alternatives defines as follows (Triantaphyllou & Mann, 1989):

$$Q_{i1} = \sum_{j=1}^{n} \bar{x}_{ij}\, w_j \quad (4)$$

where linear normalization of initial criteria values is applied, i.e.

$$\overline{x}_{ij} = \frac{x_{ij}}{max_i\, x_{ij}} \quad (5)$$

if $\max_i x_{ij}$ value is preferable or

$$\overline{x}_{ij} = \frac{min_i\, x_{ij}}{x_{ij}} \quad (6)$$

if $\min_i x_{ij}$ value is preferable.

The relative importance of alternative i, according to WPM is calculated as follows:

$$Q_{i2} = \prod_{j=1}^{n} (x_{ij})^{w_j} \quad (7)$$

Lastly, joint generalized criterion is calculated as follows (Zavadskas, Antucheviciene, Šaparauskas & Turskis, 2013a):

$$Q_i = 0{,}5\, Q_{i1} + 0{,}5\, Q_{i2} = 0{,}5 \sum_{j=1}^{n} \bar{x}_{ij}\, w_j + 0{,}5 \prod_{j=1}^{n} (x_{ij})^{w_j} \quad (8)$$

VARIABLES AND DATASET

This study covers 10 countries among the top 15 world-leading countries in tourism, where the relevant dataset can be accessed. These countries are Austria, Germany, Greece, Italy, Japan, Mexico, Portugal, Thailand, Turkey, and the United States. The countries that are not included in the study due to lack of data, although they are in the ranking of tourism leaders, are China, France, Malaysia, Spain, and the United Kingdom. Variables used in the analysis are international tourism (number of arrivals), international tourism (receipts, % of total exports), tourism expenditure in the country (US$ millions), and average expenditure of international tourists (US$). All figures of the study consist of data for the year 2019. Ethics committee approval was not obtained in this study because it was not one of the situations that required an approval.

The data retrieved from the World Bank Open Data database including World Development Indicator is used in the analysis. Only, the average expenditure of international tourists is calculated by the authors using the data. Summary Statistics Table of the variables is presented in Table 2.

ANALYSIS AND KEY FINDINGS

Determination of Weights by Entropy Method

The initial decision matrix for the description of decision alternatives is presented in Table 3.

As discussed in detail in the methodology section, firstly, the decision matrix is normalized. The normalized decision matrix for the entropy analysis is presented in Table 4.

Table 2: Summary Statistics

	Min.	Max.	Mean	Std. Dev.
International Tourism (Number of Arrivals)	17174000	166009000	60498500	43437091
International Tourism (Receipts, % of Total Exports)	3.21	28.33	13.08	8.21
Tourism Expenditure in the Country (US$ Millions)	23003	233461	59923.7	59659.96
Average Expenditure of International Tourists (US$)	265.22	1630.47	1059.07	465.33

The entropy values of the decision-making units (DMUs) are obtained by multiplying the normalized values (P_{ij}) with the logarithm values (($\ln(P_{ij})$) of these values. The entropy values of each DMUs are presented in Table 5.

Table 3: Entropy Decision Matrix

Decision-Making Units (DMU)	Tourism (Number of Arrivals)	Tourism (Receipts, % of Total Exports)	Tourism Expenditure (US$ Millions)	Average Expenditure of Tourists (US$)
Austria	31884000	10.23	25288	793.13
Germany	39563000	3.21	58201	1471.10
Greece	34005000	28.33	23003	676.46
Italy	95399000	8.16	52076	545.88
Japan	31882000	5.44	49206	1543.38
Mexico	97406000	5.25	25834	265.22
Portugal	17174000	23.61	24736	1440.32
Thailand	39916000	20.09	65082	1630.47
Turkey	51747000	17.23	42350	818.40
United States	166009000	9.23	233461	1406.32

Then, k constant is calculated as $k=0.4343$ with the formula $k= (ln(m))^{-1}$. The entropy values obtained for the decision-making units (see Table 6) are multiplied by the constant k, and the entropy value (e_j) for each criterion is determined. After calculation of the degree of diversification (d_j), the weight (w_j) for each criterion is calculated (see Table 6). *Tourism expenditure in the country* seems as the most weighted (0.39) and *average expenditure of international tourists* seems as the least weighted criterion. These weights will be used in the performance ranking to be made in the next part of the analysis.

Table 4: Normalized Decision Matrix

Decision-Making Units (DMU)	Tourism (Number of Arrivals)	Tourism (Receipts, % of Total Exports)	Tourism Expenditure (US$ Millions)	Average Expenditure of Tourists (US$)
Austria	0.0527	0.0782	0.0422	0.0749
Germany	0.0654	0.0245	0.0971	0.1389
Greece	0.0562	0.2166	0.0384	0.0639
Italy	0.1577	0.0624	0.0869	0.0515
Japan	0.0527	0.0416	0.0821	0.1457
Mexico	0.1610	0.0401	0.0431	0.0250
Portugal	0.0284	0.1805	0.0413	0.1360
Thailand	0.0660	0.1536	0.1086	0.1540
Turkey	0.0855	0.1317	0.0707	0.0773
United States	0.2744	0.0706	0.3896	0.1328

Table 5: Entropy Values

Decision-Making Units (DMU)	Tourism (Number of Arrivals)	Tourism (Receipts, % of Total Exports)	Tourism Expenditure (US$ Millions)	Average Expenditure of Tourists (US$)
Austria	-0.1551	-0.1993	-0.1336	-0.1941
Germany	-0.1784	-0.0910	-0.2265	-0.2742
Greece	-0.1618	-0.3314	-0.1251	-0.1757
Italy	-0.2913	-0.1731	-0.2123	-0.1528
Japan	-0.1551	-0.1323	-0.2053	-0.2807
Mexico	-0.2940	-0.1290	-0.1355	-0.0923
Portugal	-0.1011	-0.3090	-0.1316	-0.2713
Thailand	-0.1794	-0.2878	-0.2411	-0.2881
Turkey	-0.2103	-0.2670	-0.1873	-0.1979
United States	-0.3548	-0.1871	-0.3673	-0.2681

Table 6: Degree of Diversification and Weights of Criteria

	International Tourism (Number of Arrivals)	International Tourism (Receipts, % of Total Exports)	Tourism Expenditure in the Country (US$ Millions)	Average Expenditure of International Tourists (US$)
Entropy value (ej)	0.90	0.92	0.85	0.95
Degree of diversification (dj)	0.10	0.08	0.15	0.05
Weight (wj)	0.26	0.23	0.39	0.12
Rank	*2*	*3*	*1*	*4*

Performance Ranking by WASPAS Method

The weight of each criterion is determined with the Entropy method in the first part of the analysis. In the second part of the analysis, these weights are used in WASPAS analysis. The ranking of each DMUs is determined by applying WASPAS method. The normalized decision matrix for the description of decision alternatives is presented in Table 7.

Table 7: Normalized Decision Matrix

Decision-Making Units (DMU)	Tourism (Number of Arrivals)	Tourism (Receipts, % of Total Exports)	Tourism Expenditure (US$ Millions)	Average Expenditure of Tourists (US$)
Austria	0.1921	0.3611	0.1083	0.4864
Germany	0.2383	0.1133	0.2493	0.9023
Greece	0.2048	1.0000	0.0985	0.4149
Italy	0.5747	0.2881	0.2231	0.3348
Japan	0.1920	0.1920	0.2108	0.9466
Mexico	0.5868	0.1851	0.1107	0.1627
Portugal	0.1035	0.8332	0.1060	0.8834
Thailand	0.2404	0.7092	0.2788	1.0000
Turkey	0.3117	0.6080	0.1814	0.5019
United States	1.0000	0.3259	1.0000	0.8625

By using the weights determined by the entropy method, the relative significances of each DMUs are calculated by WSM and WPM model. The results of the WSM are presented in Table 8. As it is seen in Table 8, the US ranks first and Austria ranks last. The performance ranking of all DMUs is respectively; the US, Thailand, Greece, Portugal, Turkey, Italy, Germany, Japan, Mexico, and Austria.

Relative significances based on WPM are presented in Table 9. The US ranks first and Austria ranks last as in WSM. The performance ranking of all DMUs is respectively; the US, Thailand, Italy, Turkey, Japan,

Table 8: Relative Significances Based on Weighted Sum Model (WSM)

Decision-Making Units (DMU)	Tourism (Number of Arrivals)	Tourism (Receipts, % of Total Exports)	Tourism Expenditure (US$ Millions)	Average Expenditure of Tourists (US$)	Q_{i1}	Rank
Austria	0.0493	0.0820	0.0424	0.0606	0.2344	*10*
Germany	0.0612	0.0257	0.0976	0.1125	0.2970	*7*
Greece	0.0526	0.2271	0.0386	0.0517	0.3700	*3*
Italy	0.1476	0.0654	0.0873	0.0417	0.3421	*6*
Japan	0.0493	0.0436	0.0825	0.1180	0.2934	*8*
Mexico	0.1507	0.0420	0.0433	0.0203	0.2564	*9*
Portugal	0.0266	0.1892	0.0415	0.1101	0.3674	*4*
Thailand	0.0618	0.1610	0.1091	0.1247	0.4566	*2*
Turkey	0.0801	0.1380	0.0710	0.0626	0.3517	*5*
United States	0.2569	0.0740	0.3914	0.1075	0.8298	*1*

Germany, Greece, Portugal, Mexico, and Austria. The US, Thailand, Mexico, and Austria are seen in the same ranking for both models. Portugal and Greece have the biggest difference in ranking based on two different models.

Table 9: Relative Significances Based on Weighted Product Model (WPM)

Decision-Making Units (DMU)	Tourism (Number of Arrivals)	Tourism (Receipts, % of Total Exports)	Tourism Expenditure (US$ Millions)	Average Expenditure of Tourists (US$)	Q_{i2}	Rank
Austria	0.6545	0.7935	0.4190	0.9141	0.1989	*10*
Germany	0.6918	0.6099	0.5806	0.9873	0.2419	*6*
Greece	0.6654	1.0000	0.4037	0.8961	0.2408	*7*
Italy	0.8673	0.7538	0.5559	0.8725	0.3171	*3*
Japan	0.6545	0.6875	0.5437	0.9932	0.2430	*5*
Mexico	0.8720	0.6818	0.4225	0.7974	0.2003	*9*
Portugal	0.5583	0.9594	0.4154	0.9847	0.2191	*8*
Thailand	0.6934	0.9249	0.6066	1.0000	0.3890	*2*
Turkey	0.7412	0.8932	0.5127	0.9177	0.3115	*4*
United States	1.0000	0.7753	1.0000	0.9817	0.7611	*1*

Weighted relative significances based on WPM and WSM represent the common results for the analysis. The final ranking based on WSM and WPM is presented in Table 10. The US ranks first and Austria ranks last as in WSM and WPM. The final performance ranking of all DMUs is respectively; the US, Thailand, Turkey, Italy, Greece, Portugal, Germany, Japan, Mexico, and Austria. The US, Thailand, Mexico, and Austria keep their places in the final ranking. This ranking represents the tourism performance of tourism leading countries for the year 2019 which is the last normal tourism season before the COVID 19 crisis.

Table 10: Weighted Relative Significances Based on WSM and WPM

DMU	Q_i	Rank
United States	0.7954	*1*
Thailand	0.4228	*2*
Turkey	0.3316	*3*
Italy	0.3296	*4*
Greece	0.3054	*5*
Portugal	0.2932	*6*
Germany	0.2694	*7*
Japan	0.2682	*8*
Mexico	0.2283	*9*
Austria	0.2166	*10*

CONCLUSION

This paper shows the huge impact of COVID-19 on the tourism sector. The following year after COVID-19, tourist arrivals fell 74% compared to the previous year. Travel restrictions and border closures brought tourism visits to almost zero points. The effects of the COVID-19 crisis are far bigger than the previous crises such as SARS, the 11 September attacks, and the 2008 global economic crisis. According to UNWTO the damage caused by COVID-19 is eight times higher than the 2008 global economic crisis.

As of July 2021, many countries have made significant progress in vaccination. Countries with decreasing number of cases have gradually started to open their borders and accept tourists. However, various variants, especially the variant seen in India, have brought about reclosures. Countries have started vaccination controls for tourist admission. Even, some European countries have decided not to recognize vaccines of different origins like Sinovac and stipulated that European vaccines should be given, such as Biontech.

The tourism season, which has been very unhopeful in the whole of 2020 and the first six months of 2021, is making preparations for July 2021 and beyond. However, the future of the tourism season is still uncertain due to newly emerging variants of the virus. Economic reasons also play an important role in the decisions of countries whose economies depend on tourism to a large extent.

In this paper, an index covering 10 world-leading countries in tourism is created and a performance ranking is made for 2019, which was the last normal tourism year before the COVID-19 crisis. According to this ranking determined by Entropy and WASPAS methods, the performance ranking of countries is respectively; the US, Thailand, Turkey, Italy, Greece, Portugal, Germany, Japan, Mexico, and Austria.

Time will tell whether tourism leader countries can maintain their performance. In future studies, the

change in tourism leading countries can be discussed by comparing this performance ranking. In this way, changing balance among the leading countries in the world tourism sector by the impact of COVID-19 may emerge. It is expected that this performance ranking, which is made using multi-criteria decision-making methods, will contribute to the literature as a due diligence before the COVID-19 crisis.

This study covers 10 countries among the top 15 world-leading countries in tourism, where the relevant dataset can be accessed. These countries are Austria, Germany, Greece, Italy, Japan, Mexico, Portugal, Thailand, Turkey, and the United States. Variables used in the analysis are international tourism (number of arrivals), international tourism (receipts, % of total exports), tourism expenditure in the country (US$ millions), and average expenditure of international tourists (US$). The number of countries, the number of variables and the scope of the dataset are the limitations of this paper. In the future studies, it would be beneficial for the literature to make the research with more country groups and more comprehensive dataset.

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