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TURKEY'S HEALTH TOURISM DEMAND FORECAST: THE ARIMA MODEL APPROACH

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Abstract

Aim: A large number of people around the world travel abroad to get health services at more affordable prices. In terms of travel, Turkey is among the countries with a high potential to attract foreign patients. The development of health tourism has accelerated due to many advantages such as the work quality of the services provided in Turkey, the affordable price policy, the presence of specialist physicians, and the geographical location. The actualization of future plans by making health tourism demand forecasting depends on the decisions taken today. From this aspect, it is of great importance to forecast the demand for health tourism. This study aims to predict the future status of patients who come to Turkey to receive health services and to examine them within the scope of health tourism.

Methods: In the study, the data obtained within the scope of "Visitors Leaving by Reason of Arrival" in TUIK Tourism Statistics were used. Data refers for quarters period of 2003q1-2019q4. ARIMA models

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were used to predict the future of health tourism. Analysis and estimation equations were obtained using Eviews 10.0 package software.

Findings: ARIMA (3,0,1) was obtained as the most suitable model for the study. It is predicted that the number of health tourists arriving in Turkey will be 734,860 in 2022 and 780,754 in 2023.

Conclusion: In the next years, Turkey has high growth potential in terms of health tourism. Considering the expected increase in the demand for health tourism, it will be seen that Turkey has a rising trend in terms of attracting foreign patients. The results of the study will make it easier for policymakers to make decisions on critical issues.

Keywords: Health Tourism, Time Series Analysis, Tourism Demand Forecasting, Arima Model

Introduction

It is not possible to make a single definition of health tourism, but in the most general terms, health tourism can be defined as travels made to improve the health of individuals. Both spa visits for resort and relaxation and hospital visits for cosmetic surgery or diagnosis can be considered in this context (Ross, 2001). Visits by individuals to another country are classified into three groups such as thermal and spa-wellness tourism, advanced age and disabled tourism, and medical tourism (Aydın et al., 2011). Health tourism is explained within the scope of the services provided and handled as elderly care services, health promotion services, rehabilitation services, and therapeutic services (Tontuş, 2016). In addition to the diversity of elements such as well-being, renewal, and relaxation that health tourism offers to people, developments in communication and technologies at the global level also ensure the diversity of health services, facilities, and destinations (Akın, 2021). The relevant variety includes individuals traveling outside of their environment for the purpose of mental or physical recovery and health improvement (Carrera and Bridges, 2006). These trips require leaving the place of residence for the purpose of maintaining and promoting health and treating diseases. In addition, It includes staying at the destination for at least 24 hours and benefiting from health or tourism opportunities (Ministry of Health, 2013). The common point of the definitions is that individuals visit different countries from their own countries in order to maintain, improve and get treatment. In this respect, health tourism can be considered as a basic concept covering both medical and healthy life. Health tourism is defined as regular tourist attraction initiatives supported by health services in addition to the regular tourism opportunities of a touristic destination or facility. The health

services mentioned here include medical check-ups and surgical procedures; within the scope of health tourism, there are medical procedures, special diets, vitamin complex treatments, herbal medicines, and treatment forms provided by thermal swimming pools (Goodrich and Goodrich, 1987). Health travels present the existence of a mature perception of health travel that includes encouraging elements such as beauty, tolerance, and regeneration, and rewarding elements of beauty, tolerance and renewal (Laesser, 2011). On the one hand, the fact that countries provide services in different types of tourism ensures that health tourism activities become increasingly widespread due to improvements in quality, accreditation, technology, and lifestyle changes, on the other hand, countries have more intense competition due to their economic return has created awareness about health tourism and countries have focused on health tourism.

The convenience of Turkey's geographical location, the improvement of health services, the increase in the quality of health services, the increase in the number of private health institutions, the relatively cheaper health services compared to other countries in the world attracts many tourists to our country for treatment purposes. It can be said that Turkey has reached an important position in health tourism among the countries of the world as a result of providing services to the citizens of many countries both in medical tourism and thermal tourism and earning significant income through these services (Özer and Sonğur, 2012). USHAS (International Health Services Inc.), established under the Ministry of Health, is among the strategic steps Turkey has taken in the field of health tourism in recent years. It is aimed to promote the services offered in Turkey, to support the activities of the institutions providing services, and to make Turkey a brand by making its name more known in health tourism. In this way, it is aimed for Turkey to preserve and develop the position it has achieved.

When the scientific studies written within the scope of health tourism are examined, there are some studies for demand forecasting, but none of them includes the ARIMA model for Turkey's health demand forecasting. With this aspect, the study is considered important in terms of estimating the patients who will come to Turkey in the next two years to receive health services. In addition, the estimation of health tourism demand is an important parameter in determining the economic strategies of Turkey when considered at the macro level, and of health tourism stakeholders when considered at the micro-level.

1. Research Methodology

Cross-border patient mobility for treatment is becoming more and more common around the world. Countries that want to get a share from the health tourism market are trying to distinguish with competitive policies and in this regard, they expand the scope of services they can provide. This study aims to predict the future status of patients who come to Turkey to receive health services and to examine them within the scope of health tourism. For this purpose, the data obtained for the people who came to Turkey from abroad to receive health services in the 2003q1-2019q4 period were analyzed. In this context, the data obtained within the scope of "Visitors Leaving by Arrival Reason" for the quarter period of 2003q1-2019q4 in TUIK Tourism Statistics (2020) were used. The data of 2020, which could not be surveyed due to the pandemic, are excluded from the scope. The data includes foreign patients coming to Turkey from other countries for health and medical reasons and Turkish citizens residing abroad. Economic models will be derived by using ARMA (p, q) models with the relevant data and estimation equations will be obtained. According to Namini (2018), the ARIMA model demonstrates its superior overperforms in precision, and accuracy in estimating the next delays of the time sequences. Also, Cuhadar (2014) states that the model's versatility and accuracy have long been accepted for use of short and medium-term forecasts. Analysis and estimation equations were obtained using Eviews 10.0 package software. The number of foreign patients or citizens residing abroad for health and medical reasons is considered as a quadrans.

2. Analysis

Unit Root Test

Although different unit root tests have been developed, all tests measure the stationary of the series. The unit root results of the series to be used in the analysis are given in Table 1. If the series to be used in the analysis are not stationary, the series should be made stationary by taking the variation. If the stationarity condition is still not achieved after applying the first variation operation to the series, the series should be made stationary by taking the secondary variation of the series. According to unit root tests, whether the series in question contains a unit root at 1%, 5%, and 10% significance level is given in the table below.

Table 1. Unit Root Dickey-Fuller Test

Total Number of Tourists Arriving in Turkey		
H_0: The Total Number of Tourists Arriving in Turkey has a Unit Root		
	t-Statistic	Prob.
Augmented Dickey-Fuller Test	0.515480	0.9860
Test Kritik Değeri: %1	-3.538362	
%5	-2.908420	
%10	-2.591799	
Augmented Dickey-Fuller Testi (1st difference taken)	t-Statistic	Prob.
	-4.583697	0.0004
Test Kritik Değeri: %1	-3.538362	
%5	-2.908420	
%10	-2.591799	

As seen in Table 1, according to the Dickey-Fuller unit root test result, it is seen that the probability value is greater than the critical value and the series contains a unit root. Besides, the fact that the t statistical value of the series is lower than the t statistical value of all significance levels is another proof that the series contains a unit root. Since the series has a unit root, it is made stationary by taking the variation. The general graphic structure and stagnation of the series are shown below.

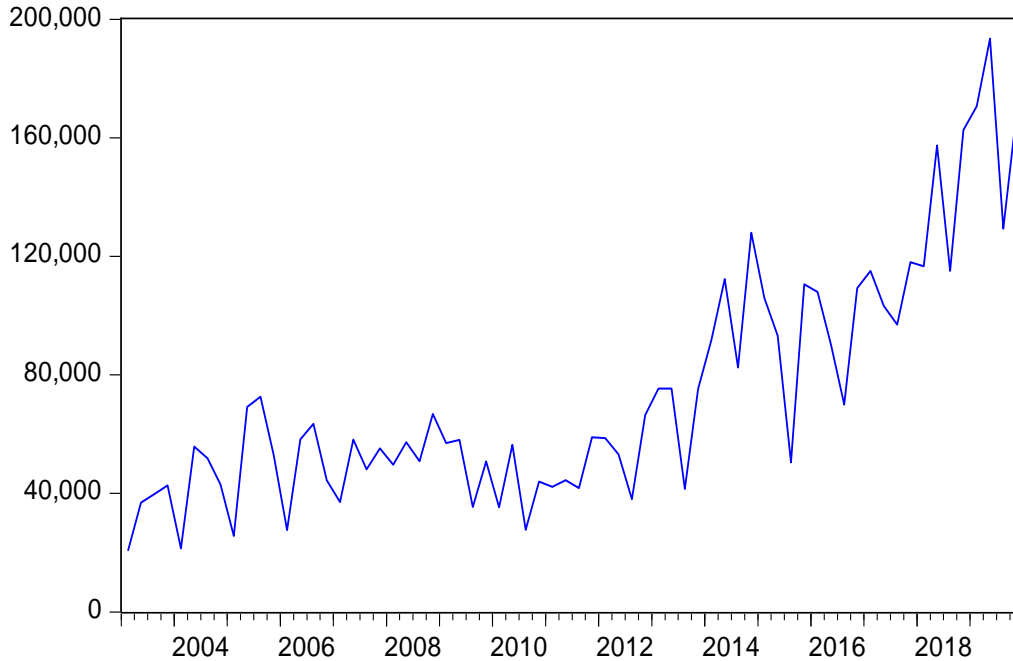**Number of People Arriving in Turkey for Health Tourism Purposes**

Figure 1. Progress of Persons Arriving in Turkey for Health Care by Years

Figure 1 shows the course of the series formed over the years in the number of people arriving in Turkey for health and medical reasons. When the graph is examined, it is seen that there has been a constant increasing trend since 2013, although it fluctuated at a certain level until 2013. In 2019, it is seen that the level of 2003 has reached almost five times. It can be said that the series has a unit root and shows seasonality when the graph is examined. For this reason, firstly, the series will be made stationary by taking the natural logarithm of the series and then taking the variation in the next process.
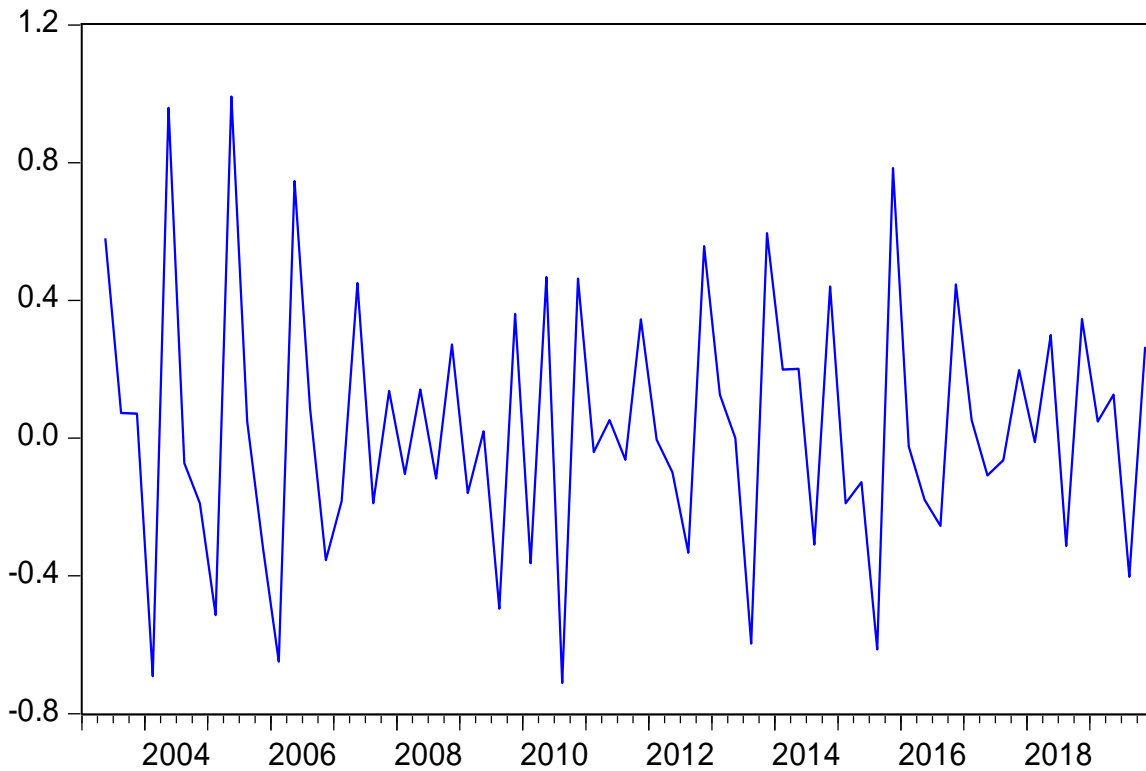
DLN Total Number of People

Figure 2. Series Graph with Logarithmic Transformation Applied

First, the natural logarithmic transformation was applied to the series analyzed in Figure 2, and the series was made stationary by taking the 1st variation. The series has been made stationary and converted to the required format for modeling the series. After the variation process in the series, the autocorrelation (ACF) and partial autocorrelation (PACF) graphs of the series were examined. It has been observed that the relations in the graph gradually decrease as the delay numbers increase. According to the study of Cicekgil and Yazıcı (2016), it is seen that the appropriate model is ARIMA due to the relevant situation.

In the ARIMA (p,d,q) model, there are criteria to be considered in order to determine the appropriate p, d and q values. In these criteria, parameter estimators should be meaningful therefore firstly, the smallest information criteria, especially SIC and AIC information criteria, should be preferred, and attention should be paid to the F probability value, which indicates whether the model is meaningful as a whole. Considering relevant criteria, different alternative

models were developed, and it was seen that the most suitable model was ARIMA (3,0,1). The estimation result of the model is shown in the table below.

Table 2. Results on the ARIMA (3,0,1) Model for the Total Number of Health Tourists Visiting Turkey

Variables	Parameter	Standard Error	t statistics	Probability Value
C	0.024668	0.010736	2.2977	0.0250
AR(1)	-0.995751	0.090730	-10.9749	0.0000
AR(2)	-0.850651	0.109723	-7.7527	0.0000
AR(3)	-0.802845	0.077284	-10.3882	0.0000
MA(1)	0.442352	0.159422	2.77	0.0073
R^2:0.7186	F Prob.: 0.000	Akaike Information Criterion: -0.135698	Shwarz Information Criterion:0.061737	
AR ROOTS:	-.01-.91i	-.01-.91i	-.97	
MA Root:	-.44			

When the results of the model created in Table 2 are examined, it is seen that all parameter estimators are significant. It is seen that the F probability value is also significant and the model has significance as a whole. Another point to be considered in the developed model is whether there is autocorrelation in the model. It was determined that there was no autocorrelation problem at the 5% significance level in the tests performed to the 28th delay value in the model. Theil's U value of the model was found to be 0.28 and the related value was below 0.50. Thus, it has been understood that the model is suitable for making predictions. On the other hand, it can be said that the average absolute percentile error (MAPE) value of the model is 16% and therefore it is a predictable model. The graph of the surplus values of the model is shown below.
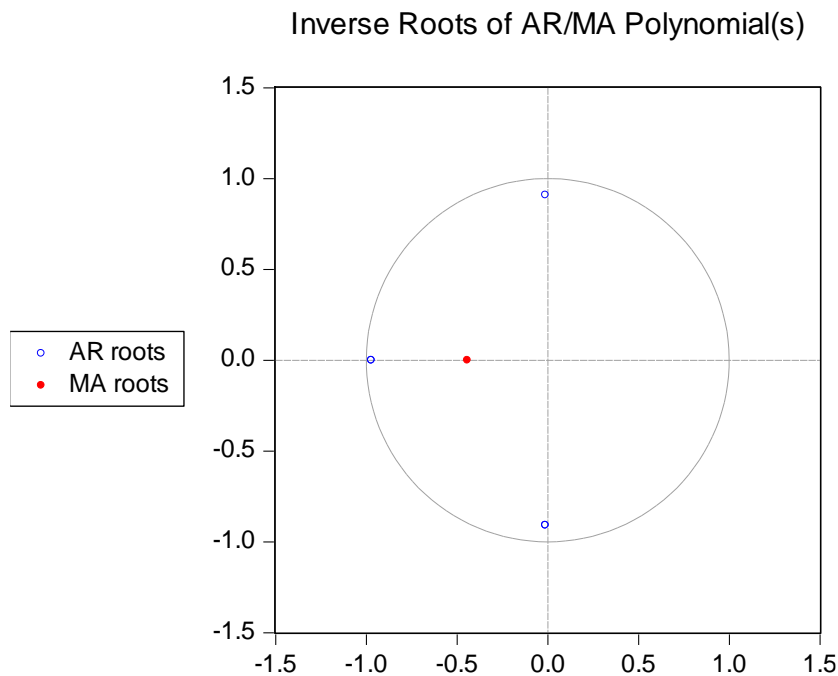
Inverse Roots of AR/MA Polynomial(s)

Figure 3: Representing the Roots of the Model on the Unit Circle

In a model created within the scope of the analysis, the roots are required to be inside the unit circle. The fact that the roots are inside or on the unit circle obligates different transformations. As seen in Figure 4, the roots of the model are in the unit circle.
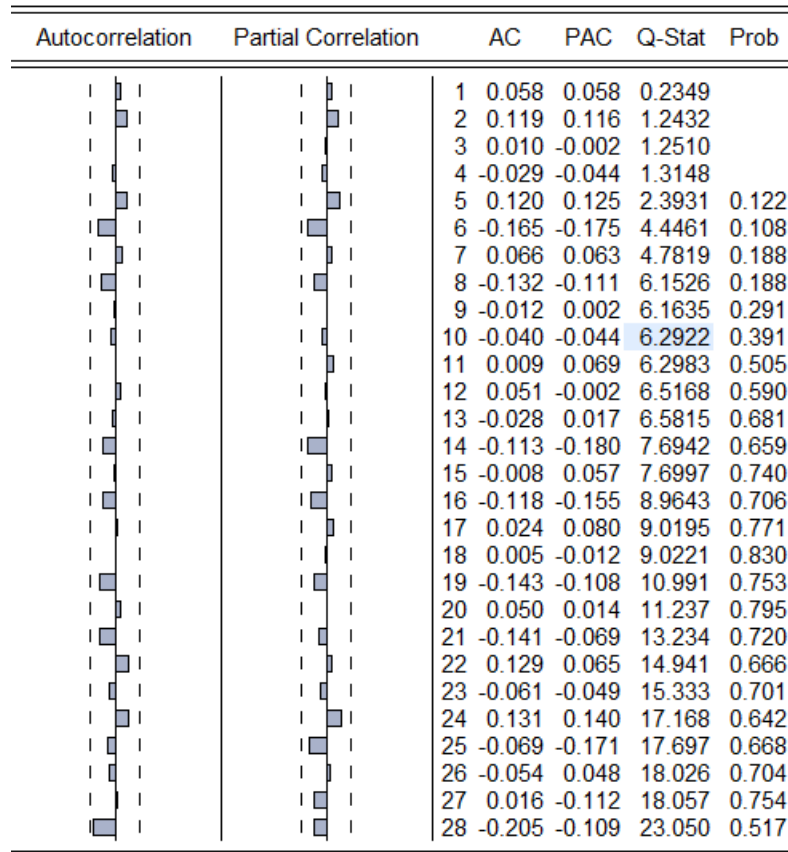
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.058	0.058	0.2349	
		2	0.119	0.116	1.2432	
		3	0.010	-0.002	1.2510	
		4	-0.029	-0.044	1.3148	
		5	0.120	0.125	2.3931	0.122
		6	-0.165	-0.175	4.4461	0.108
		7	0.066	0.063	4.7819	0.188
		8	-0.132	-0.111	6.1526	0.188
		9	-0.012	0.002	6.1635	0.291
		10	-0.040	-0.044	6.2922	0.391
		11	0.009	0.069	6.2983	0.505
		12	0.051	-0.002	6.5168	0.590
		13	-0.028	0.017	6.5815	0.681
		14	-0.113	-0.180	7.6942	0.659
		15	-0.008	0.057	7.6997	0.740
		16	-0.118	-0.155	8.9643	0.706
		17	0.024	0.080	9.0195	0.771
		18	0.005	-0.012	9.0221	0.830
		19	-0.143	-0.108	10.991	0.753
		20	0.050	0.014	11.237	0.795
		21	-0.141	-0.069	13.234	0.720
		22	0.129	0.065	14.941	0.666
		23	-0.061	-0.049	15.333	0.701
		24	0.131	0.140	17.168	0.642
		25	-0.069	-0.171	17.697	0.668
		26	-0.054	0.048	18.026	0.704
		27	0.016	-0.112	18.057	0.754
		28	-0.205	-0.109	23.050	0.517

Figure 4. ACF and PACF Distributions of the Total Number of Tourists Arriving in Turkey Model

When the figure above is examined, it is seen that the residuals are within the determined limits. As can be seen from the figure, the suitability of the model has also been confirmed here. Through providing all the conditions, the following table shows the predictions of the number of people who will arrive to Turkey for the 2022q1-2023q4 periods to receive services within the scope of health tourism.

Table 4. Forecasts of the Model for the Periods of 2022q1-2023q4

Periods	Predictive Value
2022q1	177.405
2022q2	199.755
2022q3	163.914
2022q4	193.786
2023q1	186.041
2023q2	208.150
2023q3	178.878
2023q4	207.685

Forecasts of the ARIMA (3,0,1) model for health tourists coming to Turkey for 2-year and 4-quadrans periods are shown in Table 4. According to the table, the lowest and highest forecast values in 2022 vary between 177,405 and 193,786. It is expected that 186.041 health tourists will visit Turkey in the 2023q1 period and 207,685 people in the 2023q4 period, with a total of 780,754 health tourists. Thus, it can be said that an increase is expected in the number of health tourists expected to arrive to Turkey for health and medical reasons between 2022 and 2023.
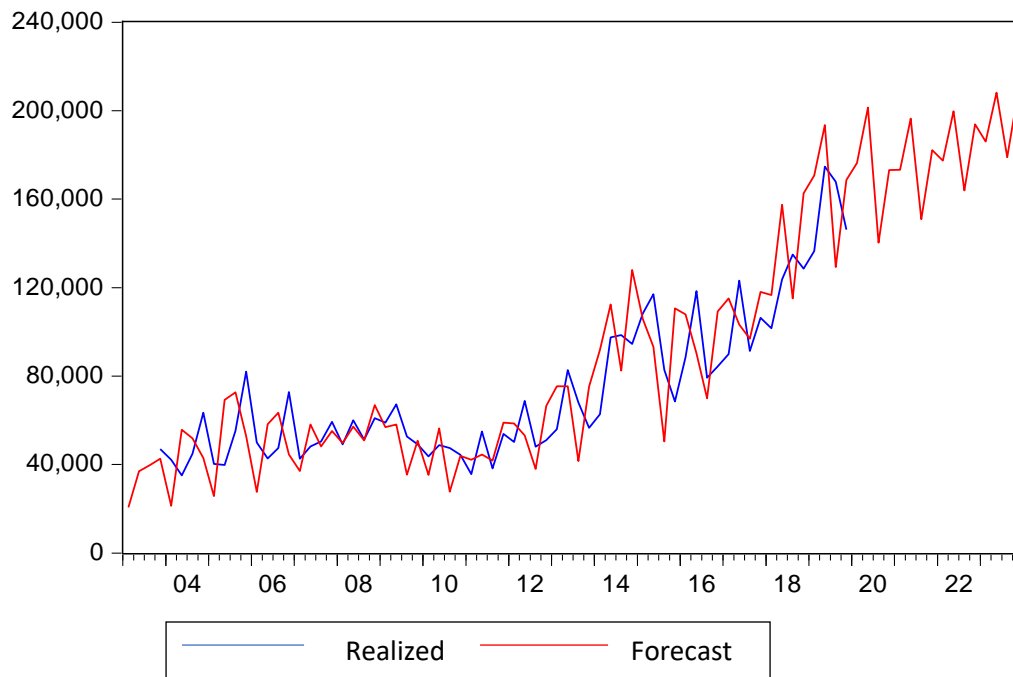
Figure 5: Forecast Graph of the Number of People Arriving in Turkey for Health Tourism Purposes

As seen in both Figure 5 and Table 4, although certain values show a decrease in quarterly, it is seen that there is an increasing trend in general. While the blue line in Figure 3 shows the people who arrive to Turkey for health tourism purposes, the red line shows the forecast graph until 2023q4. Although the values decrease at certain ranges, it is predicted that the number of people who will come to Turkey for health and medical reasons will be 780,754 in the q1-q2-q3-q4 quarters of 2023. The obtained time series has an upward trend. Thus, it can be said that number of the health tourists will increase in the long term. Obtained findings are considered as important for policymakers, decision makers and health sector stakeholders and it is thought that it will guide the investments to be made in health tourism. It is thought that it will be beneficial

for the stakeholders in the health tourism presentation, such as public and private health institutions, intermediary institutions, health tourism agencies, hotels, construction, finance, travel and communication-information sector, to consider such empirical research results in the future planning.

3. Conclusions and Recommendations

This study was performed to predict the number of people arriving in Turkey to receive health care services from different countries by using the ARIMA model, which is one of the time series methods. While developing the model, different alternatives were tried, and it was seen that the most suitable model was ARIMA (3,0,1). It is predicted that the number of health tourists arriving in Turkey will be 734,860 in 2022 and 780,754 in 2023. Quarterly forecasts for 2022 (q1-q2-q3-q4) and 2023 (q1-q2-q3-q4) show that Turkey has growth potential in terms of health tourism. Turkey is in an increasing trend in terms of attracting foreign patients from abroad in the next 2 years. The increasing number of foreign patients shows that Turkey will generate more income through health tourism. Hence, the literature (Connell, 2006; Cortez, 2008; Bennett et al., 2004; Özer and Sunğur, 2012) shows that health tourism is among the fastest growing markets, that it is the fastest-growing service sector of our time, and it supports the national economies and has significant economic contributions in many countries.

In the literature, there are many studies in which the ARIMA model is used, apart from health tourism. In Tay Bayramoğlu and Öztürk's (2017) study, the ARIMA model was used to estimate the Consumer Price Index, and the inflation rate was estimated for Turkey. In another study, the estimation of stock prices was performed with ARIMA, which has common use in modeling economic and financial time series. It has been determined that the ARIMA model is a powerful method for short-term forecasting (Ariyo et al., 2014). In a study using Johns Hopkins epidemiological data to predict the evolution of the COVID-2019 pandemic (Benvenuto, 2020), the epidemiological trend of the prevalence and incidence of the disease was estimated with the ARIMA model. It is known that the ARIMA model is used to predict the prevalence and incidence of diseases such as Tuberculosis (Zheng et al., 2015), SARS (Earnest et al., 2005), Malaria (Gaudart et al., 2009), Influenza (He and Tao, 2018) and Brucellosis (Cao et al., 2020) in the literature. In addition, using the ARIMA model in the literature, the relations between the average daily patient stay in the emergency room and various independent variables were examined (Rathlev et al., 2007), and there are also studies in which the daily number of patients

presented to the hospital is estimated (Kam et al., 2010) and the patient densities of a private hospital are estimated (Irmak et al., 2012).

In the literature, while the studies on demand forecasting on health tourism or medical tourism, which is a sub-branch, are limited, there are few studies on forecasting with the ARIMA model. The ARIMA model was used in the study (Rai et al., 2014), which was performed to estimate the medical tourism demand in India using data from the years 2009-2014. Again, demand forecasting analysis was performed in the study (Ahire and Fernandes, 2020), in which the ARIMA model was used to analyze and predict the medical tourism mobility seen in India between the years 2014-2017. In the study of Kumar and Sharma (2016), in which the SARIMA model was used, the tourist flow of Singapore from South Asian countries was estimated monthly for the next 2 years. Considering that Singapore is a country at the forefront of medical tourism, which is one of the main earning sectors, the forecast for tourism is also considered important. In the study of Isikli et al. (2020), Turkey's medical tourism demand forecast was performed by using the Least Squares Regression method. In Bayir and Isikli's (2019) study, data of health tourists who applied to a dental clinic (foreign patients from abroad and Turkish expats living abroad and coming to Turkey for health care) between 2013-2019 were used and a prediction study has been made to find an estimation at the future through four different models. According to the results of Sen's (2020) study, it is seen that the number of foreign patients who will demand health services from the Gynecology and Obstetrics, Cardiology, Orthopedics and Traumatology departments, which were estimated for 2020, 2021, 2022 and 2023, is increasing. This situation increases the belief that there is an increase in health tourists expediently with Turkey's 2023 targets and in reaching the target (Sen, 2020). According to the results of this study, an increase in the number of patients who will demand health services from Turkey is expected in 2022 and 2023.

In the literature, there are also forecasting studies on the field of health tourism with the Gray System Model, which is one of the demand forecasting models. The GM (1,1) estimation model was applied to estimate the demand for Thailand's medical tourism services and revenues from these services (Lin et al., 2009). The Gray GM (1,1) model was also used in the study on medical tourism forecasting in Bermuda (La Foucade et al., 2019). In the thesis study practiced by Sen in 2020, the demand forecast for the medical departments of a private hospital serving in Istanbul between the years 2015-2019 was performed with the Gray System Model GM (1,1).

Huang's (2012) study used the GM (1,1) model, which is the Gray forecasting model, to predict the health tourism demand in Asian countries. In this study, the existing secondary and primary data of the "Opportunities in Asian Health Tourism" report covering the period 2002-2009 were used. Dang et al., (2016) conducted a study on estimating the number of patients coming to Thailand, Singapore, Malaysia, South Korea, Taiwan, and India for health tourism purposes. Considering the forecasts for 2022 and 2023, it is essential that health tourism stakeholders, especially the Ministry of Health, must set targets and take steps in this direction to actualize these forecasts. In order to achieve these goals, the Ministry of Health can act together with health tourism stakeholders. Hereby, Turkey needs to increase its efforts on its strengths to become a world brand, especially in medical tourism.

Especially Turkish immigrants living in Europe, in other words, diaspora Turks, receive health services from Turkey due to some chronic diseases and to spend more time in their homeland after retirement (Yazıcı et al., 2018). The relevant immigrant citizens residing abroad have great potential for Turkey. It can be said that the brand strategies that can be developed for diaspora patients who are close to Turkey in terms of cultural distance play a facilitating role in reaching the predicted target. Marketing activities to be performed in Germany, which is one of the countries where the number of citizens of Turkish origin living in Europe is high, is of great importance in terms of medical tourism.

With all the estimation models to be made, it will be possible to forecast the demand for health tourism and its sub-branch, medical tourism. Thus, the basis for the emergence of improvement ideas for countries in the health tourism sector will be prepared. In addition, the results of the study will make it easier for policymakers to make decisions on critical issues. Through its potential and strengths in health tourism, Turkey will be able to attract more patients in the next years. In this study, it is pointed out that Turkey's health tourism industry will grow rapidly in the next years. For this reason, both the institutions affiliated to the Ministry of Health and the private sector stakeholders have to make the necessary investments in health tourism and take strategic steps in order to develop the health tourism industry.

Demand forecasting is important for the planning and strategic steps to be taken for health tourism. For the said planning, it is necessary to estimate the number of foreign patients who will come to the country. In this study, it has been tried to predict the number of foreign

patients who will come to Turkey in the next two years. However, the difficulty of estimating due to political, health, socio-economic and technological developments should not be ignored.

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