Üçüncü Sektör Sosyal Ekonomi Dergisi
Third Sector Social Economic Review
60(2) 2025, 1760-1782
doi: 10.63556/tisej.2025.1463

Research Article

Determination of Future Trends of Cruise Tourism in Turkiye Through Time Series Analysis

Turkiye'de Kruvaziyer Turizmin Zaman Serileri Analizine Göre Gelecek Eğilimlerinin Belirlenmesi

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Makale Geliş Tarihi	Makale Kabul Tarihi
11.04.2025	**15.05.2025**

Abstract

In this study, 170 data sets are created from the Ministry of Transport and Infrastructure database for analysis between 2011-2025, including Jan and Feb 2025. In this context, numbers for incoming cruise ships belonging to cruise markets, incoming passengers, outgoing passengers, transit passengers and total number of passengers are created and examined. The average values, minimum and maximum values are analyzed separately on a monthly, annual and port authority basis. The study has been done in three stages. In the first stage, status of cruise tourism has been expressed statistically. In second stage, time series analysis has been performed to determine future estimates. For this purpose, by performing forecast modeling in SPSS 29 package program, estimated values regarding the incoming and outgoing passenger numbers of cruise tourism in Türkiye for next five-year period (2025-2030) are obtained. It is understood that the zero-ship number and zero passenger effect recorded in the statistics during the pandemic period negatively affected the forecast for the demand. As a result it is observed that despite the recovery trend seen on the figures, negative effect is expected to continue for the next 5 years. Finally, estimate values obtained are compared to the values realized in 2024 and comprehensive evaluations for cruise tourism in Turkiye are made.

Keywords: *Cruise industry, Forecasting, Turkiye, SPSS 29, ARIMA*

Öz

Bu çalışmada, veri analizi için Ulaştırma ve Altyapı Bakanlığı veri tabanından 2011-2025 yılları arasında, 2025 yılının ilk iki ayını da kapsayan 170 veri seti oluşturuldu. Bu bağlamda gelen kruvaziyer gemi sayısı, gelen yolcu sayısı, giden yolcu sayısı, transit yolcu sayısı ve toplam yolcu sayısı veri seti incelendi. Bu değerler aylık, yıllık ve liman başkanlığı bazında minimum, maksimum ve ortalama değerleri elde edildi. Çalışma üç aşamada gerçekleştirilmiştir. İlk aşamada kruvaziyer turizminin mevcut durumu istatistiksel olarak ifade edilmiştir. İkinci aşamada, gelecek tahminlerini belirlemek için zaman serisi analizi yapılmıştır. Bu amaçla SPSS 29 paket programında tahmin modellemesi kullanılarak Türkiye'de kruvaziyer turizminin gelecek beş yıllık dönemde (2025-2030) gelen ve giden yolcu sayılarına ilişkin tahmini değerler elde edilmiştir. Pandemi döneminde kaydedilen sıfır gemi sayısı ve sıfır yolcu etkisinin talep tahminlerini olumsuz etkilediği anlaşılmıştır. Sonuç olarak tahmin edilen verilerdeki eğilimin toparlanma yönünde olduğu ancak negatif etkinin önümüzdeki 5 yıl boyunca devam edeceği görülmektedir. Son olarak tahmin edilen değerler 2024 yılında gerçekleşen değerlerle kapsamlı karşılaştırılarak değerlendirmelere yer verilmiştir.

Anahtar sözcükler*: Kruvaziyer Turizm, Talep Tahminleme, Turkiye, SPSS 29, ARIMA.*

Önerilen Atıf /Suggested Citation
Koraltürk, G., 2025, Determination of Future Trends of Cruise Tourism in Turkiye Through Time Series Analysis, *Üçüncü Sektör Sosyal Ekonomi Dergisi*, 60(2), 1760-1782.

1. Introduction

Turkiye, having nice shores through its worldwide known beautiful cities with a lot of cultural nature is a very attractive country itself in terms of cruise tourism. The climate, natural resources, historical and religious places and the presence of unique bays position Turkiye as a country preferred by tourists in the market in comparison to near countries in the Mediterranean Sea. Passengers do not carry their suitcases with them in the cities they go. Thus, the ability to visit more than one destination, enjoying the tour that they paid, can be listed as the most important reasons why cruisers love and enjoy cruise travel. Cruise tourism is divided into 11 regions in the world. These are South America, Western Europe, Asia Australasia, South America, Eastern Europe, Middle East/Arabia, Scandinavia/Iceland, Africa, Caribbean, and Central America (CLIA Global Passenger Report 2020). The Cruise Lines International Association (CLIA), the world's largest cruise industry trade association, announced in its 2023 report that world cruise passenger transportation by region reached 31 million in 2023 (CLIA, 2024). Average Cruise Trip Duration is 7 days and passenger ages are 46 and 47 (CLIA Global Passenger Report 2020).

Cruise Tourism has many definitions in the literature. The cruise industry is a major sector within global tourism and maritime travel, offering experiences on ships that operate in various regions worldwide. Briefly, cruise is one of the passenger transport (Kendall, 1986), "ship represents in itself the destination, essentially acting as a floating resort (Yui-yip Lau & Tsz Leung Yip, 2020) and (Rodrigue & Notteboom, 2013). Cruise Tourism type is a significant economic added value especially at sea and culture touring destinations (Alkan, Koraltürk, Eroğlu Pektaş, & Kahraman, 2015). In addition to the economic impacts of cruise tourism, environmental (Johnson, 2002) (Davenport, J. & Davenport, J.L, 2006) (Paiano, A.,, Crovella, T.,, & Lagioia, G. , 2020) (Han, Koo, & Kim, 2019) (Lloret, Carreno, Caric, H., San, J, & Fleming L.E, 2021) and socio-cultural (Niatu, 2007) (Brida) (ARAS, 2022) impacts have also been mentioned in the literature (Paiano, A.,, Crovella, T.,, & Lagioia, G. , 2020)**.** Seasonality affects cruise traffic, particularly in regions like the Western Mediterranean (Wang, Shi and Mei 2019) and the Adriatic Sea (Esteve-Perez, Garcia-Sanchez, & Muñoz-Paupie, 2019).

The COVID-19 pandemic heavily disrupted the cruise industry, affecting forecasts and plans. Recovery strategies will need to address (Peručić and Greblički 2022). Accurate forecasting of cruise demand is essential for efficient planning. Various forecasting methods, including classical and advanced pickup, have been evaluated for their effectiveness in predicting final bookings (Sun, Gauri and Webster, 2011). Time series models have been the traditional and most widely used models for tourism demand forecasting by many authors (Athanasopoulos et al., 2011) (Chan, Lim, Mcaleer 2005), (Jian-Wu, Hui, Zhi-Ping 2021), (Chen,2000). Additionally, studies have been conducted on cruise terminals (Kong. Lau, Tam, Palli (2014). A traffic comparison is made for the port in 2021 and seasonal movements are examined in the ports (Yabancı, 2023). Demand forecasting methods, which are among the most used methods in econometric models, provide information to sector stakeholders about how demand will change. In this way, stakeholders playing a role in the sector can make future predictions.

1.1. Cruise Tourism in Turkiye

Turkiye is a major transport hub connecting two continents, Europe and Asia. Turkiye symbolizes the habits from the past by being a brand country and ancient historical places. Additionally, Turkiye attracts cruise tourism with its location and supports other tourism activities as well. According to Brand Finance Best Cities **Index, Turkiye has three major cities, Istanbul ranked 31st in recognition, Antalya 95th and Izmir 100th. Those** cities are also having a significant impact on tourism types and that directly supports the tourism (Railynews,2025).

Accordingly, the following graphs are obtained in between 2011 and 2025. Figure 1 shows the number of cruise ship calling at Turkiye in between 2011 and 2025. It is seen that the highest number of ships arrived in 2011 is 274 ships. In figure 2; the number of cruise passengers arrived in Turkiye is shown. Accordingly, the highest passenger value is observed in 2015 and the value is 45,117.

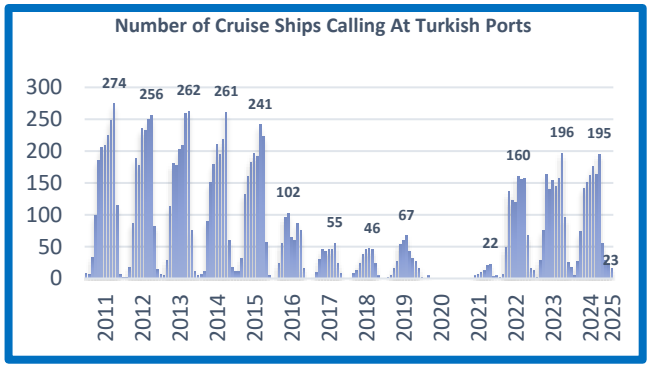

Figure 1. Number of Cruise Ships Calling at. Passengers in Turkiye in between 2011-2025

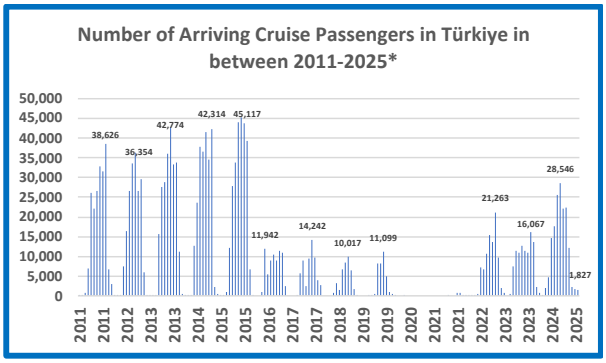

Figure 2. Number of Arriving Cruise Turkiye in between 2011-2025

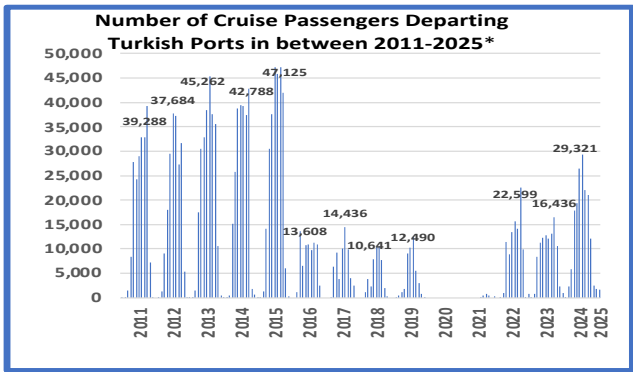

Figure 3. Number of Cruise Passengers

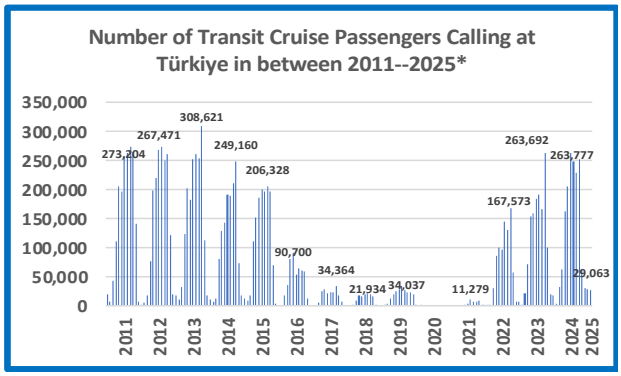

Figure 4. Number of Transit Cruise Passengers Calling at Turkiye in between 2011-2025. Departing Turkish Port in between 2011-2025

In figure 3; the number of cruise passengers departed Turkiye is given. Accordingly, it is observed that 47,125 passengers departed in 2015 with the highest rate. The data reading transit cruise passengers calling at Turkiye in between 2011-2025 is shown in figure 4. Accordingly, the maximum transit cruise passenger number is 308,621 in 2013.

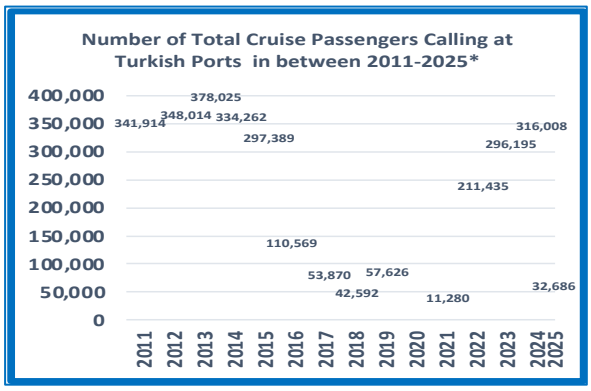

Figure 5. Number of Total Cruise Passengers Called at Turkiye in between 2011-2025

The total cruise passenger numbers between 2011-2025 are given in figure 5 and it is seen that the highest total cruise passenger number is 378,025 in 2013. It is seen that in between years 2011 and 2015 the highest numbers of total cruise passengers were achieved in Turkiye in past 14 years.

2. METHODOLOGY

In this study, the ships, cruise passengers that have arrived in Turkiye between 2011-2025, including the first two months of 2025 have been analyzed. The data included in the research are obtained from the Turkish Ministry of Transport and Infrastructure website (Ulaştırma Bakanlığı (2024). With this study, the main aim is to have answers to following questions:

- When did Turkiye have the highest number of cruise ships and passengers in between 2011-2024?
- What are the number of cruise ships and passengers arriving in each Port Harbour?
- Which Port Harbours did have the highest number of cruise ships and passengers?
- How did the cruise ship and passenger number values occur before and after the covid period?
- What are the estimate figures of cruise ships and passengers for next 5 years by using the data set in between 2011-2024?
- What is the comparison between the figures made in 2024 and estimated figures for 2030 by using ARIMA method?

In the first stage of the study, cruise statistics are evaluated. In this evaluation, the values observed on a monthly, annual and harbour masters basis are interpreted.

2.1. Non-Stationary Linear Stochastic Models (ARIMA)

If the observation values of a time series are not stationary around the mean value of these series, stationarity is achieved by taking appropriate differences of the series. The degree of difference is symbolized by d and in practice, d usually takes the value of 1 and at most 2. Models applied to series that are not stationary but have been converted to stationary by the difference process are called integrated models or "non-stationary stochastic models". If the degree of the autoregression parameter is p, the degree of the moving average parameter is q and the difference process is performed d times, this model is called an autoregressive integrated moving average model of degree (p,d,q) and is written as ARIMA (p,d,q) (Fazıl,1991),(Akgül, 2003), Duru,2007).

The expression of the general ARIMA (p.d.q) model is as follows:

$wt = \varphi 1 wt-1 + \varphi 2 wt-2 + ... + \varphi p wt-p + at - \theta 1 at-1 - \theta 1 at-2 - ... - \theta q at-q$

∇= Difference operator

d = Degree of difference

{wt} = Differenced series.

If the first differences (d=1) make the series

stationary, the difference operator

operation is shown as;

$\nabla xt = wt = xt - xt-1$

$\nabla xt = xt - xt-1$

If the dth differences make the series stationary, ∇ difference is expressed as;

$dxt = wt = (1- B)d\ xt\ \nabla$

The number of parameters to be calculated in the general ARIMA(p,d,q) model used in forward forecasting of series that do not show seasonal fluctuations is the same as in ARMA(p,q).

In the ARIMA(p,d,q) model, p or q can be zero. In this case, the model is reduced to either AR(d,p) or MA(d,q) model type.

1. ARIMA (0,1,1) model

$\nabla x_t = a_t - \theta_1 a_{t-1}$

$= (1-\theta_1 B)\, a_t$

2. ARIMA (0,2,2) model

$= (1-\theta_1 B - \theta_2 B^2)\, a_t$

3. ARIMA (1,1,1) model ∇x_t.

It is expressed by the equations $-\nabla x_{t-1} = a_t - \theta_1 a_{t-1}$ or $(1-\varphi_1 B)\, \nabla x_t = (1-\theta_1 B)\, a_t$.

In order to decide which of the ARIMA models will be appropriate for a time series to be analyzed for cruise datas, the stationarity and seasonality of the series must be determined.

3. FINDINGS

In the first stage, with the created data set, histogram curves are created in the model for cruise ships, arriving passenger, departing passenger, transit passenger and total passenger, and normal distribution kurtosis, skewness test, trend, detrend trend and extreme and low values of the data are determined.

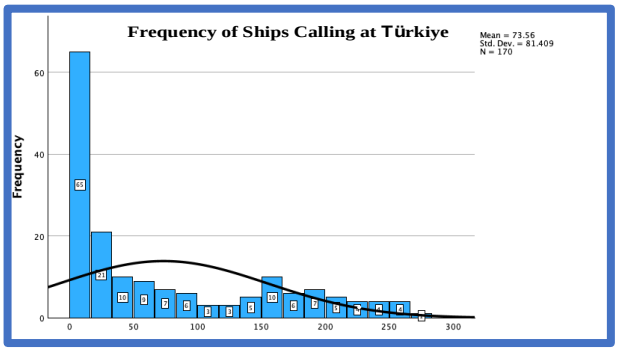

Figure 6. Frequency of Ships Calling at Turkish Ports

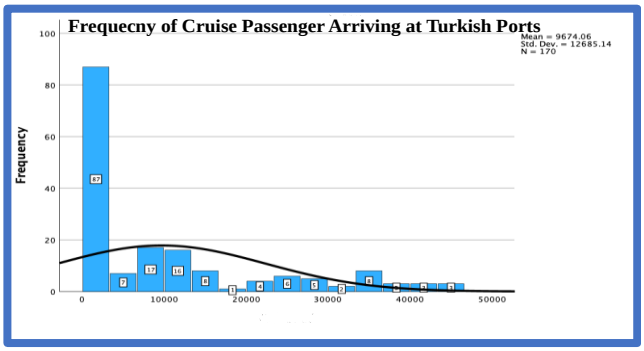

Figure 7. Frequency of Arriving Cruise Passenger in Turkish Ports

The frequency graph of ships calling at Turkish ports is shown in Figure 6. Accordingly, the average number of cruise passenger ships calling at Turkish port is observed as 73.56. The frequency graph of number of cruise passengers arriving in Turkish port in between 2011-2025 is shown in figure 7. Accordingly, the average number of arriving cruise passengers in Turkish port is observed as 9674.06.

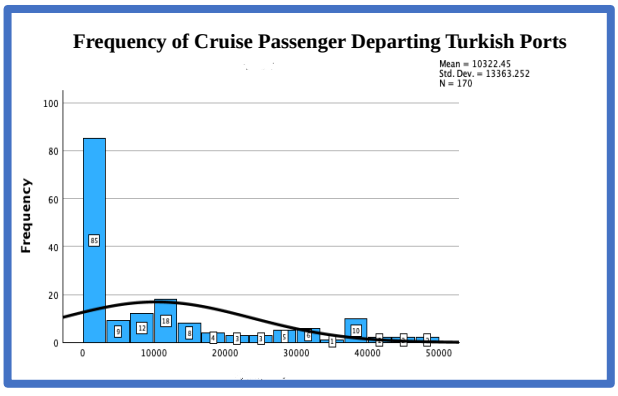

Figure 8. Frequency of Cruise Passengers.

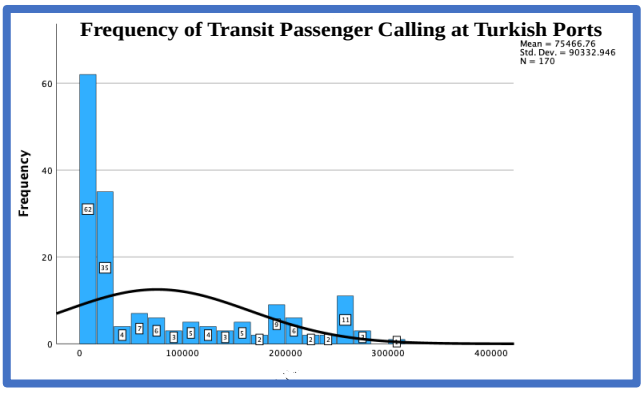

Figure 9. Frequency of Transit Passenger Departing Turkish Ports

Figure 8 shows the frequency graph of the number of cruise passengers departing Turkish ports. Accordingly, the average number of cruise passengers departing is observed as 10,322.45. Figure 9 shows the frequency graph of the number of transit passengers to Turkish Ports. Accordingly, the average number of transit passengers is observed as 75466.76.

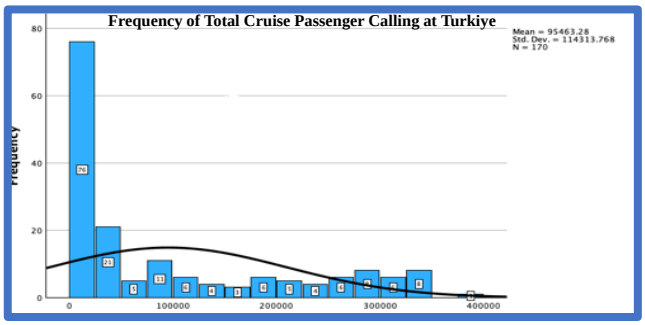

Figure 10. Frequency of Total Cruise Passenger Calling at Turkish Ports

Figure 10 shows the frequency graph of the total number of passengers to Turkish Ports. Accordingly, the average of the total number of passengers is observed as 95,463.28.

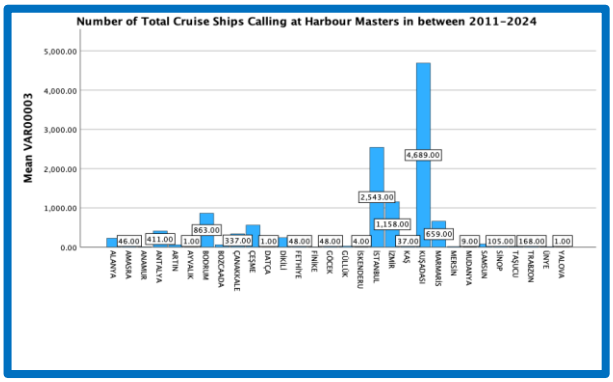

Figure11. Number of Total Cruise Ships Calling at in Harbour Masters in between 2011-2024.

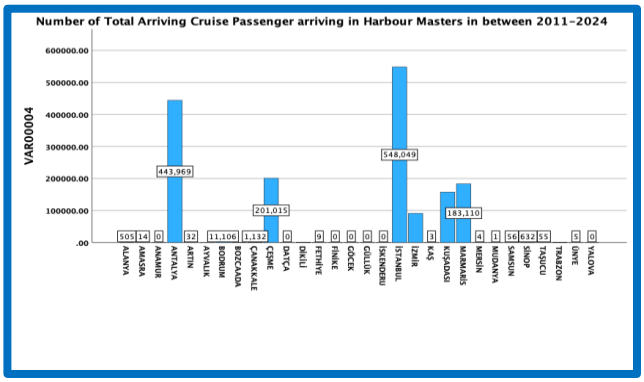

Figure12. Number of Total Cruise Passenger arriving in Harbour Masters in between 2011-2024.

Number of Total Cruise ships calling in Harbour Masters in between 2011-2024 is shown in figure 11. Accordingly, Kuşadası had 4689 ships, while İstanbul had 2543 ships and İzmir with 1158 ships. Number of total Cruise Passenger arriving in Harbour Masters in between 2011-2024 is shown in figure 12. Accordingly, Istanbul had 548,049 passengers, while Antalya had 443,969, following Çeşme with 201.015 passengers and Marmaris with 183,110 passengers.

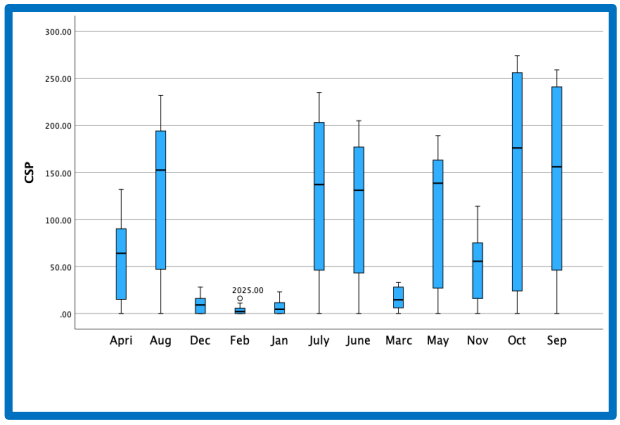

Figure 13. Comparison of the Number of Ships Cruise Calling at Turkiye for each month in between between 2011-2025.

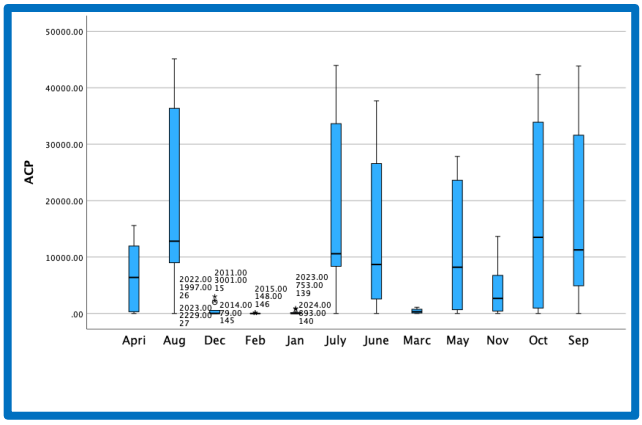

Figure14. Comparison of the Number of Arrival Passenger in Turkiye for each month in 2011-2025

With the evaluation made for each month on the number of cruise ships calling at Turkiye in between 2011-2024 is shown in figure 13, it is found that the maximum number of ships are reached in October 2013 by 274 ships, second month coming after it is September 2013 with 259 ships. The evaluation for each month on the number of passengers arriving in Turkiye in between 2011-2024 is shown in figure 15, it is found that the maximum number of passengers were reached back in August 2015 by 45,117 passenger, second month coming after it is July 2025 with 43,957 passengers. Starting by Figure 15 till Figure 19, the number of Cruise Ships called, Number of Passengers arrived in each Port Harbour Masters are observed on a monthly and yearly basis.

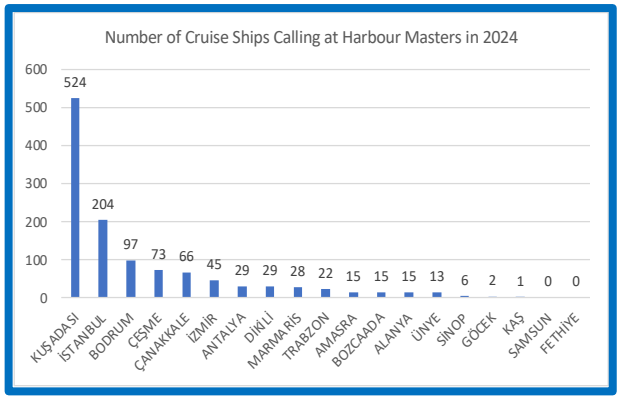

Figure 15. Number of Cruise Ships Calling Harbour Master in 2024

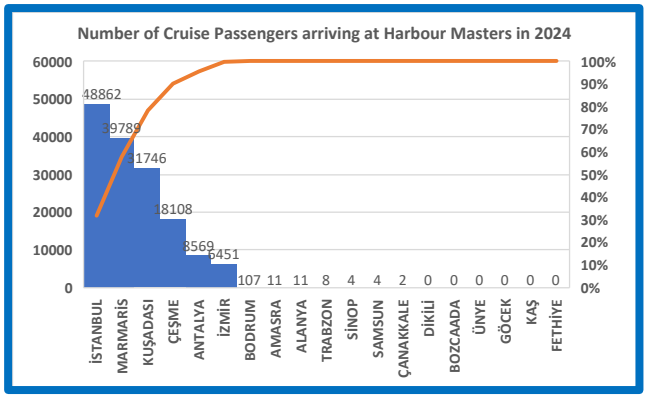

Figure 16 Number of Cruise Passengers arriving at at Harbour Master in 2024

The number of cruise ships arrived at Harbour Masters in 2024 are shown in figure 15. Accordingly, a total of 1,195 ships arrived at port authorities. It is observed that Kuşadası is the first most called harbour with 524 ships, Istanbul is ranked the second with 204 ships and Bodrum is the third with 97 ships. The number of cruise passengers arrived at port authorities in 2024 are shown in figure 16. Accordingly, it is observed that Istanbul is in the first rank with 48,862 passengers, Marmaris is the second with 39,789 passengers and Kuşadası is the third with 31,746 passengers. During this period, it is determined that 29 cruise ships arrived in Antalya Harbour Master with 8569 passengers. It is seen that Antalya Harbour Master itself is doing the %8 contribution to cruise tourism in Turkiye.

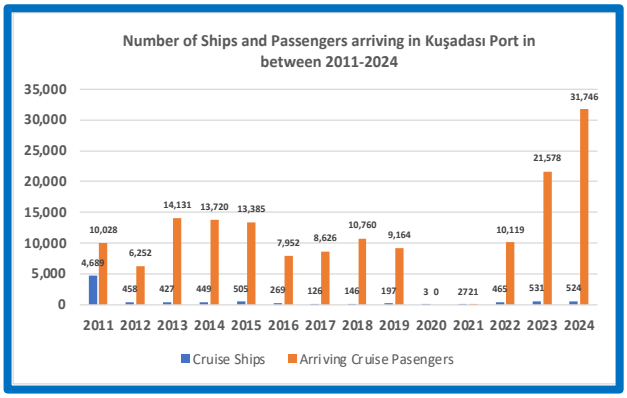

Figure 17. Number of Cruise Ships and Passengers arriving in Kuşadası Harbour Master in between 2011-2024.

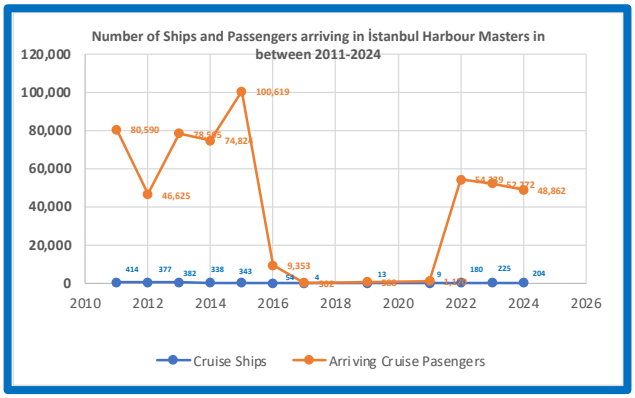

Figure 18. Number of Cruise Ships and Passengers arriving in İstanbul Harbour Master in between 2011-2024.

The number of ships and passengers arrived in Kuşadası Harbour Master in between 2011-2024 are given in figure 17. Accordingly, it is observed that the number of passengers arrived in 2024 is 31,746.

The number of ships and passengers arrived in Istanbul Harbour Master in between 2011-2024 are given in figure 18. It is observed that the highest number of ships and passengers arrived back in 2015. Accordingly, it is observed that the number of ships arrived is 343 and the number of passengers arriving is 100,619. It is seen that number of passengers arrived in Istanbul Harbour Master have significantly gone down since 2015.

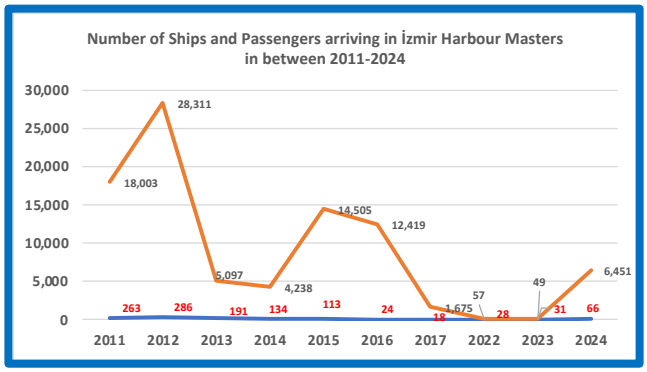

Figure 19. Number of Cruise Ships and Passengers arriving in Istanbul Harbour Masters in between 2011-2024

The number of ships and passengers arrived in Izmir Harbour Master in between 2011-2024 is given in figure 19. It is observed that the highest number of ships and passengers arrived in 2012. Accordingly, it is observed that the number of ships arrived is 286 and the number of passengers arrived is 28,311.

The other data obtained are briefly summarized as below:

- It has been determined that the average number of ships arrived in Antalya Harbour Master in between 2011-2024 is 32 and the average number of passengers arrived is 34,151.
- It has been determined that the average number of ships arrived in Alanya Harbour Master in between 2011-2024 is 19 and the average number of passengers arrived is 45.
- It has been determined that the average number of ships arrived in Bodrum Harbour Master in between 2011-2024 is 66 and the average number of passengers arrived is 854.
- It has been determined that the average number of ships arrived in Çeşme Harbour Master in between 2011-2024 is 47 and the average number of passengers arrived is 16,751.

- It has been determined that the average number of ships arrived in Dardanelles Harbour Master in between 2011-2024 is 28 and the average number of passengers arrived is 103.
- It has been determined that the average number of ships arrived in Marmaris Harbour Master in between 2011-2024 is 47 and the average number of passengers arrived is 11,025.

In this stage, current data are evaluated, and forecasting is done to estimate the future figures. Although there is no missing data in the data set, correction is applied only to the values that occurred as 0 in the 2020-2022 pandemic period and missing data conversion is made in the time series, and sequence and seasonal separation steps are performed using the SPSS 29 Package program. Expert programs are selected from the SPSS 29 package program time series forecasting application, comparison is made, and the most appropriate model is defined. Since the values for 2020 are zero, it is observed that the data difference is negative for a long period, even though the correction factor is applied.

In table 1 descriptive statistics of the mitting model is given. Statistics used to measure the predictive accuracy (prediction performance) of models; The mean squared error (MSE), root mean squared error (RMSE), absolute mean error (Mean Absolute Error - MAE), mean percentage error (Mean Percentage Error – MAE and mean absolute percentage error (MAPE) are called. The Dickey Fuller (DF) stationary significance test rate is also found to be significant for 5 models. Accordingly, the model's definition statistics are shown in table 2. The residual autocorrelation function and residual partial autocorrelation tables are shown in table 3 and table 4.

Table 1. Descriptive Statistics of the Fitting Model

Table 1. Descriptive Statisctics of the Fitting Model

		Model Fit							
		Fit Statistic							
		Stationary R-squared	R-squared	RMSE	MAPE	MaxAPE	MAE	MaxAE	Normalized BIC
Mean		.874	.874	14786.321	2009.044	91192.824	10255.699	48694.145	16.599
SE		.039	.039	15656.533	2609.444	125367.211	11076.986	48926.962	5.801
Minimum		.828	.828	26.892	88.000	1638.424	18.639	90.968	6.735
Maximum		.909	.909	34880.173	5084.758	266354.736	24517.928	112818.708	21.070
Percentile	5	.828	.828	26.892	88.000	1638.424	18.639	90.968	6.735
	10	.828	.828	26.892	88.000	1638.424	18.639	90.968	6.735
	25	.831	.831	2663.136	99.903	2014.230	1713.266	10501.024	11.988
	50	.893	.893	5454.670	120.776	2582.301	3551.793	21253.501	17.299
	75	.907	.907	31575.330	4862.319	224676.679	22150.086	100607.589	20.860
	90	.909	.909	34880.173	5084.758	266354.736	24517.928	112818.708	21.070
	95	.909	.909	34880.173	5084.758	266354.736	24517.928	112818.708	21.070

Table 2. Model Fit Statistics

		Model Statistics							
		Model Fit Sttaistics					Ljung-Box Q (18)		
Model	Number of Predictors	Stationary R-squared	R-Squared	RMSE	MAPE	Normalized BIC	Statistics	DF	Sig.	Number of Outliers
CS-Model_1	0	.893	.893	26.892	88.000	6.735	25.635	14	.029	<. 001
ACP-Model_2	0	.828	.828	5299.381	5084.758	17.241	30.156	16	.017	<. 001
DCP-Model_3	0	.835	.835	5454.670	4639.880	17.299	31.324	16	.012	<. 001
TransCP-Model_4	0	.904	.904	28270.488	111.805	20.650	35.701	14	.001	<. 001
TotalCP-Model_5	0	.909	.909	34880.173	120.776	21.070	32.027	14	.004	<. 001

Accordingly, the following abbreviations are used.

- CS represents number of Cruise ships
- ACP represents number of arriving Cruise Passengers

- DCP represents number of departing Cruise Passengers
- TransCP represents number of transit Cruise Passengers
- TotalCP represents number total Cruise Passengers

Table 3. Autocorrelation Function of Residuals

Residual ACF Summary

Lag	Mean	SE	Min	Max.	Percentile						
					5	10	25	50	75	90	95
Lag 1	.108	.072	.009	.170	.009	.009	.031	.148	.164	.170	.170
Lag 2	.125	.030	.084	.157	.084	.084	.093	.139	.149	.157	.157
Lag 3	.092	.063	.001	.144	.001	.001	.027	.129	.138	.144	.144
Lag 4	.040	.109	-.093	.135	-.093	-.093	-.078	.096	.129	.135	.135
Lag 5	-.035	.030	-.078	.005	-.078	-.078	-.060	-.033	-.011	.005	.005
Lag 6	-.086	.059	-.145	-.004	-.145	-.145	-.144	-.077	-.034	-.004	-.004
Lag 7	-.120	.032	-.171	-.086	-.171	-.171	-.147	-.119	-.093	-.086	-.086
Lag 8	-.028	.028	-.064	.008	-.064	-.064	-.051	-.036	-.001	.008	.008
Lag 9	.093	.029	.060	.130	.060	.060	.064	.099	.118	.130	.130
Lag 10	.069	.021	.041	.095	.041	.041	.051	.064	.090	.095	.095
Lag 11	.137	.020	.111	.162	.111	.111	.120	.133	.156	.162	.162
Lag 12	-.033	.140	-.183	.106	-.183	-.183	-.182	.020	.090	.106	.106
Lag 13	.061	.084	-.014	.160	-.014	-.014	-.005	.011	.152	.160	.160
Lag 14	.099	.066	.020	.175	.020	.020	.032	.108	.162	.175	.175
Lag 15	-.012	.029	-.055	.020	-.055	-.055	-.036	-.012	.013	.020	.020
Lag 16	-.047	.058	-.118	.019	-.118	-.118	-.098	-.066	.013	.019	.019
Lag 17	-.013	.102	-.130	.071	-.130	-.130	-.124	.054	.064	.071	.071
Lag 18	-.011	.027	-.053	.012	-.053	-.053	-.036	-.006	.012	.012	.012
Lag 19	-.017	.027	-.052	.015	-.052	-.052	-.041	-.022	.009	.015	.015
Lag 20	.055	.033	.019	.096	.019	.019	.024	.048	.089	.096	.096
Lag 21	.007	.053	-.064	.061	-.064	-.064	-.044	.009	.058	.061	.061
Lag 22	.020	.085	-.055	.121	-.055	-.055	-.047	-.031	.112	.121	.121
Lag 23	.087	.035	.053	.128	.053	.053	.060	.069	.125	.128	.128
Lag 24	.111	.036	.052	.138	.052	.052	.077	.127	.138	.138	.138

Table 4. Summary of Residual Autocorrelation (Residual PACF)

Residual PACF Summary

Lag	Mean	SE	Min	Max	Percentile						
					5	10	25	50	75	90	95
Lag 1	.108	.072	.009	.170	.009	.009	.031	.148	.164	.170	.170
Lag 2	.110	.031	.082	.157	.082	.082	.082	.113	.138	.157	.157
Lag 3	.071	.049	-.002	.110	-.002	-.002	.021	.097	.108	.110	.110
Lag 4	.006	.097	-.106	.100	-.106	-.106	-.098	.048	.090	.100	.100
Lag 5	-.067	.022	-.093	-.042	-.093	-.093	-.086	-.078	-.044	-.042	-.042
Lag 6	-.094	.039	-.129	-.031	-.129	-.129	-.126	-.100	-.059	-.031	-.031
Lag 7	-.113	.034	-.148	-.077	-.148	-.148	-.146	-.117	-.078	-.077	-.077
Lag 8	.010	.039	-.029	.065	-.029	-.029	-.022	-.008	.051	.065	.065
Lag 9	.139	.044	.092	.195	.092	.092	.095	.143	.181	.195	.195
Lag 10	.077	.029	.039	.113	.039	.039	.049	.080	.103	.113	.113
Lag 11	.110	.042	.067	.174	.067	.067	.075	.097	.151	.174	.174
Lag 12	-.120	.120	-.256	-.007	-.256	-.256	-.250	-.055	-.023	-.007	-.007
Lag 13	-.026	.130	-.142	.115	-.142	-.142	-.138	-.083	.115	.115	.115
Lag 14	.083	.039	.042	.134	.042	.042	.045	.086	.120	.134	.134
Lag 15	-.027	.034	-.059	.025	-.059	-.059	-.057	-.025	.002	.025	.025
Lag 16	-.026	.034	-.077	.013	-.077	-.077	-.055	-.030	.006	.013	.013
Lag 17	.038	.122	-.097	.149	-.097	-.097	-.095	.114	.133	.149	.149
Lag 18	-.024	.015	-.041	.001	-.041	-.041	-.036	-.024	-.011	.001	.001
Lag 19	-.017	.043	-.063	.030	-.063	-.063	-.062	-.008	.023	.030	.030
Lag 20	.050	.030	.003	.080	.003	.003	.022	.061	.073	.080	.080
Lag 21	-.007	.061	-.108	.046	-.108	-.108	-.058	-.001	.041	.046	.046
Lag 22	-.003	.099	-.104	.116	-.104	-.104	-.090	-.039	.102	.116	.116
Lag 23	.069	.037	.035	.121	.035	.035	.040	.051	.107	.121	.121
Lag 24	.073	.060	.003	.146	.003	.003	.011	.098	.122	.146	.146

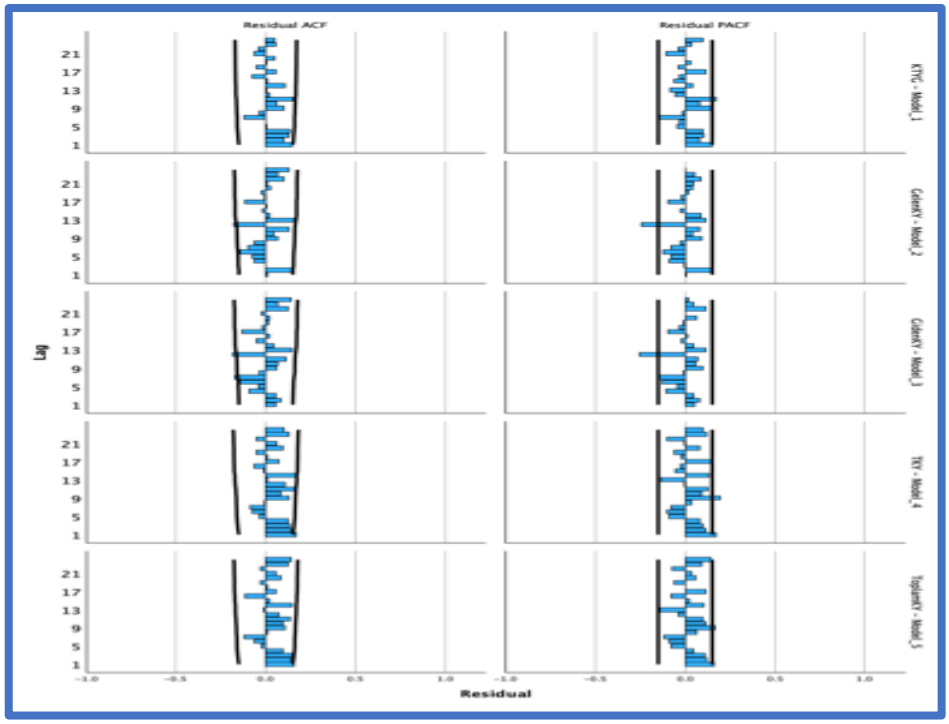

Figure 20. Residual ACF and Residual PACF

Accordingly, the residual ACF and PACF pulse graphs of the gait are observed in Figure 20. The most appropriate model types for the predictions are shown in table 5. In table 6 Arima Model Parameters are given.

- Cruise Ships model ARIMA (0,0,3) (1,0,0) model is found to be the best fitted model for the given Cruise Ship Data Stationary R square value of selected models is 0.893 and Ljung–Box test value is 14 and p value is 0.029.
- Arriving Cruise Passengers Model ARIMA (1,0,0) (1,0,0) model is found to be the best fitted model for the given Arriving Cruise Passengers Data Stationary R square value of selected models is 0.0828 and Ljung–Box test value is 16 and p value is 0.017.
- Departing Cruise Passengers Model ARIMA (1,0,0) (1,0,0) model is found to be the best fitted model for the given Arriving Cruise Passengers Data Stationary R square value of selected models is 0.835 and Ljung–Box test value is 16 and p value is 0.012.
- Transit Cruise Passengers Model ARIMA (0,0,3) (1,0,0) model is found to be the best fitted model for the given Arriving Cruise Passengers Data Stationary R square value of selected models is 0.904 and Ljung–Box test value is 14 and p value is 0.001.
- Total Cruise Passengers Model ARIMA (0,0,3) (1,0,0) model is found to be the best fitted model for the given Arriving Cruise Passengers Data Stationary R square value of selected models is 0.909 and Ljung–Box test value is 14 and p value is 0.004.

Table 5. The Most Suitable Model Types for Forecasting

	Model Type		
Model ID	CS	Model_1	ARIMA(0,0,3)(1,0,0)
	ACS	Model_2	ARIMA(1,0,0)(1,0,0)
	DCS	Model_3	ARIMA(1,0,0)(1,0,0)
	TransCS	Model_4	ARIMA(0,0,3)(1,0,0)
	TotalCS	Model_5	ARIMA(0,0,3)(1,0,0)

Table 6. ARIMA Model Parameters

ARIMA Model Parameters							
				Estimate	SE	t	Sig.
CS-Model_1	CS	Constant		94.022	27.858	3.375	<.001
		MA	Lag 1	-.912	.076	-12.027	<.001
			Lag 2	-.684	.090	-7.585	<.001
			Lag 3	-.347	.077	-4.524	<.001
		AR, Seasonal	Lag 1	.863	.037	23.150	<.001
ACP-Model_2	ACP	Constant		11010.190	5213.753	2.112	.036
		AR	Lag 1	.754	.052	14.586	<.001
		AR, Seasonal	Lag 1	.762	.048	15.849	<.001
DCP-Model_3	DCP	Constant		11617.004	5731.849	2.027	.044
		AR	Lag 1	.768	.050	15.292	<.001
		AR, Seasonal	Lag 1	.764	.048	15.964	<.001
TransCP-Model_4	TranscP	Constant		109087.470	31932.969	3.416	<.001
		MA	Lag 1	-.877	.072	-12.229	<.001
			Lag 2	-.661	.085	-7.814	<.001
			Lag 3	-.419	.071	-5.881	<.001
		AR, Seasonal	Lag 1	.875	.037	23.459	<.001
TotalCP--Model_5	TotalCP	Constant		133530.708	39656.818	3.367	<.001
		MA	Lag 1	-.958	.073	-13.086	<.001
			Lag 2	-.717	.089	-8.098	<.001
			Lag 3	-.391	.073	-5.375	<.001
		AR, Seasonal	Lag 1	.872	.037	23.782	<.001

The goodness of fit model values is given in table 7. Arıma test parameter estimates is given in table 8

Table 7. Goodness of Fit

Goodness of Fit[a]			
	Value	df	Value/df
Deviance	2051.912	169	12.141
Scaled Deviance	170.000	169	
Pearson Chi-Square	2051.912	169	12.141
Scaled Pearson Chi-Square	170.000	169	
Log Likelihood[b]	-452.931		
Akaike's Information Criterion (AIC)	909.863		
Finite Sample Corrected AIC (AICC)	909.935		
Bayesian Information Criterion (BIC)	916.135		
Consistent AIC (CAIC)	918.135		

Dependent Variable: MONTH, period 12
Model: (Intercept)

Table 8. Parameters Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	6.441	.2665	5.919	6.963	584.345	1	<.001
(Scale)	12.070[a]	1.3092	9.759	14.929			

Dependent Variable: MONTH, period 12
Model: (Intercept)

Table 9. Demand Forecasting for Cruise Passenger Ships Calling at Turkish Ports in between 2025-2030

CS-Model-1			
Months-Years	**Prediction (P)**	**Upper Control Limit (UCL)**	**Lower Control Limit (LCL)**
Mar 2025	42	88	-4
Apr 2025	72	135	10
May 2025	134	204	64
Jun 2025	143	215	71
Jul 2025	153	224	81
Aug 2025	165	236	93
Sep 2025	154	226	83
Oct 2025	181	253	109
Nov 2025	60	132	-11
Dec 2025	37	109	-35
Jan 2026	33	104	-39
Feb 2026	27	98	-45
Mar 2026	49	131	-33
Apr 2026	75	165	-15
May 2026	129	222	35
Jun 2026	136	231	42
Jul 2026	145	239	50
Aug 2026	155	250	60
Sep 2026	146	241	51
Oct 2026	169	264	74
Nov 2026	65	160	-30
Dec 2026	45	140	-50
Jan 2027	41	136	-54
Feb2027	36	131	-59
Mar2027	55	156	-46
Apr 2027	78	183	-28
May2027	124	232	16
Jun 2027	131	239	22
Jul 2027	138	246	29
Aug 2027	147	255	38
Sep 2027	139	248	30
Oct 2027	159	268	50
Nov 2027	69	178	-40
Dec 2027	52	160	-57
January 2028	48	157	-60

CS-Model-1			
Months-Years	**Prediction (P)**	**Upper Control Limit (UCL)**	**Lower Control Limit (LCL)**
Feb 2028	44	153	-65
Mar 2028	60	173	-52
Apr 2028	80	196	-36
May 2028	120	237	2
Jun 2028	126	244	8
Jul 2028	132	250	14
Aug 2028	139	258	21
Sep 2028	133	251	15
Oct 2028	150	268	32
Nov 2028	72	190	-46
Dec 2028	57	176	-61
Jan 2029	55	173	-63
Feb 2029	51	169	-67
Mar 2029	65	186	-56
Apr 2029	82	205	-41
May 2029	116	241	-8
Jun 2029	121	246	-3
Jul 2029	127	251	2
Aug 2029	133	258	9
Sep 2029	127	252	3
Oct 2029	142	267	18
Nov 2029	75	200	-49
Dec 2029	62	187	-62
Feb 2028	60	185	-65
Mar 2028	57	181	-68
Apr 2028	69	196	-58
May 2028	84	212	-45
Jan2030	113	242	-16
Feb 2030	118	247	-12
Mar 2030	122	251	-7
Apr 2030	128	257	-1
May 2030	123	252	-6
Jun 2030	136	265	6
Jul 2030	78	207	-51
Aug 2030	67	196	-62

Demand Forecasting numbers obtained from the model 1 to estimate the number of Cruise Passenger Ships Calling at Turkish Ports in between 2025-2030 are shown in table 9.

Table. 10 Demand Forecasting for Number of Cruise Passenger Arriving in Turkish Ports in between 2025-2030

ACS-Model-2			
Months-Years	Prediction (P)	Upper Control Limit (UCL)	Lower Control Limit (LCL)
Mar 2025	3385	12919	-6148
Apr 2025	5659	17598	-6280
May 2025	13338	26449	227
Jun 2025	15819	29551	2086
Jul 2025	21958	36032	7885
Aug 2025	24182	38445	9918
Sep 2025	19405	33776	5035
Oct 2025	19584	34015	5153
Nov 2025	11894	26359	-2571
Dec 2025	4363	18847	-10122
Jan 2026	3965	18460	-10531
Feb 2026	3790	18292	-10711
Mar 2026	5172	21539	-11194
Apr 2026	6912	24249	-10425
May 2026	12769	30634	-5096
Jun 2026	14663	32822	-3495
Jul 2026	19345	37668	1022
Aug 2026	21042	39458	2626
Sep 2026	17403	35872	-1065
Oct 2026	17541	36039	-957
Nov 2026	11681	30196	-6834
Dec 2026	5942	24467	-12583
Jan 2027	5639	24169	-12891
Feb2027	5507	24040	-13027
Mar2027	6560	25978	-12857
Apr 2027	7886	27789	-12016
May2027	12350	32523	-7823
Jun 2027	13794	34119	-6531
Jul 2027	17362	37773	-3049
Aug 2027	18655	39115	-1804
Sep 2027	15882	36369	-4605
Oct 2027	15987	36490	-4516
Nov 2027	11521	32033	-8991
Dec 2027	7148	27664	-13369
January 2028	6917	27437	-13603

ACS-Model-2			
Months-Years	Prediction (P)	Upper Control Limit (UCL)	Lower Control Limit (LCL)
Feb 2028	6816	27337	-13705
Mar 2028	7619	28610	-13372
Apr 2028	8629	29882	-12624
May 2028	12031	33432	-9369
Jun 2028	13132	34616	-8353
Jul 2028	15851	37383	-5680
Aug 2028	16837	38395	-4722
Sep 2028	14723	36297	-6850
Oct 2028	14803	36385	-6779
Nov 2028	11400	32987	-10187
Dec 2028	8066	29656	-13523
Jan 2029	7891	29482	-13701
Feb 2029	7814	29406	-13779
Mar 2029	8426	30279	-13427
Apr 2029	9196	31195	-12804
May 2029	11788	33871	-10294
Jun 2029	12627	34757	-9503
Jul 2029	14699	36856	-7457
Aug 2029	15450	37622	-6721
Sep 2029	13840	36020	-8340
Oct 2029	13901	36086	-8284
Nov 2029	11307	33495	-10881
Dec 2029	8767	30956	-13423
Jan2030	8633	30823	-13557
Feb 2030	8574	30765	-13617
Mar 2030	9040	31379	-13298
Apr 2030	9627	32049	-12795
May 2030	11603	34072	-10866
Jun 2030	12242	34738	-10254
Jul 2030	13822	36333	-8689
Aug 2030	14394	36914	-8126
Sep 2030	13167	35692	-9358
Oct 2030	13213	35741	-9315
Nov 2030	11236	33766	-11293
Dec 2030	9300	31831	-13230

Demand Forecasting numbers obtained from the model 2 to estimate the number of Cruise Passengers arrivals in Turkiye in between 2025-2030 are shown in table 10.

Table. 11 Demand Forecasting for Number of Cruise Passenger Departing Turkish Ports in between 2025-2030

DCS-Model-3			
Months-Years	Prediction (P)	Upper Control Limit (UCL)	Lower Control Limit (LCL)
Mar 2025	3693	13528	-6141
Apr 2025	6586	18986	-5815
May 2025	15875	29566	2185
Jun 2025	17171	31568	2773
Jul 2025	22693	37492	7894
Aug 2025	24903	39933	9872
Sep 2025	19359	34525	4194
Oct 2025	18737	33981	3492
Nov 2025	11815	27106	-3476
Dec 2025	4494	19812	-10825
Jan 2026	4055	19390	-11279
Feb 2026	3938	19282	-11407
Mar 2026	5530	22799	-11740
Apr 2026	7747	26058	-10564
May 2026	14847	33745	-4051
Jun 2026	15841	35077	-3395
Jul 2026	20062	39495	629
Aug 2026	21752	41300	2204
Sep 2026	17522	37137	-2094
Oct 2026	17048	36703	-2608
Nov 2026	11764	31443	-7915
Dec 2026	6174	25867	-13518
Jan 2027	5840	25541	-13861
Feb2027	5751	25457	-13955
Mar2027	6967	27586	-13652
Apr 2027	8661	29800	-12478
May2027	14083	35523	-7357
Jun 2027	14842	36458	-6774
Jul 2027	18065	39784	-3653
Aug 2027	19356	41135	-2423
Sep 2027	16125	37940	-5689
Oct 2027	15764	37599	-6072
Nov 2027	11729	33577	-10119
Dec 2027	7461	29316	-14395
January 2028	7206	29065	-14654

DCS-Model-3			
Months, Years	Prediction (P)	Upper Control Limit (UCL)	Lower Control Limit (LCL)
Feb 2028	7138	29000	-14725
Mar 2028	8066	30414	-14282
Apr 2028	9359	31989	-13270
May 2028	13500	36294	-9295
Jun 2028	14080	36970	-8811
Jul 2028	16541	39488	-6407
Aug 2028	17526	40507	-5455
Sep 2028	15060	38060	-7941
Oct 2028	14783	37796	-8229
Nov 2028	11703	34722	-11317
Dec 2028	8443	31467	-14580
Jan 2029	8249	31274	-14777
Feb 2029	8197	31224	-14831
Mar 2029	8906	32203	-14392
Apr 2029	9893	33349	-13562
May 2029	13055	36603	-10494
Jun 2029	13497	37100	-10105
Jul 2029	15377	39012	-8258
Aug 2029	16129	39783	-7524
Sep 2029	14246	37911	-9419
Oct 2029	14035	37706	-9637
Nov 2029	11682	35358	-11993
Dec 2029	9194	32871	-14484
Jan2030	9045	32724	-14634
Feb 2030	9005	32685	-14675
Mar 2030	9547	33380	-14287
Apr 2030	10301	34224	-13623
May 2030	12715	36692	-11262
Jun 2030	13053	37061	-10955
Jul 2030	14488	38515	-9539
Aug 2030	15063	39100	-8975
Sep 2030	13624	37668	-10419
Oct 2030	13463	37511	-10584
Nov 2030	11667	35717	-12383
Dec 2030	9766	33818	-14285

Demand Forecasting numbers obtained from the model 3 to estimate the number of Cruise Passengers departures from Turkiye in between 2025-2030 are shown in table 11.

Table. 12 Demand Forecasting for Number of Transit Cruise Passenger Calling at Turkish Ports in between 2025-2030

TransCS-Model-4			
Ay-Yıl	Tahmin	Üst Sınır Limiti	Alt Sınır Limiti
Mar 2025	53762	102776	4748
Apr 2025	68163	133369	2957
May 2025	154810	227624	81996
Jun 2025	194221	269879	118564
Jul 2025	244447	320104	168789
Aug 2025	230845	306503	155188
Sep 2025	214547	290204	138889
Oct 2025	234463	310120	158805
Nov 2025	69414	145071	-6244
Dec 2025	40144	115801	-35514
Jan 2026	39063	114720	-36595
Feb 2026	36925	112583	-38732
Mar 2026	60676	147644	-26293
Apr 2026	73277	168038	-21484
May 2026	149097	248009	50184
Jun 2026	183583	284116	83050
Jul 2026	227532	328065	126999
Aug 2026	215630	316163	115097
Sep 2026	201368	301902	100835
Oct 2026	218796	319329	118262
Nov 2026	74371	174905	-26162
Dec 2026	48759	149292	-51774
Jan 2027	47813	148346	-52720
Feb2027	45943	146476	-54590
Mar2027	66725	174035	-40584
Apr 2027	77752	190000	-34497
May2027	144097	259055	29139
Jun 2027	174274	290303	58244
Jul 2027	212731	328761	96702
Aug 2027	202317	318346	86287
Sep 2027	189837	305866	73807
Oct 2027	205086	321116	89057
Nov 2027	78709	194739	-37320
Dec 2027	56298	172327	-59732
January 2028	55470	171500	-60559

TransCS-Model-4			
Ay-Yıl	Tahmin	Üst Sınır Limiti	Alt Sınır Limiti
Feb 2028	53833	169863	-62196
Mar 2028	72019	192606	-48568
Apr 2028	81668	205650	-42315
May 2028	139722	265591	13853
Jun 2028	166128	292748	39509
Jul 2028	199780	326399	73160
Aug 2028	190667	317286	64047
Sep 2028	179746	306366	53127
Oct 2028	193090	319710	66471
Nov 2028	82506	209125	-44114
Dec 2028	62894	189514	-63725
Jan 2029	62170	188790	-64449
Feb 2029	60738	187357	-65881
Mar 2029	76651	206490	-53188
Apr 2029	85094	217359	-47171
May 2029	135894	269516	2272
Jun 2029	159000	293164	24836
Jul 2029	188447	322611	54283
Aug 2029	180472	314636	46308
Sep 2029	170917	305081	36753
Oct 2029	182593	316757	48429
Nov 2029	85827	219991	-48337
Dec 2029	68667	202831	-65497
Jan2030	68033	202197	-66131
Feb 2030	66780	200944	-67384
Mar 2030	80704	217205	-55796
Apr 2030	88092	226364	-50179
May 2030	132544	271812	-6723
Jun 2030	152763	292429	13097
Jul 2030	178530	318196	38864
Aug 2030	171552	311218	31886
Sep 2030	163191	302856	23525
Oct 2030	173408	313074	33742
Nov 2030	88734	228400	-50932
Dec 2030	73718	213383	-65948

Demand Forecasting numbers obtained from the model 4 to estimate the number of Transit Cruise Passengers through Turkiye in between 2025-2030 are shown in table 12.

Table. 13. Demand Forecasting for Number of Total Cruise Passenger Calling at Turkish Ports in between 2025-2030

TotalCS-Model-5			
Months, Years	Prediction (P)	Upper Control Limit (UCL)	Lower Control Limit (LCL)
Mar 2025	57325	117266	-2615
Apr 2025	77627	160616	-5361
May 2025	186144	279613	92676
Jun 2025	229422	325781	133062
Jul 2025	292574	388933	196214
Aug 2025	283938	380298	187579
Sep 2025	255798	352158	159439
Oct 2025	275041	371400	178681
Nov 2025	93883	190242	-2477
Dec 2025	47708	144067	-48652
Jan 2026	45637	141996	-50723
Feb 2026	43144	139504	-53215
Mar 2026	67112	176722	-42499
Apr 2026	84807	205293	-35679
May 2026	179388	305569	53206
Jun 2026	217107	344930	89285
Jul 2026	272149	399971	144326
Aug 2026	264622	392445	136800
Sep 2026	240096	367919	112274
Oct 2026	256868	384690	129045
Nov 2026	98975	226797	-28848
Dec 2026	58729	186552	-69093
Jan 2027	56925	184747	-70898
Feb2027	54752	182574	-73071
Mar2027	75642	211332	-60049
Apr 2027	91064	233587	-51459
May2027	173499	319717	27280
Jun 2027	206374	353672	59076
Jul 2027	254347	401645	107049
Aug 2027	247787	395085	100489
Sep 2027	226411	373709	79113
Oct 2027	241028	388326	93730
Nov 2027	103412	250710	-43885
Dec 2027	68336	215634	-78962
January 2028	66763	214060	-80535

TotalCS-Model-5			
Months, Years	Prediction	Upper Control Limit (UCL)	Lower Control Limit (LCL)
Feb 2028	64869	212167	-82429
Mar 2028	83076	235626	-69475
Apr 2028	96518	253730	-60695
May 2028	168366	328135	8596
Jun 2028	197019	357540	36498
Jul 2028	238831	399352	78310
Aug 2028	233114	393635	72593
Sep 2028	214483	375004	53962
Oct 2028	227223	387744	66702
Nov 2028	107280	267801	-53240
Dec 2028	76708	237229	-83813
Jan 2029	75337	235858	-85184
Feb 2029	73687	234208	-86834
Mar 2029	89555	253761	-74650
Apr 2029	101271	268783	-66241
May 2029	163892	333232	-5448
Jun 2029	188866	358745	18987
Jul 2029	225308	395187	55429
Aug 2029	220325	390204	50446
Sep 2029	204087	373966	34208
Oct 2029	215191	385070	45312
Nov 2029	110652	280531	-59227
Dec 2029	84006	253885	-85873
Jan2030	82811	252690	-87068
Feb 2030	81372	251251	-88507
Mar 2030	95203	267736	-77330
Apr 2030	105414	280345	-69518
May 2030	159993	336257	-16271
Jun 2030	181759	358416	5102
Jul 2030	213522	390179	36865
Aug 2030	209178	385835	32522
Sep 2030	195026	371682	18369
Oct 2030	204704	381361	28047
Nov 2030	113590	290247	-63067
Dec 2030	90366	267023	-86291

Demand Forecasting numbers obtained from the model 5 to estimate the number of Total Cruise Passengers through Turkiye in between 2025-2030 are shown in table 13.

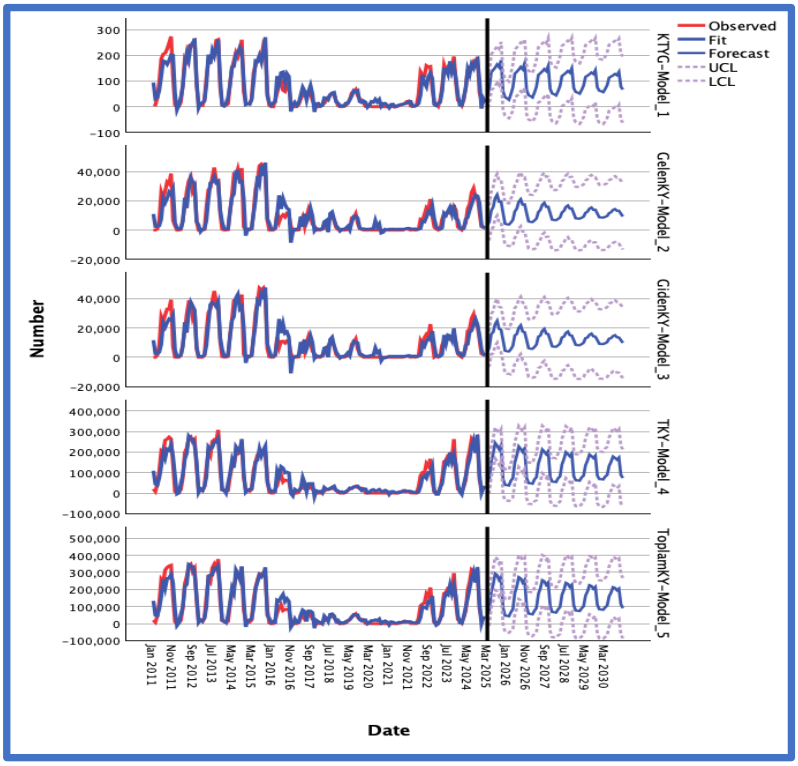

Figure 21. Demand Forecast Graphs of Model I, Model II, Model III, Model IV and Model V

The graphs of forecast results obtained from Model I, Model II, Model III, Model IV and Model V figures are shown in figure 21.

4. DISCUSSION

According to the statistical data published by the Ministry of Culture and Tourism: 1195 ships called in Turkish cruise ports in 2024, and the number of incoming cruise passengers is observed to be 153,663 (Cruise Statistics 2024).

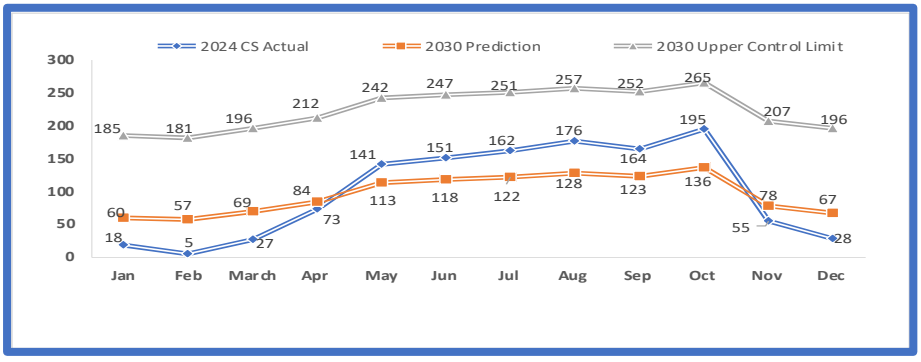

Figure: 22. Comparison of Cruise Ship Arrivals in Turkiye Monthly Forecast Numbers and Upper Control Limit Numbers for 2030 and Monthly Actual Values for 2024

Monthly estimates of cruise ships arrivals in Turkiye for 2030 and upper control limit values and monthly actual numbers for 2024 are shown in the comparison figure 22. When the estimates for 2024 and 2030 are compared, it is observed that the average number of cruise ships arriving in 2024 is 100, this value is calculated as 224 reaching the highest value in 2030 and the average value will be 96 ships. It is estimated that there will be a decrease of 4% compared to the estimate of 2030.

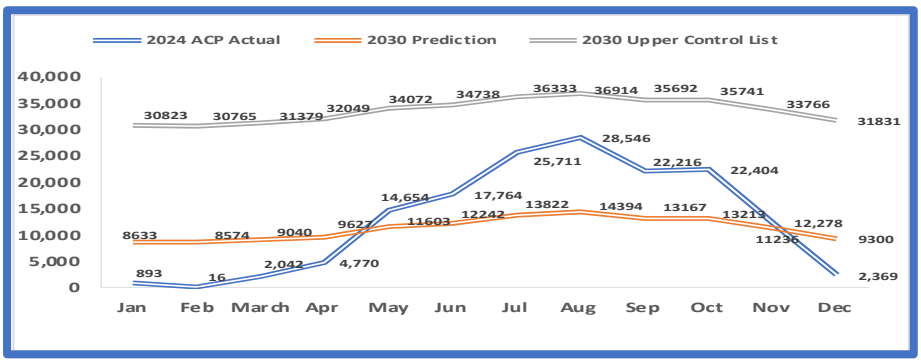

Figure: 23. Comparison of Cruise Passenger Arrivals in Turkiye Monthly Forecast Numbers and Upper Control Limit Numbers for 2030 and Monthly Actual Values for 2024

Monthly estimates of cruise passenger arrivals in Turkiye for 2030 and upper control limit values and monthly actual numbers for 2024 are shown in the comparison figure 23. When the estimates for 2024 and 2030 are compared, it is observed that the average number of cruise passengers arriving in 2024 is 12,835, marking the highest number will be 33,675 passengers for 2030 and the average value 11,238 passengers. It is estimated that there will be a decrease of 12.24% compared to the estimate of 2030.

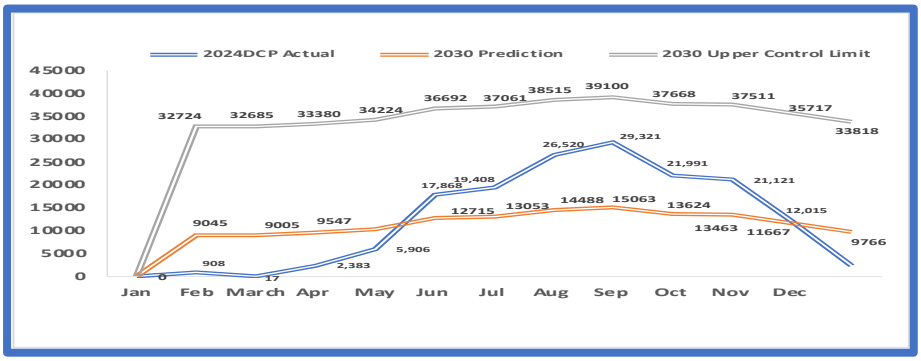

Figure: 24. Comparison of Cruise Passenger Departures in Turkiye, Monthly Forecast Numbers and Upper Control Limit Numbers for 2030 and Monthly Actual Values for 2024

Monthly estimates of cruise passenger departures in Turkiye for 2030 and upper control limit values and monthly actual numbers for 2024 are shown in the comparison figure 24. When comparing the 2024 and 2030 estimates, it is observed that the average number of outgoing cruise passengers is 13,321 in 2024, this value is calculated 35,758 as the highest value in 2030 and the average value is 11,811 passengers. It is estimated that there will be a decrease of 11.33% compared to the estimate of 2030.

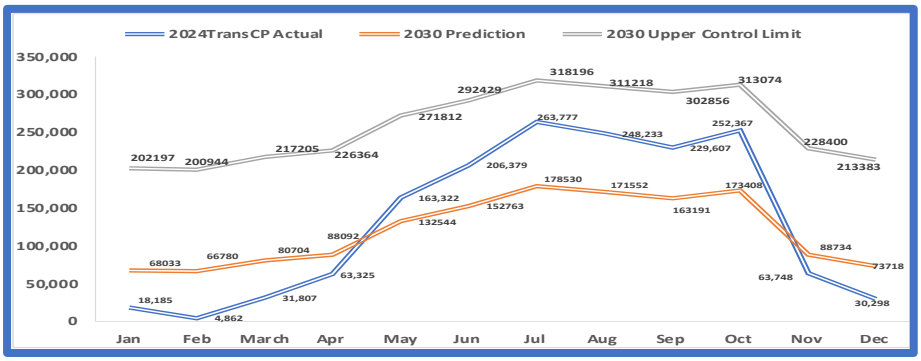

Figure: 25. Comparison of Transit Cruise Passenger Calls in Turkiye, Monthly Forecast Numbers and Upper Control Limit Numbers for 2030 and Monthly Actual Values for 2024

Monthly estimates of transit cruise passenger call in Turkiye for 2030 and upper control limit values and monthly actual numbers for 2024 are shown in the comparison figure 25. When comparing the 2024 and 2030 estimates, it is observed that the average number of transit cruise passengers is 131,326 in 2024, this value is calculated 258,173 as the highest value in 2030 and its average value is 119,837 passengers. It is estimated that there will be a decrease of 8.74% compared to the estimate of 2030.

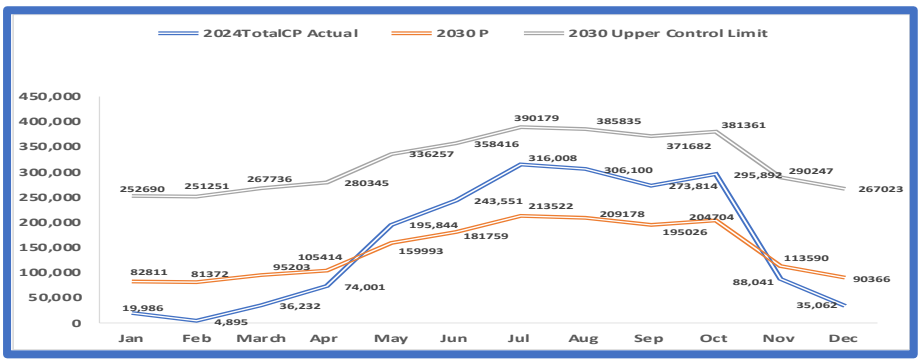

Figure: 26. Comparison of Total Cruise Passenger Calls in Turkiye Monthly Forecast Numbers and Upper Control Limit Numbers for 2030 and Monthly Actual Values for 2024

Monthly estimates of total cruise passengers call in Turkiye for 2030 and upper control limit values and monthly actual numbers for 2024 are shown in the comparison figure 26. When comparing the 2024 and 2030 estimates, it is observed that the average of total number of cruise passengers is 157,452 in 2024, this value is calculated 319,419 as the highest value in 2030 and its average value is 144,412 passengers. It is estimated that there will be a decrease of 8.28 % compared to the estimate of 2030.

According to the report published by CLIA International Cruise Union, it has been observed that cruise tourism has gradually recovered in all regions of the world after the pandemic period and the same situation has been observed in Turkiye. As a result, it has been observed that the trend in the estimated data is going in the direction of recovery, but the negative impact will continue for the next 5 years. In addition, it is observed that there has been an increase in the number of incoming passengers and ships, and it is determined that the reason for this is that passenger preferences in cruise ports in Turkiye, especially in Istanbul Galataport, are focused on Turkiye. It has been understood that the zero number of ships and the zero-passenger effect recorded in the statistics during the pandemic period negatively effected the future demand estimates. For this reason, the upper control limit values are specified in the obtained data and the results are interpreted for 2030.

It is observed that the values of 2011 and 2025 reached the highest values in cruise tourism. It is expected that tourism demand will increase despite the pandemic and will increase accordingly in these upcoming periods for Turkiye. With Istanbul Galataport got into service back in 2021 has supported cruise tourism and with various historical and religious culture of Izmir and Kuşadası resulted in cruise companies adding Antalya to their routes. It is understood that demand will increase in the coming years despite the pandemic and reach the expected levels.

When examined on a monthly basis, it is determined that cruise tourism is effective in almost every month, but the number of ships and passengers arriving reaches the highest values in August, September and October.

Although the average values for 2030 are in line with the estimates made with pandemic effect that seems to be around 4% lower in 2024, it is expected to reach the highest values in 2030 with estimated values studied in this method.

5. CONCLUSION AND SUGGESTION

It is stated by CLIA that families keeps travelling together since three or five generations while having cruise tours. The ability to visit more than one destination in a single tour, makes them enjoy the tour that they pay, can be listed as the most important factors why cruisers love and enjoy cruise travel. Passengers do not carry their luggages with them to the cities they go by keeping their luggages in the cruise ship. Accordingly, cruise tourism is one of the most preffered tourism type in the world despite the pandemic back in 2020. The climate, natural resources, historical and religious places and the presence of unique bays position Turkiye as a country preferred by tourists in the market compared to other countries in the Mediterranean Sea. It is seen that in between years 2011 and 2015 the highest numbers of total cruise passengers were achieved by Turkiye in past 14 years. Having each month observed separately, it is determined that cruise tourism is effective in almost all months of the year, however number of cruise ships and passengers have reached the highest numbers by August, September and October.

It is observed that Kuşadası Harbour is the first most called port by the cruise ships, Istanbul is ranked the second and Bodrum is the third. It is seen that Antalya Harbour Master is doing the %8 contribution to cruise tourism in Turkiye. In addition, the increase on the number of passengers coming to the Port Harbours,

Marmaris and Çeşme and the income coming out of it is a crystal clear proof that cruise tourism is contributing to the country's economy.

By having the estimate figures for 2030 obtained by SPSS 29 program compared the actual figures for 2024, it is observed that the average number of cruise ships arrived in 2024 is 100, this value is calculated as 224 reaching the highest value in 2030 and the average value will be 96 ships. It is estimated that there will be a %4 decrease on the number of cruise ships by 2030 compared to 2024. Accordingly with the report published by CLIA, it is quite observed that cruise tourism is in recovering trend in whole world after pandemic. It is understood that the zero-ship number and zero passenger effect recorded in the statistics during the pandemic period negatively affected the forecast for the demand. As a result, it is observed that despite the recovery trend seen on the figures, negative effect is expected to continue for the next 5 years. In the meantime, by having the figures observed for the first two months of 2025, it is seen that there is a slightly increase on number of cruise ships and passengers coming in. The reason for the slight increase is because of the preference of passengers in Turkiye and its Galataport. Turkiye will continue to grow its touristic and historical features in the coming years and its competitive position will continue to increase in the Mediterranean Sea.

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Araştırma Makalesi

Determination of Future Trends of Cruise Tourism in Turkiye Through Time Series Analysis

Turkiye'de Kruvaziyer Turizmin Zaman Serileri Analizine Göre Gelecek Eğilimlerinin Belirlenmesi

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Genişletilmiş Özet

Bu çalışmada, veri analizi için Ulaştırma ve Altyapı Bakanlığı veri tabanından 2011-2025 yılları arasında, 2025 yılının ilk iki ayını da kapsayan 170 veri seti oluşturuldu. Bu bağlamda kruvaziyer pazarlarına ait gelen kruvaziyer gemileri sayısı, gelen yolcu sayısı, giden yolcu sayısı, transit yolcu sayısı ve toplam yolcu sayısı oluşturularak aylık, yıllık ve liman başkanlığı bazında incelenmiştir. Bu değerlerin ortalama değerleri, minimum ve maksimum değerleri aylık, yıllık ve Liman Başkanlığı bazında ayrı ayrı analiz edildi.

Araştırmanın amacından aşağıdaki sorulara yanıt aranmıştır.

- Türkiye'de 2011-2024 yılları arasında kruvaziyer turizmi gelen gemi ve yolcu sayılarının en yüksek değerleri hangi yıllarda gerçekleşmiştir?
- Liman Başkanlıklarına gelen gemi sayısı ve yolcu sayı değerleri nelerdir?
- En çok gemi ve yolcu gelen liman başkanlıkları hangileridir?
- Kruvaziyer gemi ve yolcu sayısı değerleri Covid öncesi ve sonrası nasıl gerçekleşmiştir?
- 2011 ve 2024 yılı veri seti kullanılarak önümüzdeki 5 yıl için gemi ve yolcu tahmini değerleri kaçtır?
- 2024 yılı için gerçekleşen değerler ile 2030 yılı için tahmin edilen değerlerin karşılaştırması nasıldır?

Çalışma üç aşamada gerçekleştirilmiştir. İlk aşamada kruvaziyer turizminin mevcut durumu istatistiksel olarak ifade edilmiştir. İkinci aşamada, gelecek tahminlerini belirlemek için zaman serisi analizi yapılmıştır. Bunun için SPSS 29 paket programında tahmin modellemesi yapılarak, Türkiye'de kruvaziyer turizminin gelecek beş yıllık dönemde (2025-2030) gelen ve giden yolcu sayılarına ilişkin tahmini değerler elde edilmiştir. Son olarak elde edilen tahmini değerler 2024 yılında gerçekleşen değerlerle karşılaştırılarak Türkiye'deki kruvaziyer turizmi hakkında kapsamlı değerlendirmeler yapılmıştır.

Buna göre, elde edilen verilerle, 2011-2024 yılları arasında Kuşadası için Liman Başkanlıklarına uğrayan ortalama Kruvaziyer Gemisi sayısının 630 gemi ve yolcu sayısının 11.249 olduğu görülmektedir. İstanbul için ortalama Kruvaziyer Gemisi sayısı 212 ve yolcu sayısı 45.671'dir. İzmir için ortalama kruvaziyer gemisi sayısı 115, yolcu sayısı ise 9.081'dir. Buna göre, 2011 ve 2015 yılları arasında kruvaziyer turizminde en yüksek değerlere ulaştığı görülmektedir. İstanbul ve İzmir'in tarihi dokusu ve eşsiz güzelliklerinin Türkiye'de tanınmış marka şehirler olarak turist çekmeye devam ettiği ortaya çıkmaktadır. 2021 yılında tekrar hizmete giren Istanbul Galataport ile kruvaziyer turizmi desteklediği, Marmaris, Antalya ve Çeşme'nin de kruvaziyer turizme destek verdiği görülmektedir. Bu bölgelerde turist çekme potansiyelinin dikkat çekici olduğu ve bu yerlerin kruvaziyer turizmini de desteklediği kanıtlanmıştır. Pandemiye rağmen önümüzdeki yıllarda talebin artacağı ve beklenen seviyelere ulaşacağı anlaşılmıştır.

CLIA International Cruise Union tarafından yayınlanan rapora göre, pandemi dönemi sonrasında kruvaziyer turizminin dünyanın tüm bölgelerinde kademeli olarak toparlandığı görülmüş ve aynı durum Türkiye'de de gözlemlenmiştir. Sonuç olarak, tahmini verilerdeki eğilimin toparlanma yönünde gittiği ancak olumsuz etkinin önümüzdeki 5 yıl boyunca devam edeceği görülmektedir. Ayrıca, 2025 yılının ilk iki ayında gözlenen değerlere göre, gelen yolcu ve gemi sayısında artış olduğu görülmüş, bunun nedeninin Türkiye'deki kruvaziyer limanlarında, özellikle İstanbul Galataport'ta yolcu tercihlerinin Türkiye odaklı olması olduğu belirlenmiştir. Pandemi döneminde istatistiklerde kaydedilen sıfır gemi sayısı ve sıfır yolcu etkisinin gelecekteki talep tahminlerini olumsuz etkilediği anlaşılmıştır. Bu nedenle elde edilen verilerde üst kontrol limit değerleri belirtilmiş ve sonuçlar 2030 yılı için yorumlanmıştır. Buna göre aşağıdaki sonuçlar elde edilmiştir.

- Aylık bazda incelendiğinde kruvaziyer turizminin hemen hemen her ayda etkili olduğu, ancak gelen gemi ve yolcu sayısının Ağustos, Eylül ve Ekim aylarında en yüksek değerlere ulaştığı tespit edilmiştir.
- 2011-2015 dönemleri arasında en yüksek gelen gemi sayısını 274 gemi olarak 2011 yılında gerçekleştiği ve 2015 yılında da ise gelen yolcu sayısının 45117 olarak gerçekleştiği görülmektedir.
- 2024 yılında en fazla Kuşadası Liman Başkanlığı'na 524 adet geminin uğrak yaptığı, İstanbul Liman Başkanlığı'na 204 ve Bodrum Liman Başkanlığı'na 97 geminin uğrak yaptığı görülmektedir.
- 2024 yılında İstanbul Liman Başkanlığı'na gelen yolcu sayısının 48862 olarak gerçekleştiği ve toplam 2024 yılı için gelen yolcu sayısının % 88'ini karşılık geldiği görülmektedir.
- 2024 ve 2030 tahminleri karşılaştırıldığında, 2024 yılında gelen kruvaziyer gemilerinin ortalama sayısının 100 olduğu, bu değerin 2030 yılında en yüksek değere ulaşarak 224 olarak hesaplandığı ve ortalama değerin 96 gemi olacağı görülmektedir.
- 2024 ve 2030 tahminleri karşılaştırıldığında, 2024 yılında gelen kruvaziyer yolcularının ortalama sayısının 12.835 olduğu, 2030 yılında en yüksek sayının 33.675 yolcu, ortalama değerin ise 11.238 yolcu olacağı görülmektedir.
- 2024 ve 2030 tahminleri karşılaştırıldığında, 2024 yılında ortalama giden kruvaziyer yolcusu sayısının 13.321 olduğu, bu değerin 2030 yılında en yüksek değer olarak 35.758 olarak hesaplandığı ve ortalama değerin 11.811 yolcu olduğu görülmektedir.
- 2024 ve 2030 tahminleri karşılaştırıldığında, 2024 yılında ortalama transit kruvaziyer yolcusu sayısının 131.326 olduğu, bu değerin 2030 yılında en yüksek değer olarak 258.173 olarak hesaplandığı ve ortalama değerinin 119.837 yolcu olduğu görülmektedir.
- 2024 ve 2030 tahminleri karşılaştırıldığında, 2024 yılında toplam kruvaziyer yolcu sayısının ortalamasının 157.452 olduğu, bu değerin 2030 yılında en yüksek değer olarak 319.419 olarak hesaplandığı ve ortalama değerinin 144.412 yolcu olduğu görülmektedir.

Sonuç olarak 2030 yılı ortalama değerleri, 2024 yılında gerçekleşen değerlere göre yaklaşık %4 daha düşük hesaplandığı görülmektedir. Bu yöntemle çalışılan tahmini değerlerle 2030 yılında en yüksek değerlere ulaşması beklenmektedir. Türkiye 'nin önümüzdeki yıllarda turistik ve tarihi özellikleriyle kruvaziyer turizminde gelişmeye devam edeceği ve Akdeniz, Adriyatik Adaları ve hatta Karadeniz bölgelerinde rekabetçi konumunun artacağı sonucuna varılmıştır.