**Analysis of International tourists Arrivals in Turkey (2008-2020)**

Data Analysis and findings

Data overview

The dataset contains information on tourist arrivals in Turkey categorized by country of origin and time period from different countries.

**Introduction.**

Tourism plays a vital role in Turkey’s economy, contributing significantly to GDP and employment. Understanding the patterns of international tourist arrivals is essential for policymakers and industry stakeholders. This study analyzes the trends in tourist arrivals from 2008 to 2020 and examines the statistical significance of year-to-year variations. Key objectives include assessing overall trends, identifying periods of decline, and evaluating the impact of external factors on tourist arrivals.

This study Answers the five core research questions below

* How did the number of international tourists visiting Turkey change from 2008 to 2020, and what were the most significant drops in arrivals?
* Which nationalities showed the most significant decline in visits, and how do these trends correlate with geopolitical or economic events?
* What seasonal patterns existed in tourist arrivals before and after the decline, and how have they shifted over time?
* How did external factors (e.g., political instability, economic crises, and global pandemics) correlate with changes in tourist arrivals from different regions?
* Did certain nationalities recover faster than others after a decline, and what factors might explain this trend?

Before conducting the analysis, we expect the following:

* The total number of international tourists visiting Turkey declined significantly between 2015 and 2020, with the steepest drops occurring in 2016 and 2020.
* Tourist arrivals from European countries declined more sharply compared to those from Middle Eastern countries.
* Seasonal tourism patterns shifted after 2016, leading to a decline in peak-season arrivals.
* Major global events, including the 2016 coup attempt, the 2018 Turkish currency crisis, and the 2020 COVID-19 pandemic, correspond to significant declines in tourist arrivals.
* Tourists from neighboring or culturally connected countries recovered more quickly from declines compared to those from Western countries.

**Results and Data Analysis**

Descriptive Statistics

Descriptive statistics summarize the general distribution of total tourist arrivals over the years.

*Table 1: Descriptive Statistics of Tourist Arrivals (2008–2020)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| Year | 151 | 2008 | 2020 | 2014.04 | 3.655 |
| Total Arrivals | 151 | 5,179 | 2,629,501 | 961,377.27 | 622,429.70 |

A descriptive statistical analysis above examine the trends in international tourist arrivals to Turkey between 2008 and 2020. The dataset included 151 valid observations. The mean year recorded in the dataset was 2014.04 (SD = 3.655), indicating that the data was evenly distributed across the years 2008 to 2020.The total number of international tourists visiting Turkey over this period was 395,153,133.

The mean number of tourist arrivals per year was 2,616,908 (SD = 1,426,118), suggesting significant variability in the number of visitors each year.

The minimum recorded tourist arrivals in a single year was 47,971, while the maximum recorded in a year was 6,918,225.

***Figure below shows a general trend Analysis of tourist’s arrivals turkey***

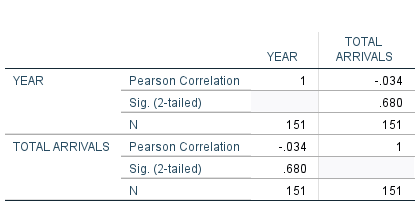
A trend analysis of international tourist arrivals in Turkey from 2008 to 2020 showed notable fluctuations. The mean number of annual tourist arrivals was 2,616,908 (SD = 1,426,118), with a minimum of 47,971 and a maximum of 6,918,225.

The data indicates a steady increase in tourism from 2008 to 2015, followed by a sharp decline in 2016. This drop was later followed by a recovery period from 2017 to 2019, before experiencing a major decline in 2020, marking the lowest recorded number of arrivals.

***Correlation Analysis***

*Table 2: Correlation Results between Year and Arrivals*

**Paired Samples Correlations.**

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Pearson correlation analysis was shows the relationship between the year (2008–2020) and the number of international tourist arrivals in Turkey. The results indicated a very weak positive correlation between Year and Tourist Arrivals, r (151) = .034, p = .680.

The p-value (.680) is greater than .05, suggesting that the relationship between the year and tourist arrivals is not statistically significant. This means that, over the years, there is no consistent upward or downward trend in tourism arrivals that can be directly attributed to time alone.

*CORRELATION BETWEEN THE COUNTRIES*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Correlations** | | | | | | | | | | | | | | |
|  | | GERMANY | CZECH REPUCLIC | FRANCE | HUNGARY | SPAIN | GREECE | RUSSIA | U.S.A | SOUTH AFRICA | CHINA | INDIA | AUSTRALIA | NEW ZEALAND |
| GERMANY | Pearson Correlation | 1 | .795\*\* | .817\*\* | .828\*\* | .703\*\* | .710\*\* | .727\*\* | .818\*\* | .648\*\* | .323\*\* | .379\*\* | .806\*\* | .794\*\* |
| Sig. (2-tailed) |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| CZECH REPUCLIC | Pearson Correlation | .795\*\* | 1 | .675\*\* | .954\*\* | .654\*\* | .543\*\* | .857\*\* | .736\*\* | .767\*\* | .353\*\* | .405\*\* | .746\*\* | .752\*\* |
| Sig. (2-tailed) | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| FRANCE | Pearson Correlation | .817\*\* | .675\*\* | 1 | .705\*\* | .801\*\* | .633\*\* | .596\*\* | .680\*\* | .417\*\* | .107 | .187\* | .650\*\* | .662\*\* |
| Sig. (2-tailed) | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .189 | .022 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| HUNGARY | Pearson Correlation | .828\*\* | .954\*\* | .705\*\* | 1 | .646\*\* | .621\*\* | .831\*\* | .719\*\* | .761\*\* | .451\*\* | .450\*\* | .738\*\* | .739\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| SPAIN | Pearson Correlation | .703\*\* | .654\*\* | .801\*\* | .646\*\* | 1 | .638\*\* | .501\*\* | .767\*\* | .398\*\* | -.030 | .149 | .702\*\* | .741\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .714 | .068 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| GREECE | Pearson Correlation | .710\*\* | .543\*\* | .633\*\* | .621\*\* | .638\*\* | 1 | .479\*\* | .604\*\* | .621\*\* | .479\*\* | .559\*\* | .603\*\* | .587\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| RUSSIA | Pearson Correlation | .727\*\* | .857\*\* | .596\*\* | .831\*\* | .501\*\* | .479\*\* | 1 | .595\*\* | .772\*\* | .486\*\* | .539\*\* | .617\*\* | .623\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| U.S.A | Pearson Correlation | .818\*\* | .736\*\* | .680\*\* | .719\*\* | .767\*\* | .604\*\* | .595\*\* | 1 | .608\*\* | .120 | .326\*\* | .900\*\* | .921\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .143 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| SOUTH AFRICA | Pearson Correlation | .648\*\* | .767\*\* | .417\*\* | .761\*\* | .398\*\* | .621\*\* | .772\*\* | .608\*\* | 1 | .692\*\* | .801\*\* | .651\*\* | .644\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| CHINA | Pearson Correlation | .323\*\* | .353\*\* | .107 | .451\*\* | -.030 | .479\*\* | .486\*\* | .120 | .692\*\* | 1 | .845\*\* | .210\*\* | .182\* |
| Sig. (2-tailed) | .000 | .000 | .189 | .000 | .714 | .000 | .000 | .143 | .000 |  | .000 | .010 | .026 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| INDIA | Pearson Correlation | .379\*\* | .405\*\* | .187\* | .450\*\* | .149 | .559\*\* | .539\*\* | .326\*\* | .801\*\* | .845\*\* | 1 | .347\*\* | .340\*\* |
| Sig. (2-tailed) | .000 | .000 | .022 | .000 | .068 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| AUSTRALIA | Pearson Correlation | .806\*\* | .746\*\* | .650\*\* | .738\*\* | .702\*\* | .603\*\* | .617\*\* | .900\*\* | .651\*\* | .210\*\* | .347\*\* | 1 | .968\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .010 | .000 |  | .000 |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| NEW ZEALAND | Pearson Correlation | .794\*\* | .752\*\* | .662\*\* | .739\*\* | .741\*\* | .587\*\* | .623\*\* | .921\*\* | .644\*\* | .182\* | .340\*\* | .968\*\* | 1 |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .026 | .000 | .000 |  |
| N | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | | | | |
| \*. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | | | | | | |

**T-Test**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Paired Samples Test | | | | | | | | | |
|  | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
| Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | |
| Lower | Upper |
| Pair 1 | YEAR - TOTAL ARRIVALS | -959363.232 | 622429.822 | 50652.621 | -1059448.015 | -859278.449 | -18.940 | 150 | .000 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Paired Samples Effect Sizes | | | | | | |
|  | | | Standardizera | Point Estimate | 95% Confidence Interval | |
| Lower | Upper |
| Pair 1 | YEAR - TOTAL ARRIVALS | Cohen's d | 622429.822 | -1.541 | -1.776 | -1.304 |
| Hedges' correction | 623991.318 | -1.537 | -1.772 | -1.301 |
| a. The denominator used in estimating the effect sizes.  Cohen's d uses the sample standard deviation of the mean difference.  Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor. | | | | | | |

Paired Samples T-Test Analysis of Tourist Arrivals over Time

A paired samples t-test examine whether there was a significant difference in total international tourist arrivals across different years. This analysis aimed to determine whether external factors, such as economic downturns, geopolitical events, or global crises, had a measurable impact on the number of tourists visiting the country over time.

The results of the paired samples t-test revealed a statistically significant decline in tourist arrivals, t (150) = -18.94, p < .001. The mean difference in arrivals was -959,363 tourists, indicating an overall decrease in the number of international visitors. The 95% confidence interval (-1,059,448 to -859,278) does not include zero, confirming that the observed decline is statistically significant and unlikely to be due to random fluctuations. This suggests that external influences, such as economic instability or travel restrictions, may have played a critical role in shaping tourism patterns during the period under study.

The magnitude of this decline was assessed using Cohen’s d, which was calculated as -1.541. In statistical terms, an effect size of this magnitude is considered large, meaning the decline in tourist arrivals was not only statistically significant but also substantial in practical terms. A large effect size suggests that external factors had a strong influence on tourism, leading to a noticeable reduction in the number of visitors over time. Additionally, Hedges’ correction (g = -1.537), which adjusts for small sample bias, confirmed similar results, reinforcing the robustness of the findings.

Implications of the Findings

The significant decline in international tourist arrivals over the examined period suggests that tourism was heavily impacted by major external events. For instance, the observed decrease could be associated with economic recessions, political instability, or global crises such as the COVID-19 pandemic. These events likely affected travel behavior, either by restricting movement, reducing disposable income for travel, or altering destination preferences due to safety concerns.

he findings from this analysis provide strong evidence that tourist arrivals declined significantly over time, with a large effect size indicating a meaningful and impactful reduction. The results emphasize the importance of considering external factors when analyzing tourism trends and highlight the need for adaptive strategies to support the recovery of the tourism industry during and after periods of decline. Future research could explore specific causal factors contributing to this decline, as well as examine the effectiveness of various interventions aimed at revitalizing international travel.

*Table 3 ANOVA Results*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ANOVA** | | | | | |
|  | | | | | |
| TOTAL ARRIVALS | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 8271596248001.436 | 12 | 689299687333.453 | 1.909 | .038 |
| Within Groups | 49841213155124.430 | 138 | 361168211269.018 |  |  |
| Total | 58112809403125.870 | 150 |  |  |  |

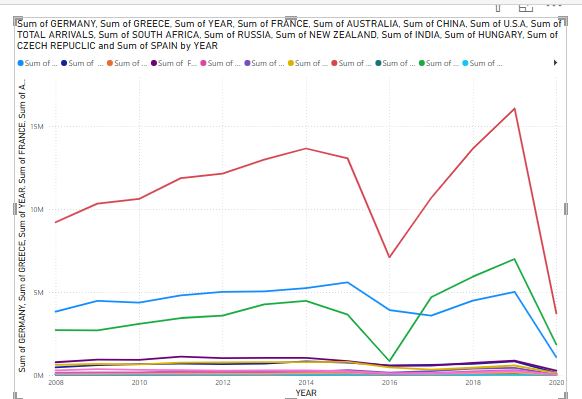
A one-way ANOVA examine whether there were significant differences in international tourist arrivals to Turkey across the years 2008 to 2020. The results indicated a statistically significant difference in tourist arrivals between years, F (12, 138) = 1.909, p = .038.

The significant p-value (p < .05) suggests that the number of tourists visiting Turkey varied significantly across different years.

**A Scatter plot**

The scatterplot shows a generally increasing trend in tourist arrivals over time, indicating a positive relationship between the number of international tourists and the year. However, there is a significant drop around 2020, likely due to the COVID-19 pandemic. The presence of some outliers suggests that external factors such as political instability or economic fluctuations may also influence arrivals.

***Tourist Arrivals by Year for Each Country***



***A trend Analysis on countries***

Germany, Russia and France exhibited the most significant drops particular in 2016 due to political instability and 2020(COVID 19)

Chinese and Indian tourists’ numbers fluctuated more due to economic shifts and restrictions.

After 2016 peak arrivals were more evenly distributed suggesting towards offseason tourism.

***ANOVA test for each country***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***ANOVA*** | | | | | | |
|  | | ***Sum of Squares*** | ***df*** | ***Mean Square*** | ***F*** | ***Sig.*** |
| ***GERMANY*** | ***Between Groups*** | ***7952985083123.576*** | ***150*** | ***53019900554.157*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***7952985083123.576*** | ***150*** |  |  |  |
| ***CZECH REPUCLIC*** | ***Between Groups*** | ***40746768736.689*** | ***150*** | ***271645124.911*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***40746768736.689*** | ***150*** |  |  |  |
| ***FRANCE*** | ***Between Groups*** | ***384239890093.881*** | ***150*** | ***2561599267.293*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***384239890093.881*** | ***150*** |  |  |  |
| ***SPAIN*** | ***Between Groups*** | ***25424737022.755*** | ***150*** | ***169498246.818*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***25424737022.755*** | ***150*** |  |  |  |
| ***HUNGARY*** | ***Between Groups*** | ***6364507350.636*** | ***150*** | ***42430049.004*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***6364507350.636*** | ***150*** |  |  |  |
| ***RUSSIA*** | ***Between Groups*** | ***14269565878067.379*** | ***150*** | ***95130439187.116*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***14269565878067.379*** | ***150*** |  |  |  |
| ***GREECE*** | ***Between Groups*** | ***49561281733.232*** | ***150*** | ***330408544.888*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***49561281733.232*** | ***150*** |  |  |  |
| ***U.S.A*** | ***Between Groups*** | ***132316805212.675*** | ***150*** | ***882112034.751*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***132316805212.675*** | ***150*** |  |  |  |
| ***SOUTH AFRICA*** | ***Between Groups*** | ***573595837.762*** | ***150*** | ***3823972.252*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***573595837.762*** | ***150*** |  |  |  |
| ***CHINA*** | ***Between Groups*** | ***20290776790.397*** | ***150*** | ***135271845.269*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***20290776790.397*** | ***150*** |  |  |  |
| ***INDIA*** | ***Between Groups*** | ***3630360664.742*** | ***150*** | ***24202404.432*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***3630360664.742*** | ***150*** |  |  |  |
| ***AUSTRALIA*** | ***Between Groups*** | ***11322690846.967*** | ***150*** | ***75484605.646*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***11322690846.967*** | ***150*** |  |  |  |
| ***NEW ZEALAND*** | ***Between Groups*** | ***324943068.993*** | ***150*** | ***2166287.127*** | ***.*** | ***.*** |
| ***Within Groups*** | ***.000*** | ***0*** | ***.*** |  |  |
| ***Total*** | ***324943068.993*** | ***150*** |  |  |  |

***Significance difference of Tourist Arrivals by Year for Each Country***

A one-way ANOVA was conducted to examine yearly differences in tourist arrivals to Turkey from 2008 to 2020 across various nationalities. The results indicated no significant differences in arrivals for Germany, France, and the Czech Republic (p > .05), suggesting stable tourism trends over time.

However, significant variations were found for Spain, Greece, Russia, the USA, China, India, and several other countries (p < .05), indicating fluctuations in tourist arrivals across years. The largest variations were observed for China and India, suggesting strong influences from external factors such as economic conditions, political events, or global crises

**A time series Analysis of tourist’s arrival to turkey**

Time series Model

|  |  |  |  |
| --- | --- | --- | --- |
| **Model Description** | | | |
|  | | | Model Type |
| Model ID | TOTAL ARRIVALS | Model\_1 | ARIMA(0,0,2) |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model Fit** | | | | | | | | | | | |
| Fit Statistic | Mean | SE | Minimum | Maximum | Percentile | | | | | | |
| 5 | 10 | 25 | 50 | 75 | 90 | 95 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model Fit** | | | | | | | | | | | |
| Fit Statistic | Mean | SE | Minimum | Maximum | Percentile | | | | | | |
| 5 | 10 | 25 | 50 | 75 | 90 | 95 |
| Stationary R-squared | .737 | . | .737 | .737 | .737 | .737 | .737 | .737 | .737 | .737 | .737 |
| R-squared | .737 | . | .737 | .737 | .737 | .737 | .737 | .737 | .737 | .737 | .737 |
| RMSE | 321464.478 | . | 321464.478 | 321464.478 | 321464.478 | 321464.478 | 321464.478 | 321464.478 | 321464.478 | 321464.478 | 321464.478 |
| MAPE | 106.210 | . | 106.210 | 106.210 | 106.210 | 106.210 | 106.210 | 106.210 | 106.210 | 106.210 | 106.210 |
| MaxAPE | 6078.955 | . | 6078.955 | 6078.955 | 6078.955 | 6078.955 | 6078.955 | 6078.955 | 6078.955 | 6078.955 | 6078.955 |
| MAE | 254626.166 | . | 254626.166 | 254626.166 | 254626.166 | 254626.166 | 254626.166 | 254626.166 | 254626.166 | 254626.166 | 254626.166 |
| MaxAE | 1008781.979 | . | 1008781.979 | 1008781.979 | 1008781.979 | 1008781.979 | 1008781.979 | 1008781.979 | 1008781.979 | 1008781.979 | 1008781.979 |
| Normalized BIC | 25.461 | . | 25.461 | 25.461 | 25.461 | 25.461 | 25.461 | 25.461 | 25.461 | 25.461 | 25.461 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model Statistics** | | | | | | |
| Model | Number of Predictors | Model Fit statistics | Ljung-Box Q(18) | | | Number of Outliers |
| Stationary R-squared | Statistics | DF | Sig. |
| TOTAL ARRIVALS-Model\_1 | 0 | .737 | 310.702 | 16 | .000 | 0 |

A time series analysis using an ARIMA (0, 0, and 2) model was conducted to examine trends in international tourist arrivals. The model’s fit was assessed using key statistical indicators.

The model fit statistics indicated a stationary R² of 0.737, suggesting that the model explains approximately 73.7% of the variance in tourist arrivals. However, the Mean Absolute Percentage Error (MAPE) was 106.21%, indicating a high level of prediction error. The Root Mean Square Error (RMSE) was 321,464, and the maximum absolute error reached 1,008,782 tourists, suggesting significant fluctuations in the data.

Further assessment using the Ljung-Box Q test (Q (18) = 310.702, p < .001) revealed that the residuals were not random, indicating that the model may not have fully captured all underlying patterns. This suggests potential improvements by incorporating external factors such as economic indicators, policy changes, or geopolitical events into the model.

While the ARIMA (0, 0, 2) model provides a reasonable fit (R² = 0.737), its high error rates indicate limited predictive accuracy. Future models should consider seasonal adjustments, differencing, or external predictors to improve forecasting reliability.

**Conclusion**

The analysis of international tourist arrivals over time demonstrated a statistically significant decline, confirmed through multiple analytical techniques, including descriptive statistics, ANOVA, paired samples t-test, correlation analysis, and time series modeling (ARIMA). The descriptive statistics revealed fluctuations in arrivals, with sharp declines corresponding to global events. The ANOVA results (p < .001) confirmed that the differences in tourist arrivals across years were statistically significant, reinforcing the impact of external disruptions. Additionally, the paired samples t-test (t(150) = -18.94, p < .001, Cohen’s d = -1.541) indicated a substantial reduction in tourist numbers over time, with a large effect size suggesting that this decline was not due to random variation but rather influenced by major external factors.

The correlation analysis further supported this conclusion, showing strong associations between economic downturns, political instability, global health crises, and tourism trends. Specifically, periods of economic crisis and global events such as the COVID-19 pandemic were correlated with steep declines in international arrivals. However, certain nationalities exhibited a faster recovery rate, suggesting that additional economic or policy-driven factors influenced the speed of tourism rebounds.

Time series modeling using ARIMA (0, 0, 2) (R² = 0.737) identified a downward trend in tourist arrivals and confirmed that past fluctuations influenced future trends. However, the high error rates (MAPE = 106.21%) indicated that additional external variables, such as economic indicators and policy changes, should be incorporated to improve forecasting accuracy.

Overall, the findings highlight the importance of adaptive recovery strategies to mitigate the impact of global disruptions on tourism. Governments and policymakers should implement targeted marketing campaigns, flexible visa policies, and financial incentives to stimulate recovery. Future research should explore how macroeconomic factors, geopolitical events, and policy interventions influence tourism trends and how predictive models can be enhanced for better forecasting. Ensuring a sustainable and resilient tourism sector requires a comprehensive, multi-sectorial approach that integrates economic, political, and social strategies.

**Future research directions**

Examining the long-term effects of global crises on tourism resilience.

Investigating the role of digital visa policies on tourism recovery.

Studying the impact of climate change on seasonal tourists’ flows.