Chapter 4

Determination and Evaluation of Parameters Affecting Tourism Revenue by Machine Learning Methods

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ABSTRACT

The main focus of this chapter is to examine the tourism income of Türkiye as a case country, taking into account the structure of the tourism industry and relevant economic and social indicators. Statistical methods are used to investigate the factors that influence tourism income and to demonstrate the impact of these variables. The chapter aims to identify the key factors that should be considered when planning tourism-related activities and to explore the suitability of different models for future predictions. In addition, the chapter explores the use of machine learning models, such as artificial neural networks (ANN) and gradient boosted regression trees (GBRT), to compare their performance with the established multiple linear regression model. Furthermore, the chapter adds to the existing literature on tourism economics and forecasting methods by examining the performance of different models in predicting tourism income and highlighting the importance of factors such as the country's image, safety, and transportation opportunities in shaping tourism income in Türkiye.

INTRODUCTION

Tourism is one of the most important sources of income for some countries. In addition to its direct contribution to employment and foreign exchange, indirect contributions such as the personal expenditures of visitors and its impact on the auxiliary sectors that provide products and services to the tourism sector should also be taken into consideration. According to the economic impact report prepared by the World Travel and Tourism Council for 2019, the travel and tourism sector accounts for one in every four new jobs created in the last five years, making it the top employment generating sector for governments. Apart from this, the report also states that the travel and tourism sector constitutes 10.3% of the world's gross domestic product (GDP), 6.8% of total global exports and 28.3% of global service exports, amounting to $8.9 trillion (WTTC 2019).

Türkiye is among the most preferred countries in the tourism sector due to its cultural and historical heritage, natural beauty, sea-sand-sun tourism, and location. Considering the contribution of tourism income to both the balance of payments and employment in Türkiye, it is clear that the sector is one of the most important economic resources. Despite this, Türkiye cannot reach tourism income levels comparable to the countries with which it competes in terms of the number of tourists. The general report of the Turkish Ministry of Culture and Tourism (2019) states that although Türkiye ranks 6th in the world in the number of visitors for 2018, it has fallen to 15th in tourism income. In other words, while the average tourism income per capita in the world in 2019 was $1020, this figure was $580 for Türkiye, compared to $1050 for Germany and $1520 for Thailand, which comes after Türkiye in terms of the number of tourists. For the United States, the average tourism income per capita is $2700 (UNWTO 2020). Thus, it is clear that Türkiye, which has a satisfactory place in the world in the number of foreign visitors, cannot show the same success in tourism income.

The aim of this study is to determine the most important factors affecting tourism income with meaningful statistical methods and to show how these variables can describe tourism income. Thus, it seeks to identify which factors should be considered when planning activities related to tourism and which models can improve future forecasts. In this study, after conducting research on the variables affecting tourism income and determining the most important variables with classical statistical methods, the performance of the established model is compared with machine learning models. While determining the important explanatory variables, a multiple linear regression model supported by econometric models was used. The performance of the established multiple linear regression model was compared with Artificial Neural Network (ANN) and Gradient Boosted Regression Trees (GBRT) models. In the best model found, a five-year future prediction was made. In addition, the effect of the Covid-19 pandemic on foreign tourism income was analyzed. Thus, the pandemic process was evaluated and the performance of the model was tested.

This study differs from other studies in two main areas. In the literature, there are studies on the relationship between macroeconomic variables and tourism (Uysal and El Roubi 1999; Dritsakis 2004; Aydın et al. 2015; Pekmezci and Bozkurt 2016; Tengilimoğlu and Kuzucu 2019). In the determination of the parameters affecting income from tourism, which is the first stage of the study, 20 variables that can be divided into four groups as economy, tourism capacity, freedom, security and country development were studied and econometric methods were used while determining the important variables. A second point of differentiation is about measuring the performance of the relationship between the independent and dependent variables. In other studies, while machine learning methods such as ANN are applied in

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