

Forecasting Air Passenger Demand with System Dynamics Under Terrorism Threat

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Abstract

In this study, a simulation model was developed in order to forecast and analyze air passenger demand and to determine when a capacity expansion in Istanbul Atatürk International Airport will be needed using System Dynamics approach. In thorough literature survey it is found that average airfare, runway capacity, average number of flights per day, level of service, births, deaths, immigration to Istanbul, immigrations from Istanbul, population of Istanbul, Gross Domestic Products and Gross Domestic Products growth rate are key factors considered when creating models for air passenger demand. In this paper, we insert terror attacks as a new factor that may affect air transportation demand in Istanbul Atatürk International Airport. Increase in the number of terrorists may increase the number of attacks and may have a very negative effect on the mobility of people who live in Turkey or who want to visit Turkey. There were always terror attacks in Turkey in past too, but after ISIL emerging terror threats became more frequent. So terror became a very important factor which effects air passenger demand in Istanbul Atatürk International Airport in 2014 after terrorist attacks of ISIL. But results in this paper show that although terror might have a negative effect on air transportation demand, other factors for example airfare, population, runway capacity etc. play dominant roles and capacity expansion in Istanbul Atatürk International Airport will be required until 2023. This paper shows that capacity of Istanbul Atatürk International Airport will not be enough for air transportation and a new, bigger airport will be needed. Turkey has already started constructing a new airport in the north of Istanbul in 2014.

Keywords

System Dynamics
Simulation
Air Transportation
Air Passenger Demand
Airport Demand

Biographies

Volkan Çakır was born in Balıkesir in 1970. Following his graduation from Turkish Air Force Academy Istanbul with B.Sc. in electronics engineering with the rank of lieutenant in 1992, he worked as logistics officer for 20 years. He is retired with the rank of lieutenant colonel in 2012. During this period, he obtained his M.Sc. in industrial

engineering from Middle East Technical University, Ankara in 2001 and Ph.D. in engineering management at the Old Dominion University, Norfolk, Virginia in 2011. Between 2001-2011, he served as a Lecturer in the Turkish Air Force Academy. Following his retirement in 2012, he started working as assistant professor at the Department of Industrial Engineering in Istanbul Arel University. His main research areas are simulation, statistical quality control, system dynamics, operations management and risk analysis. He is currently the head of the same department and vice director of the Institute of Sciences.

Sait Oguz was born in Mersin in 1989. Following his graduation from Turkish Air Force Academy Istanbul with B.Sc. in industrial engineering with the rank of second lieutenant in 2011, he worked as aircraft maintenance officer. He started his M.Sc. in industrial engineering from Hezarfen Aeronautics and Space Technologies Institute, Istanbul in 2015. Now he is still working System Dynamics on his M.Sc. thesis part. And He is also working as F-16 systems coordination officer in Turkish Air Force Logistic Command Headquarters.