1. Airport terminal capacity planning

Solak, Senay (1); Clarke, John-Paul B. (2); Johnson, Ellis L. (3)
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Author affiliation: (1) Department of Finance and Operations Management, Isenberg School of Management, University of Massachusetts, 121 Presidents Drive, Amherst, MA 01003, United States (2) School of Aerospace Engineering, Georgia Institute of Technology, 270 Ferst Drive, Atlanta, GA 30332, United States (3) School of Industrial and Systems Engineering, Georgia Institute of Technology, 765 Ferst Drive, Atlanta, GA 30332, United States

Abstract: The airport terminal capacity planning problem deals with determining the optimal design and expansion capacities for different areas of the terminal in the presence of uncertainty with regards to future demand levels and expansion costs. Analytical modeling of passenger flow in airport terminals under transient demand patterns is especially difficult due to the complex structure of a terminal. Because of this difficulty, the airport terminal capacity planning problem has not been studied in a holistic fashion, such that studies in this area either do not account for expandability or focus only on one particular area of the terminal. In this study, we consider the airport terminal capacity planning problem as a whole. In this regard, we first derive time functions to approximate maximum delays in passageways and processing stations of an airport terminal. We then use these delay functions to develop a multistage stochastic programming model based on a multicommodity flow network representation of the whole airport terminal. The solution of the model, for which we develop an efficient solution algorithm, provides optimal capacity requirements for each area in an airport terminal during the initial building phase, as well as the optimal expansion policy under stochastic future demand. The results of the study are applicable to all similar queuing networks, including other types of passenger terminals. © 2009 Elsevier Ltd. All rights reserved. (27 refs)

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