MODIFIED METHOD OF GRAVITY MODEL APPLICATION FOR TRANSATLANTIC AIR TRANSPORTATION

*Helena Bínová**

Abstract: Air transportation between Europe and the U.S. is becoming more and more significant. It can only hardly be replaced by other means of transportation, since its biggest advantages include speed and reliability. Air transportation forecasting is important for planning the development of airports and related infrastructure, and of course also for air carriers. Therefore, it is important to forecast the number of flights between selected airports in Europe and the U.S. and the number of transported persons. A gravity model is usually used for this forecasting. Determination of coefficients which significantly affect results of the formulas used in the gravity model is crucial. Coefficients are, as a rule, computed by an iterative algorithm implementing the gradient method. This technique has some limitations if the state space is inappropriate. Moreover, the exponent parameter in the formula is obviously fixed. We have chosen the new method of differential evolution to determine the gravity model coefficient. Differential evolution works with populations similarly to other evolution algorithms. It is suitable for solving complex numerical problems. The suggested methodology can be helpful for various airlines to forecast demand and plan new long-haul routes.

Key words: *Air transportation, development, forecasting, gravity model, transatlantic flights, differential evolution*

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1. Introduction

Aviation-related planning and services need to continuously be improved so that operations can be more efficient and profitable. Commercial air transportation is important in connecting people and businesses in the world.

Transatlantic long-haul flights fly regularly from Europe to North America, South America, the Far East and Australia, Africa and vice versa, already since the beginning of commercial aviation in 1939.

This paper describes the possibilities of current data analysis methodology, which can help identify the main factors that influence passenger demand for the transatlantic route network.

*Helena Bínová, CTU Prague, Faculty of Transportation Sciences, Department of Logistics and Management of Transport, Konviktská 20, Prague 110 00, Czech Republic, E-mail: binova@fd.cvut.cz

