

***Title:* The impact of environmental variables on airport efficiency**

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Airport efficiency has been the subject of several studies. Input considered represent either the production factors (labor and capital) or the physical infrastructure of the airports while the outputs consists of the volumes of aircraft, passengers and cargos. Technically Efficient airports are those that maximize their outputs with their given inputs. However, besides numerous benefits to citizen and companies, airports efficiency also bring undesired and damaging side effects in terms of noise pollution and emission of pollutants.

The aim of the present study is to reassess by a new perspective airports technical efficiency ranking, developing two indexes to describe the main environmental impacts of aircraft operations, noise and air pollution, produced at airports, as undesirable outputs, implementing a Stochastic Frontier Approach.

This analysis is based on the design of an Hyperbolic Distance Function and an environmental database that provides for each aircraft which has operated at Italian airports in the 1999-2008 period, as recorded in the Official Airline Guide (OAG database), both noise level and pollutants' emitted amount (CO, NO_x, HC) for single arrival and departure. Noise level (SEL(dB)) and emission quantities (tons) are calculated from certified values available at EASA, European Aviation Safety Agency, and ICAO, International Civil Aviation Organization, websites.

The next phase has consisted in the elaboration of two indexes, the Day Night Level index (DNL, internationally adopted) and the Weighted Local Air Pollution index (WLAP, expressly designed) to be calculated for each yearly scenario of the Italian airports.

Preliminary results show that the efficiency assessment of the airports (for period 2005-2008) when their undesirable outputs are ignored is totally different and can be misleading.