**Guidelines for planning of the Italian regional airports development**

*Linee guida per la programmazione dello sviluppo degli aeroporti regionali italiani*

**Funding:** National (Italy)
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**Status:** Complete with results

**Background & policy context:**

The European air transport system is undergoing significant modifications due to the liberalisation process, the growth of demand for air services and technological innovations. In particular, regional airports have become one of the fastest growing sectors of the European aviation industry in recent years.

Low-cost carriers regard regional airports as cheap and uncongested, with levels of air transport demand which are not yet met by the supply available. Low-cost carriers have the potential to stimulate demand and their low-cost fares can also attract passengers from a much wider catchment area.

The major airlines also show a renewed interest in regional airports because they consider regional airports as spokes that can feed traffic to intercontinental services at their hubs. Regional airlines in turn are likely to play an increasing role in providing fast and efficient communications around Europe; the flexibility offered by new regional jet aircraft enables provision of services to be more closely matched to demand and new markets can be exploited that are beyond the reach of major carriers.

In this context, the role of air transport as a facilitator for regional economic development and the development of new routes from European regional airports has been examined. Furthermore, methods and models that can simulate future configurations of the air transport system - along with external and internal impacts of innovations, modifications and decisions - have been evaluated.

**Objectives:**

The goal of the project was to provide a procedural framework based on the use of mathematical models to simulate and analyse the Italian airport system as a whole. The final product of the research project is a manual containing guidelines for planning the development of Italian regional airports.

The procedures proposed in the manual have been tested on some prototypal cases in order to verify their effectiveness. The quantitative evaluation of different structures of the air transport system, particularly with reference to the regional poles, directly concern the stakeholders of the Italian airport system; in fact, the opportunity to reValorise existing airports in a wider network system or to build a new airport can be evaluated by using mathematical approaches able to simulate the different components and effects of the system.

The results can be used to define and monitor planning policies and to establish which project is more suitable or has greater priority, given the amount of public financial resources that are available.

**Methodology:**

The methodology proposed to plan the development of the Italian regional airports is based on a set of models that are able to simulate the air transport system in terms of demand (and attraction basins), supply and their interactions, with particular reference to the regional poles. A performance analysis can also be conducted by means of suitable indexes that are able to represent the point of view of the various stakeholders (air carriers, users, society, etc.).

Indeed, the evolution of the air transport system both in terms of low cost companies, that generally use
regional airports, and new technologies (such as regional jets, a kind of aircraft used for medium-short distances, characterised by high cruise speed for its aircraft class, low noise level and reduced landing/take-off distances) has given a further impulse to the development of planning methodologies to support decisions concerning regional airports.

Low-cost carriers generally use regional airports and offer services characterised by cheap fares and point-to-point links that reduce the number of transfers and additional waiting time due to the connections between flights. Both these factors (low fares and reduction of the whole trip time) influence significantly the passenger demand level for a given airport and the attraction basin of it, which in turn depends on both the transport supply characteristics at the airport and the airport accessibility with respect to a geographic area.

Given the supply characteristics (links and services) and the passenger demand level (in turn depending on the supply characteristics and the airport accessibility), different configurations of the system can be obtained in terms of both passenger capacity of the links and the performances of the system as regards to more actors (air companies, users, society). The latter aspect can be analysed by means of suitable indexes that take into account the point of view of the involved actors.

In summary, the following methodologies have been applied in this research project:

- methodologies to estimate and forecast the air transport demand
- methodologies to determine an airport traffic basin
- methodologies to simulate the air transport network and the interaction between air transport demand and supply
- methodologies to analyse the performances of an air transport system.

**Parent Programmes:**

PRIN calls 1999-2005 - Research projects of national relevance

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**Partners:**

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**Key Results:**

The main results of the projects are included in three manuals (in Italian and English language), which illustrate some guidelines for planning the development of regional airports in Italy and Europe. These results can be summarised as follows:

- identification of the possible scenarios caused by the development of the low-cost and regional jets services and the consequent possible network structure, with particular reference to the regional airports
- analysis of the passenger demand models that can simulate the air transport demand for a regional service
- analysis of the models able to describe the different modal shares between land modes competitive with the air transport service on the medium-short distances
- analysis of the problem of the simulation of airport choice
- analysis of airport attraction basins with respect to other airports as a function of ground accessibility and available air services
- analysis of assignment models and methods for air transport passengers, with a specific attention to low-frequency transport systems using the schedule-based approach
- analysis of the Italian regional air transport system referred to the more general context of the European and world evolution of the air transport system
- definition of a set of performance indexes for an air transport system.

Technical Implications

1. Competition between airports in one region is an important factor for the development of a regional airport system and it requires an in-depth demand analysis by using combined time series and discrete choice approaches.

2. Models that simulate airport choice only and the models that simulate the combination of different choice dimensions such as airport-airline, airport-flight, airport-airline-flight have to be distinguished. As regards the latter models, it should be noted that the best performing ones present complex utility functions, which are not easy to apply: they require a large amount of information, which if available in the survey, might not be easily known by the analyst and/or might not be easily forecasted in operational scenarios (air fares, frequency). As a consequence, the models cannot be applied to strategic planning scenarios, particularly when it is not possible to have any information on services offered. Moreover, more complex models applied to more complex choice sets do not seem to outperform the simplest models sharply.

3. The schedule-based approach used in transportation system engineering for transit services can also be applied to estimate passengers on flights of an air transport network. The modelling framework can be specified within the random utility theory, by considering attributes that can be calculated by the sole schedule-based approach, such as single path (flight) attributes (e.g. transfer time) and early/late schedule penalties.

4. The Data Envelopment Analysis (DEA) methodology can be used for a proper evaluation of the relative efficiency of an airport sample. In the case of the Italian airport system, it can be observed that several Italian airports are inefficient also, or mainly, because their scale of operation is not large enough.

5. The ANEF methodology has been defined, which can be applied, in particular, for evaluating in an aggregate way the acoustical performance of airports and airline’s fleet mixes. The ANEF methodology is easily applicable also as a quota count system.

Policy implications

1. While transportation seldom independently acts to stimulate a regional economy, it can be a major facilitator in helping a region more fully exploit its comparative advantages, and in allowing for a more flexible movement of factors of production. This holds as much for air transportation as it does for other modes, although, of course, the role of air transportation has its particular peculiarities. Provided the investment has been carefully thought through, it can, like any other measure that stimulates trade, have welfare generating and welfare diverting effects.

2. Regional airlines and airports are likely to play an increasing role in providing fast and efficient communications around Europe. The flexibility offered by small aircraft enables provision of services to be more closely matched to demand and new markets to be exploited that are beyond the reach of the major carriers. Airports can facilitate new services by providing the capacity, the operating freedom and the marketing support to develop new types of operation.

3. In the EU, the air transport sector has been progressively liberalised but the role of the regulatory bodies is still crucial, because they have to protect the citizens and the various stakeholders of the air transport business from the effects of market distortions. In this framework, the Regulator has to get at its disposal some techniques for evaluating global airport performances.

4. Aviation externalities over the local environment are a very important issue that sometimes contributes to strain the relationship between airports and local communities. These kinds of externalities can seriously threaten the development of a regional airport system.

STRIA Roadmaps: Network and traffic management systems
Transport mode: Air transport
Transport sectors: Passenger transport, Freight transport
Geo-spatial type: Infrastructure Node