

Environmental Capacity Limitations of Hub Airports

Vjaceslavs Lapkovskis (Dr.Sc.ing.) (Riga Technical University, Institute of Aeronautics.)

Keywords – Environmental capacity, airports, hubs, air quality, noise.

I. INTRODUCTION

Rapid development of modern air transport leads to expansion of hub airports and adjacent infrastructures in order to serve more passengers and attract new airlines carriers [1]. More than 80% of airports on Airport Council International Europe Environmental Strategy Committee are being limited by environmental issues, thus, restricting a planning development [2].

II. ENVIRONMENTAL CAPACITY ELEMENTS

Construction of new airports or expansion of existing structures may significantly influence to environmental parameters such as particulate matter concentration in air or noise levels [3]. In other situations, where environmental issues are limiting an environmental capacity, preventing an expansion of important hubs, such as air pollution issues, which are delaying a construction of new runway at the Heathrow airport [4].

A concept of environmental capacity [5] requires a selection of environmental factors and evaluation of their significance.

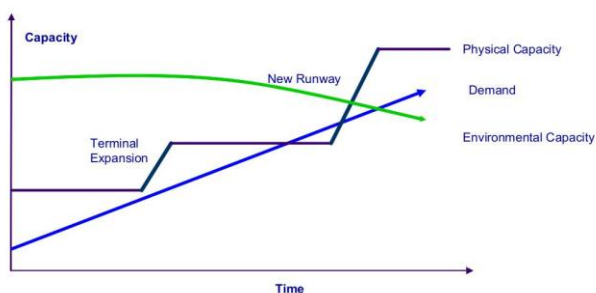


Fig. 1. Trends in airport extension vs. environmental capacity. [6]

A whole set of factors may influence the environmental capacity limits in Table 1. [5].

TABLE I

MAJOR FACTORS LIMITING ENVIRONMENTAL CAPACITY OF AIRPORTS

FACTORS	SIGNIFICANCE, AND TO WHOM IT MAY CONCERN
Aircraft noise	High significance for airport neighborhoods (in case of populated areas) and fauna.
Air quality	Very significant for airport and neighboring regions.
Operational capacity	Very significant for airport business stakeholders.
Community opposition to growth	Highly significant to both parties – population living near to airport and airport business interested to expansion.
Third party risk	Significant for communities surrounding airports.

III. ENVIRONMENTAL CAPACITY LIMITATIONS

However, there are additional components (Table II), which may have a crucial effect to environmental sustainability and capacity. These factors are inherently linked to ‘historical’ evolution of regions and cities. For example, many modern hub airports are located within the cities or very populated areas, that complicates or even prevents expandability of airport infrastructures, where dividing between airport and city planning are needed [8].

TABLE II

ADDITIONAL ENVIRONMENTAL CAPACITY LIMITATION OF HUB AIRPORTS

LIMITING FACTORS	POSSIBLE IMPACT TO ENVIRONMENTAL CAPACITY
Historical location of airport	May be critical for expansion plans due physical limitation of airport territory, and possible risks for neighboring population. Therefore, an environmental capacity limits are always constrained by historical decisions.
Regional development plans	The development plans designed in the past have comply with future programming. So a continuity of airport development is strongly linked with proper fore-sighting of regional development plans.

IV. REFERENCES

- [1] “Riga Airport begins terminal expansion,” Airport Business, 2014. [Online]. Available: <http://www.airport-business.com/2014/09/riga-airport-begins-terminal-expansion/>.
- [2] Manchester Metropolitan University, “The Concept of Airport Environmental Capacity,” 2002.
- [3] S. Sahrir, S. Bachok, and M. M. Osman, “Environmental and Health Impacts of Airport Infrastructure Upgrading: Kuala Lumpur International Airport 2,” *Procedia - Soc. Behav. Sci.*, vol. 153, pp. 520–530, Oct. 2014.
- [4] AEF, “Government delays runway decision pending more environmental analysis,” 2015. [Online]. Available: <http://www.aef.org.uk/2015/12/11/government-delays-runway-decision-pending-more-environmental-analysis/>.
- [5] P. Upham, “Environmental Capacity of Aviation: Theoretical Issues and Basic Research Directions,” *J. Environ. Plan. Manag.*, vol. 44, no. 5, pp. 721–734, 2001.
- [6] Brüel & Kjær, “Fourth Generation Aviation Environment Management White Paper,” 2003.
- [7] EEA, “European Aviation Environmental Report 2016,” 2016.
- [8] U. Knippenberger and A. Wall, *Airports in cities and regions: Research and practise*. 2009.