

SELECTED ASPECTS OF AIRPORT TYPOLOGY FORMATION

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Abstract: *The aim of the airport typology is to identify specific airport groups. Every typology is usually designed by utilizing one or more methods of similarity. This paper aims to provide an insight into the roles and characteristics of the different classifications of airports and their categories. The issue of airport categorisation is generally an extensive topic with many variables. This paper gives an overview of the most important factors that influence the formation of the typology framework. Following the definition of the types, categories and classifications of the airport explaining their differences this paper describes the role of the particularities of airport classification process. Current European airport network does not possess an integrated, unified and complete European airport classification that's the reason why we focused on the general aspects of the typology at first to determine which traits are the most important when designing a new typology.*

Keywords: AIRPORT, TYPOLOGY, CATEGORIZATION, FRAMEWORK

1. Introduction to airport classification

This paper is aimed to provide an insight into the roles and characteristics of the different classifications of airports by detailing a framework of airports. European airport network does not possess an integrated, unified and complete European airport classification that's the reason why we focused on the European Union capital airports member states.

The initial development of airports in the European Union was often determined by purely territorial considerations or, in some cases, military requirements. These land-use planning considerations may still persist in some cases, but in many others airports have been transferred from State to regional control, in some cases to be operated by public companies, or even to the private sector. The process of transfer to the private sector has normally taken the form of privatization or a progressive opening-up of capital. [1]

However, this development affects the EU's airports differently. The seven largest EU airports account for over a third of all EU traffic, and the 23 largest accounts for more than two thirds. Although they are primarily providers of infrastructure to the air transport industry, these airports have become highly efficient commercial operators. On the other hand, most small airports in the EU are still owned and operated by public authorities in the public interest. [2]

The EU legislation defines three different classification system standards which are Decision of the European Parliament and of the Council, Outlook opinion of the Committee of the Regions and the Decision of The Commission. [3]

2. Classification, types and categories of airports

At the beginning it is necessary to explain the general airport classification, categorization and typology and their differences.

Airports can be clustered using basic variables such as the number of gates, annual volume of international passengers, annual volume of domestic transfer passengers and annual volume of domestic origin-destination passengers. It is not possible to break down international passengers further into origin/destination and transfers due to data not being available. The average percentage of international passengers at US airports is, however, 2%, making the effect from international transfers likely to be neglected.

The number of gates is to represent the overall capacity of the terminal system and three passenger types are used to define passengers served at the terminal; there is correlation, however,

between number of gates and passenger types but they are both retained for classification because of the need to differentiate these characteristics.

There are many ways to discuss airport types, categories and classifications. Some classifications are rather general in nature and identify airport functions without specifying design standards. Others identify detailed lists of facilities such as goals for airports with a particular functional classification. The specific classification system identifies airport function, primary economic role and, to a lesser extent, funding category eligibility, and importance for scientific and political transportation issues. Some of these differentiation criteria can be found in regulations concerning national airport systems. These national airport systems are designed for a particular geography, economic structure and the political goals of each country, and financed to produce maximum benefit from the investment. Some systems are illustrated in the following sections to show that categories vary to suit different airports and their parameters. Firstly the difference between type of airport and the category of the airport should be pointed out. It should be made clear that the typology refers to a classification types.[4]

There are numerous different airport types such as rural airstrips, private airstrips, military airports, small community airports, regional airports, major city airports and hub airports. [5]

Classifications serve as a framework for describing the existing function of each airport in the system and as the reference for evaluating how airport systems have changed their functions or are projected to change their functions as a result of accommodating forecasted demand. [6]

Figure 1 provides a general view of the airport type, category and classification observing their approaches to the airport as the object for our study.

As mentioned above in the evaluation process each airport is integrated in appropriate classification, described by its special categorization as well as differences between the categories and the type of airport which it is a part of is then introduced.

3. Role of classification process

Airports contribute to meeting air transportation and economic necessities in different ways and at varying levels. In order to determine how each airport contributes and what role it plays in the

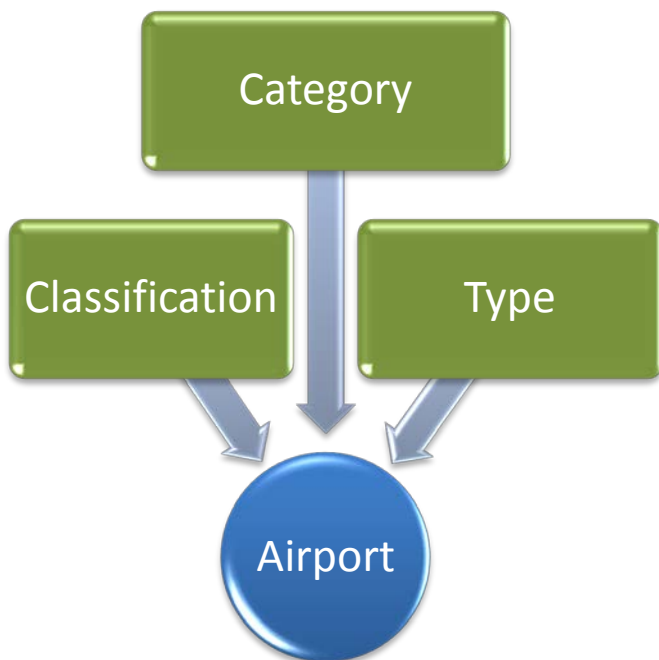


Figure 1: Airport classification, categorization and type differentiation

system, analyses of factors that typically define an airport’s role are evaluated. To achieve stability in evaluating airport requirements, the analysis has to consider both aviation and non-aviation factors in identifying each airport’s current function in the system. These factors represent the following four performance categories: [7]

- **Activity**
- **Economics**
- **Accessibility**
- **Facilities**

Within each of these categories, defining aspects are used to evaluate each airport’s role. Described factors are applied equally to all airports, regardless of the size of the airport, annual passenger enplanements, or type of aviation services currently offered at the airports.

This evaluation process provides a means to group airports by functional role based on the demand for aviation in a region, as determined based on the application of the defining factors.

3.1. Activity

Appreciation considered the levels and types of aviation activity currently occurring at each airport. Generally an airport’s total number of based aircraft and the number of aircraft that are twin-engine aircraft or larger provides an indication of the task that the airport represents. Additionally, higher concentrations of pilots usually indicate higher demand levels and greater rates of airport utilization. The following data measured activity supplied:

- **Total based aircraft** – Higher numbers of based aircraft reflect the role the airport is playing in meeting air transportation and economic needs of the market area it serves.
- **Based multi-engine aircraft** – Airports can be rated based on the number of permanently based multi-engine aircraft.
- **Based jet aircraft** – Airports can be rated based on the number of permanently based jet aircraft.
- **Registered pilots within a 30-minute drive time** – Airports can be rated based on the estimated number of pilots within a 30-minute drive time of the airport.
- **Total annual operations** – Airports can be rated based on the number of annual operations for their airport.



Figure 2: Role of Classification Process [Source: Wilbur Smith Associates. Wisconsin State Airport Plan. Technical report 2010]

3.2. Economics

As a result of the important role that airports have in supporting and leading economic growth, it is important to research aspects that could help determine the role that each airport has in supporting the State's economy. The three factors considered include: [7]

- **Percent of itinerant operations to total operations** – Higher percentages of traveling operations reflect the role the airport is playing in meeting air transportation and economic needs of the market area it serves. Itinerant operations are an important indicator because they show that users from outside of the local area, beyond a 30-minute market area, are operating at the airport. This indicates demand outside the 30-minute market area.¹
- **Gross regional product** – Airports are analyzed by the total gross regional product (GRP) captured within a 30-minute drive time. The associated counties that have higher GRP were mentioned likely to have more demand for aviation services.
- **Retail sales** – Airports can be analyzed based on the total retail sales captured within a 30-minute drive time.²

3.3. Infrastructures

Airports are also evaluated based on their physical facilities. Airports that have longer runways and more precise approach capabilities, precision or non-precision, tend to play a more fundamental role within the airport system.³

- **Primary runway length** – Airports are rated based on the length of the primary runway.
- **Approach types** – Airports can be ranked based on the type of the most demanding approach available/published. The following categories are used:
 - *Precision Approach (Lower than 1.2 km visibility)*
 - *Non-Precision Approach (Not lower than 1.2 km visibility)*
 - *Visual Approach (Visual and/or not lower than 1.6 km visibility)*
- **Presence of ASOS/AWOS** – Airports are evaluated based on whether or not the facility had an automated surface observing system (ASOS) or automated weather observing system (AWOS) on-site.

¹ Thirty-minute drive times are used as an indicator based on the FAA's use of this measure for eligibility in the NPIAS.

² Thirty-minute drive times are used as an indicator based on the FAA's use of this measure for eligibility in the NPIAS.

³ Thirty-minute drive times are used as an indicator based on the FAA's use of this measure for eligibility in the NPIAS.

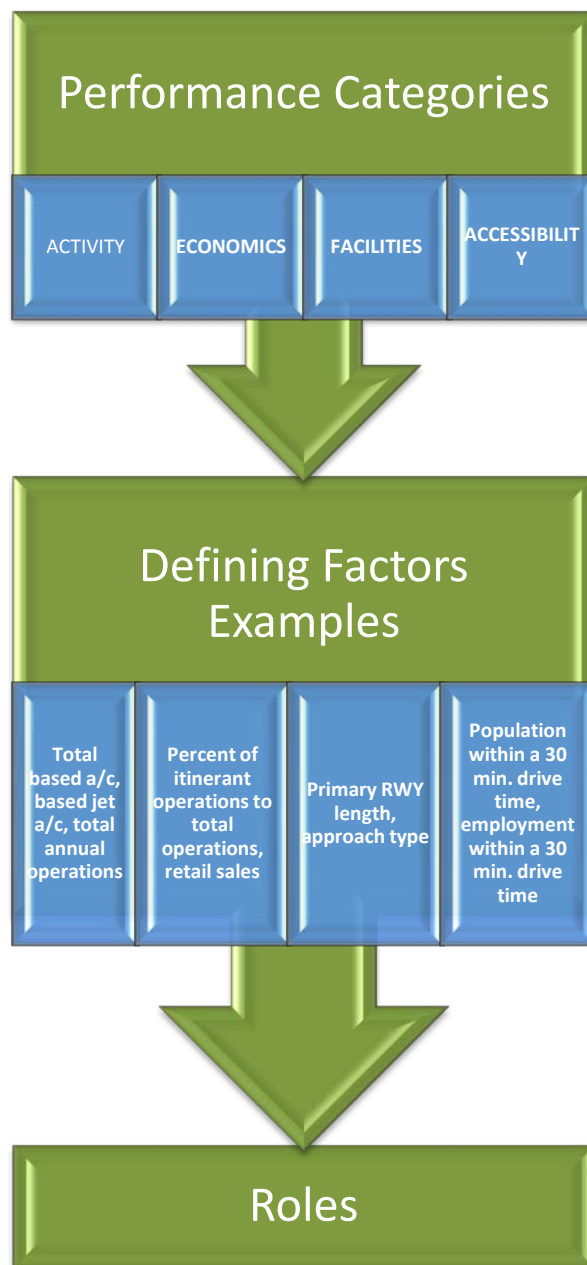


Figure 3: Evaluation Process [Source: Wilbur Smith Associates. Wisconsin State Airport Plan. Technical report 2010]

3.4. Accessibility

Airports are evaluated based on several factors that measured the overall accessibility of the facility to population, employment and the coverage of the state in terms of square miles throughout the state. Demand for both aviation and aviation-related services typically correlate with various socioeconomic/demographic indicators such as population and employment or business activity. In addition, airports within close proximity to a paved highway, specifically a four-lane paved highway, tend to have higher rates of utilization and contribute to the State's multimodal accessibility. The specific accessibility measures examined include the following:

- **Populations within a 30-minute drive time** – Airports can be rated based on block group data of total population within a 30-minute drive time of the airport.

- **Employments within a 30-minute drive time** – Airports can be rated based on block group data of total employment (jobs) within a 30-minute drive time of the airport.
- **Numbers of square miles within a 30-minute drive time** – Airports can be rated based on the estimated number of square miles within a 30-minute drive time of the airport. [7]

4. Conclusion

Figure 3 describes the role of the evaluation process of airport classification used for the Wisconsin State Airport Plan 2010. As we can see in the Figure the evaluation process involves three aspects such as performance categories, defining factors and finally the role of each airport.

As we can observe in Figure 3 the role of the evaluation process is to define airport category and airport type using performance categories such as activity, economics, facilities and accessibility, defining factors examples such as total based aircrafts, retail sales or approach type and definitively the role of the evaluation process. The evaluation process described above was applied as a part of the Technical Report of Wisconsin State Airport Plan in 2010. Nevertheless we can adapt this airport classification evaluation process sample for any airport using the different performance categories and examples of defining factors. Therefore we will apply some of performance categories such as activity, economics, accessibility and facilities from the evaluation process depicted above as the inspiration for the European Union Airport Classification Process in the future research of framework for a new typology of airports.

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