International Civil Aviation Organization

FEPW (Cairo)-WP/6
15/9/09

WORKING PAPER

REGIONAL WORKSHOP ON TRAFFIC FORECASTING AND ECONOMIC PLANNING

Cairo 2 to 4 November 2010

Agenda Item 3 c): Forecasting for Airport Planning

(Presented by the Secretariat)

Introduction

1. Traffic forecasts are required to determine future airport capacity requirements. Many aspects of the complex subject of airport planning are treated in the ICAO *Airport Planning Manual - Part 1: Master Planning* (Doc 9184), with Chapter 3 containing a discussion of the role of forecasting in airport master planning. The *Manual on Air Traffic Forecasting* (Doc 8991, Part II) contains some case studies of forecasting models and approaches applied in the planning and management of airport operations. Expected numbers of aircraft movements is the most important determinant of runway, taxiway and apron requirements, while the numbers of various categories of passengers (e.g. arriving, departing and transit) affect passenger terminal capacity requirements. Other planning parameters are required for other components of airport infrastructure, such as cargo facilities, aeronautical and non-aeronautical activities, and surface access. Airport developments are generally planned on the basis of forecast activity during typical "peak" or "busy" periods, because of the hourly, daily and monthly variations inherent in air transport.

Identification of Airport Planning Parameters

2. The availability of data required for airport forecasting and planning varies considerably from case to case. Where the available data base is inadequate, a significant part of the forecasting task may be to supplement the data base, for example, by means of special surveys.

3. The airport facilities to be considered and the nature of the planning decisions to be taken will determine the range of items to be forecast. Planning parameters commonly required are the following:

a) Annual airport passengers categorized according to international (scheduled or non-scheduled) or domestic, originating/terminating, and transiting or transferring.

b) Annual aircraft movements by type of operations (international commercial, domestic commercial, general aviation, military).

c) Peak hour passengers by various categories.

d) Peak hour aircraft movements by size/type.

e) Number of airlines serving the airport.

f) Number and type of aircraft requiring maintenance and overhaul services at the airport.

g) Number of visitors to the airport.

h) Number of employees at the airport.

i) Freight and mail traffic.

Airport Passengers

4. Terminal planning is assisted by breaking passenger forecasts down into passengers using the arrival and departure facilities (check-in, baggage collection, customs and immigration) and passengers using transfer or transit facilities (cafeterias, transit lounges). The factors which influence the numbers of originating/terminating passengers at an airport will differ from those affecting the numbers of direct transit and transfer passengers, and it is therefore preferable to analyze and forecast these traffic categories separately. Forecasts of transit and transfer passengers at an airport are particularly sensitive to the structure of airline services in the region which, in turn, is influenced by many factors, including the geographical pattern of demand, aircraft sizes, constraints on service frequencies, numbers of competing airlines and government regulation of air services.

Aircraft Movements

5. Aircraft movements can generally be grouped into commercial air transport movements (for carriage of passenger and freight traffic), general aviation movements (flying training, private and business flying, aerial work, etc.), and military movements. Accommodation of passenger aircraft movements is generally the major reason for the more important civil airport developments.

6. The simplest method of forecasting future aircraft movements is to extrapolate the historic trend. However, although it is prudent to take historic trends in movements into account, a common approach is to derive forecasts of aircraft movements from passenger traffic forecasts and assumptions about future load factors and aircraft sizes. Using this approach care is needed in the interpretation of terms and concepts involved. For example, it is important to distinguish between "embarked/disembarked" load factors (i.e. proportion of seats occupied by embarking passengers and that occupied by disembarking passengers) and "on-board" load factors. In some cases transit passengers may not be included in airport data and historic embarked/disembarked load factors observed at an airport may be much lower than on-board load factors. A low observed load factor may encourage the forecaster to predict a substantial build-up of the load factor during the forecast period, when in fact this may be impossible because of the presence of large numbers of transit passengers.

7. A critical assumption affecting the forecasts of aircraft movements and the planning of airport facilities concerns the sizes (including seating capacity) of aircraft which will be using the airport over the forecast period. Also important are the proportions of movements by aircraft of different sizes. An indication of likely changes in the mix of aircraft types using the airport may be obtained from consultations with airlines and from judgements of the likely future suitability of new aircraft types for use on routes connecting the airport.

8. Instead of determining aircraft movements from an aggregate analysis of all routes serving the airport, it may be possible, depending on resources available, to carry out a more detailed analysis by various sub-markets, e.g. long haul, short haul, regional route groups or even individual routes. In some studies aircraft movements by route were forecast for the busiest month. On routes dominated by pleasure travel, which tend to be operated at low frequencies by relatively large aircraft, forecast traffic growth was accommodated by increasing aircraft load until an upper limit was reached, and thereafter by increasing frequency. Future traffic growth on business-oriented routes on the other hand was accommodated by increasing frequency until the routes reached a level of maturity specified by an upper limit on the frequency. Further anticipated growth was then accommodated by increasing aircraft load.

Traffic in Peak Periods

9. There is no single universally accepted definition of typical peak periods. The typical peak hour is sometimes defined as 30th or 40th busy hour in a year; or traffic in a typical peak hour or peak day may be measured as an average over a specified period such as the peak month. Some airport forecasting programmes involve defining an average week in the busiest month of the year (taking into account each of the Mondays in the peak month, each of the Tuesdays, etc.). The selected "busy day" is the second busiest day of this week.

10. Forecasts of peak period passengers and aircraft movements can be obtained directly from annual forecasts by applying ratios of busy period traffic to annual traffic derived from recent historic data. However, time profiles of aviation activity are unlikely to remain constant. There is usually a trend in the ratio of peak to annual traffic which can be projected into the future, taking into account the factors which influence it, such as changes in the mix of business and holiday traffic, curfews at other airports, and changing route patterns.

Other Parameters

11. As mentioned earlier, numerous other parameters need to be forecast for planning purposes. For example, the numbers of visitors to the airport in the peak can be calculated on the basis of an assumed relationship to the numbers of originating and terminating passengers. Also the numbers of employees can be forecast on the assumption of specific relationships to numbers of air passengers, or aircraft movements (depending on the job classification). These parameters are used in the estimation of peak terminal building population, parking requirements, and the impact on airport surface access and transport.

12. The planning of freight handling facilities at an airport requires forecasts of the freight tonnage passing through the airport. Requirements for handling and clearance facilities often vary according to type of freight so that a breakdown of the forecasts into various types of freight (e.g. perishables, live cargo, manufactured goods) may be needed.

Alternate Development Strategies

13. The planning parameters indicate possible future capacity requirements for various airport facilities. However, there are usually alternative ways of providing this capacity. For example, the design of new passenger facilities will depend on the relative emphasis given to spaciousness on the one hand and economy of design on the other. Airport capacity is also affected by various operating constraints and procedures such as curfews, scheduling activities to ease congestion, and priorities assigned to types of traffic. Although flexibility in these procedures is often severely limited, the planning process may sometimes involve changes in them, which may reduce the need for capacity expansion.

— END —