International Civil Aviation Organization

WORKING PAPER

TENTH SESSION OF THE STATISTICS DIVISION

Montréal, 23 to 27 November 2009

Agenda Item 4: Airport traffic data

DATA REQUIREMENTS FOR FORECASTING ACTIVITIES

(Presented by the Secretariat)

SUMMARY
This working paper presents the restructuring of ICAO forecasting activities, discusses the related data requirements and identifies their potential sources. The focus of this paper is on requirements for air traffic and fleet forecasts. Requirements for the forecasting of licensed personnel, airport capacity, airspace capacity and funding are covered by other working papers presented to the division. Action by the division is in paragraph 4.

1. **INTRODUCTION**

1.1   The Air Transport Committee of the Council of ICAO endorsed, during its 183rd session in early 2008, a Secretariat proposal to review ICAO's forecasting activities in order to ensure better alignment with ICAO Strategic Objectives and enhance the value of the forecasts to their users. The outcome of this is expected to lead to a wider global coverage, increased consistency and improved quality of ICAO's forecasts.

1.2   The Air Transport Committee discussed the results of the review during its 185th session held in October 2008 and approved the proposed new forecasting process as described in the Appendix (AT-WP/2037).

2. **DATA REQUIREMENTS FOR AIR TRAFFIC FORECASTS**

2.1   The new traffic forecasts will be prepared using econometric modelling based on a bottom up approach, starting at the route group level and building up to the regional and global levels. The main data requirements for this process include historical origin-destination passenger and freight traffic data; demographic and socio-economic data and the related forecasts; historical data and forecasts for airline ticket prices (or average yields) and data on competing services.

2.2   **Historical Traffic data**

2.2.1   In principle, historical data on true origin and destination of passenger and freight traffic should be used as a basis for the traffic forecasts. This data, however, may not be easily accessible due to the difficulty of tracing the true origin and/or destination of a passenger. The use of a combination of data sources and the analysis of passenger true origin and destination is therefore required. In the following paragraphs, a description of the potential sources to be explored is provided.

2.2.2   Two data sets in the ICAO statistics program, OFOD and TFS, have been used towards this end. Each set has its own limitations.

2.2.3   The On-Flight Origin and Destination (OFOD) shows on an aggregate basis, the number of passengers, freight and mail tonnes carried between all international city-pairs on scheduled services. A city-pair is defined as two cities between which travel is authorized by a passenger ticket or part of a ticket (a flight coupon) or between which shipments are made in accordance with a shipment document or a part of it (freight bill or mail delivery bill). These data are collected on a quarterly basis. If the ticket has multiple flight coupons, the identification of the true origin and destination requires the re-construction of the passenger itinerary as determined by the successive flight segments according to the various flight coupons. This is not possible using the OFOD data set alone.

2.2.4   The Traffic by Flight Stage (TFS) contains annual traffic on-board aircraft on individual flight stages of international scheduled services. A flight stage is the operation of an aircraft from take-off to its next landing. An international flight stage is a flight stage with one or both terminals in the territory of a State, other than the State in which the air carrier has its principal place of business. The data, classified by international flight stage, shows for each air carrier and aircraft type used, the number of flights operated, the aircraft capacity offered and the traffic (passengers, freight and mail) carried. All passenger, cargo and mail traffic onboard the aircraft is reported regardless of whether it is loaded or off-loaded at one of the terminals, which makes it difficult to identify the true origin or destination.

2.2.5   Alternatively, Market Information Data Tapes (MIDT) is a commercial data source of passenger bookings made through all the major global distribution systems (GDSs) and which can be used to recreate the passenger itinerary post-departure, effectively indicating in most cases his/her true origin and destination. The four major GDSs are Sabre, dominant in North and South America, Amadeus, dominant in Europe, Galileo and Worldspan. China-based TravelSky is dominant in Asia. However, even when combined, data from the various GDSs does not provide a full world coverage. Direct sales and online bookings, which by-pass the GDSs and are estimated to represent about 30 per cent of all bookings made in 2004, continue to grow as airlines encourage their use by passenger and travel agencies. MIDT may therefore offer complementary but expensive data, as a set of data for only one city-pair could reach an amount in dollars showing a five digits number.

2.2.6   Another possible source is the IATA Passenger Intelligence Services ("PaxIS") which is an airline passenger market intelligence database with data captured through IATA Billing and Settlement Plan ("BSP"). BSP is a worldwide system facilitating the settlement operations for airlines and travel agents. IATA estimates that over 80 per cent of worldwide airline revenues are ticketed via IATA travel agencies in the BSP system.

2.2.7   It is important to note that OFOD, TFS, MIDT and BSP data covers only scheduled traffic. Other sources need to be found and used for non-scheduled traffic.

2.3	**Passenger surveys**

2.3.1	States, airports and airlines regularly conduct passenger surveys in the framework of their marketing activities. Only samples of passengers are surveyed to collect information such as the origin, the destination, the purpose of travel, the passenger's travelling habits, preferences, income level, etc. A proper sampling method needs to be designed in order to ensure the representativeness of the samples. The use of such data to identify the true origin and destination of the passenger, while relatively easy on a domestic or regional level, is more complex at the global level. In particular, a global and regular coverage is required. *The collection by ICAO of the summary results of such surveys, including origin-destination traffic may be useful for some of the routes.*

2.4	**Tourism data**

2.4.1	The United Nations World Tourism Organization (UNWTO) collects and disseminates data on tourism visits, which can be used to identify the country of origin (for inbound tourism) or country of destination (for outbound tourism). The definition of a tourism visit (or tourism trip which is made up of one or several visits) covers all purposes of travel including business, leisure and personal motives.

2.5	**Border crossing data**

2.5.1	Data on border crossing collected by border authorities (police, customs, immigration, etc.) may cover the true origin (or destination) of the passenger as well as the purpose of travel. This data is not easily accessible in many States.

2.6	**Historical demographic and socio-economic data and forecasts**

2.6.1	The factors affecting long term demand for passenger air travel include demographic and socio-economic factors, such as the size and spending ability of a city, country or region and the ethnic and linguistic ties between areas. The size of the market may be measured by the population and/or the Gross Domestic Product (GDP) or the Gross National Income (GNI) while the spending ability may be measured by the personal disposable income and/or the income distribution. The spending ability may also be affected by the variations in the exchange rate of the currencies of two countries. The ethnic and linguistic ties may be measured by the population of one area born in another area or the population of one area speaking the same language as the other area. Trade (imports and exports) between two areas may also be an influencing factor for passenger air travel but is more important to demand for air freight.

2.6.2	While most of the demographic and socioeconomic data required is readily available through various sources, some data such as income distribution and data on ethnic and linguistic ties may not be available for all countries.

2.7	**Historical ticket price data**

2.7.1	In general, for each flight there are multiple fare classes which lead one to the conclusion that there is no single ticket price for any given flight. In addition, airline fares may be published or unpublished. While public access to published fares is straightforward, only the air carrier and the travel agents concerned have access to unpublished fares.

2.7.2   Determining historical average ticket price data by route is possible but very complex. This requires access to historical ticket sales data through MIDT or BSP, which may track the price printed on the ticket which again may be different from the price actually paid by the passenger.

2.7.3   One alternative is to use average "passenger yield", which is equal to the ratio of the total passenger revenues by the total traffic. WP/12 (Impact of reporting of air carrier financial data on traffic forecasts) analyses the impact that accounting and reporting of certain financial items has on the estimation of average yields. Yield data is considered sensitive by the airlines and is difficult to collect by route. Network-wide yields are available but less useful to forecasting.

2.7.4   ICAO estimates average yields by major international route group based on confidential survey data collected in the framework of the series of "Studies on Regional Differences in International Airline Operating Economics".
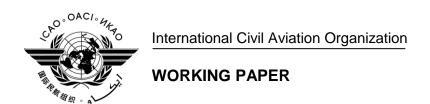
3.   DATA REQUIREMENTS FOR FLEET FORECASTS

3.1   The fleet forecasting process serves to convert the passenger and air freight forecasts into number of aircraft departure by generic aircraft category leading to the corresponding number of aircraft. In addition to the passenger and freight traffic forecasts by city-pair or by route group, the data required for fleet forecasts include historical data on average load factors, number of aircraft movements, average aircraft seating capacity and average aircraft utilization.

3.2   In the fleet forecasting process, average load factors serve to convert traffic into capacity. The average aircraft seating capacity may be estimated using TFS data.

3.3   Data on the number of aircraft movements by origin and destination is collected by ICAO through Form C (TFS). This data is also available from the Official Airline Guide (OAG).

3.4   The average aircraft seating capacity may be estimated using TFS data or the OAG. Historical data on the number of aircraft movements and the average aircraft seating capacity are used to explore the ways in which airlines respond to traffic growth (by increasing frequency, aircraft seating capacity or both).

3.5   Average aircraft utilization can be estimated using data extracted from ICAO Form D (Fleet and personnel). In the fleet forecasting process, this data is needed to convert the number of hours flown by generic aircraft category into number of aircraft.

3.6   Base year data including the fleet in service and aircraft movements data is also required. In addition to IRCA, discussed in WP/18, several commercial aircraft data sources are available on the market such as Airclaims, ACAS and Back Aviation Solutions. Collection of data on aircraft movements is addressed in WP/17.

3.7   In parallel, availability of fleet forecasts is the basis of deriving licensed personnel (pilots, maintenance engineers and air traffic controllers) forecasts as well as more sophisticated modelling of airport constraints, in addition to the ones identified by the traffic forecast. Indeed, as traffic grows, demand for licensed personnel increases and issues linked to airport capacity constraints become more critical. The failure to properly identify and remove any bottleneck through the adoption and implementation of adequate and timely measures, may adversely affect the safety of airline operations.

3.8   STAP 14 noted the data requirements for ICAO forecasting activities.

4.   **ACTION BY THE DIVISION**

4.1   The division is invited to note the data requirements for ICAO forecasting activities as endorsed by the Air Transport Committee.

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APPENDIX

International Civil Aviation Organization

WORKING PAPER

AT-WP/2037
15/9/08

185TH SESSION OF THE COUNCIL

AIR TRANSPORT COMMITTEE

Subject No. 15.8: Economic planning and forecasting

REPORT ON THE REVIEW OF ICAO FORECASTING ACTIVITIES

(Presented by the Secretary)

EXECUTIVE SUMMARY	
The Air Transport Committee, during its 183rd session, endorsed a Secretariat proposal to review ICAO's forecasting activities in order to ensure a better alignment with ICAO Strategic Objectives and enhance the value of the forecasts to their users. The outcome of the reviewed activities, if implemented, would lead to a wider global coverage, increased consistency and improved quality of ICAO's forecasts. The review spanned over the first half of 2008 and the various entities interested in the forecasts within ICAO were requested to provide their inputs, comments and suggestions. This paper describes the present ICAO forecasting activities including their shortcomings, and proposes a new forecasting process with the corresponding implementation timeline and required resources.	
Action: The Committee is invited to review and endorse the proposed forecasting process as stated in paragraph 3.	
Strategic Objectives:	This working paper relates to Strategic Objectives A, C and D.
Financial implications:	No financial implication for the current ICAO budget (paragraph 5 refers).
References:	AT-WP/2031

1.   **BACKGROUND**

1.1   Pursuant to the endorsement by the Air Transport Committee (183rd Session) of the Secretariat proposal to review ICAO forecasting activities, the Secretariat conducted this review during the first half of 2008. The main purpose of this initiative is to ensure a better alignment of these activities with ICAO Strategic Objectives and enhance the value of the forecasts to their users (planning and implementation regional groups (PIRGs), the Committee on Aviation Environmental Protection (CAEP) and others). Implementation would also lead to a wider global coverage, increased consistency and improved quality of ICAO's forecasts in parallel with a better allocation of ICAO forecasting resources.

1.2   In the course of this review, all the various forecast users within ICAO were invited to provide their inputs and notably their suggestions regarding any change that could make the forecasts more pertinent to their specific use.

2.   **ICAO'S CURRENT FORECASTING ACTIVITIES**

2.1   Forecasts are the basis of any effective planning, and in the case of ICAO's work, forecasts support the efficiency of aircraft operations (Strategic Objective D), aviation environmental protection (Strategic Objective C) and, to a lesser extent, aviation safety (Strategic Objective A). Air traffic and fleet forecasts are useful both for air navigation services planning (and hence for the efficiency of aircraft operations) and for environmental analyses, while proper prediction of licensed personnel, training and maintenance facilities requirements supports the objective of improved safety.

2.2   The Organization's current forecasting activities are governed by Appendix C of Assembly Resolution A36-15, *Consolidated statement of continuing ICAO policies in the air transport field*. In conformity with this resolution and the preceding relevant resolutions, the Secretariat has been developing long-term and medium-term global and regional forecasts of passenger and of freight traffic by region of airline registration, as well as passenger traffic forecasts for major route groups and global aircraft movement forecasts. The most recent long term forecasts are in Circular 313, *Outlook for Air Transport to the Year 2025*, published in 2007, while the most recent medium term forecasts, for the period 2007-2009, are available on the ICAO website www.icao.int/icao/en/atb/ead/fep/forecastmed.htm.

2.3   In addition, the Secretariat has been providing extensive support to the regional traffic forecasting groups (TFGs) in four ICAO regions (Africa and Indian Ocean, Asia/Pacific, Caribbean and South America and Middle East). This includes the organization and chairing of meetings, provision of statistical data, modelling, development of forecasts and writing of reports.

2.4   The Secretariat has also been providing significant support to the Forecasting and Economic Analysis Support Group (FESG) of CAEP, mainly by leading its Traffic Forecast Group in the development of traffic and fleet forecasts, the latest of which (covering the period up to the year 2036) was finalised in February 2008.

2.5   Although the review of the current forecasting activities has led to the conclusion that the forecasts currently produced are relevant and useful, two notable shortcomings were identified. Firstly, some inconsistencies have been noticed in the multiple forecasts that ICAO currently produces under its ambit in response to various users' needs. In addition, the current forecasting activities do not produce all the required deliverables; in particular, no forecasts are produced for requirements in terms of licensed personnel, airport capacity, airspace capacity and funding.

3.   **PROPOSED FORECASTING PROCESS**

3.1   The review led the Secretariat to conclude that there is a need to produce a single set of ICAO forecasts responding to the requirements of the various ICAO forecast users.

3.2   The proposed unified forecasts will provide a harmonized ICAO vision of the future of civil aviation and support the achievement of ICAO´s Strategic Objectives. They will cover the following areas: passenger and freight traffic and aircraft movements, aircraft fleet as well as requirements in terms of licensed personnel, airport capacity, airspace capacity and funding. These forecasts will be developed regularly by the Secretariat based on relevant methodologies, parameters and assumptions, and the FESG as well as the TFGs will be invited to use them.

3.3   For most analyses and planning applications related to civil aviation, a 20 year forecast time horizon is needed. Some applications may require longer time horizons, but for accuracy reasons, a 20-year time horizon is recommended, while extended forecasts for specific items can be conducted on an ad-hoc basis.

3.4   It is noteworthy that the full set of forecasts can be produced on a yearly basis if the necessary resources are made available. Otherwise, it will be delivered once every triennium, prior to each session of the Assembly.

3.5   The above proposal concerns only long-term forecasts. An annual (web-based) report outlining the recent developments in the air transport industry, including a medium-term forecast of passenger air traffic and airline finances will continue to be produced.

4.   **IMPLEMENTATION**

4.1   Given the limited resources available, a phased approach is proposed. During the first phase corresponding to the current triennium, the Secretariat will develop methodologies and forecasts of passenger and freight traffic and aircraft movements by route group for a 20-year time horizon, under three scenarios: *most likely*, *high* and *low*. The forecasts will thereafter be aggregated to the regional and the world levels. The Secretariat will also initiate the development of methodologies to produce other forecasts, notably fleet and licensed personnel.

4.2   Later in the triennium, the Secretariat intends to organize a global workshop on civil aviation forecasts to present the preliminary air traffic and aircraft movement forecast results with the associated underlying methodologies, assumptions and parameters, while participants will also be invited to present their own forecasts and to give their feedback. Forecast users, major air transport stakeholders as well as other organizations and experts involved in aviation forecasts will be invited to attend this workshop.

4.3   During the second phase that will be undertaken in the next triennium, the Secretariat will continue to develop and implement the fleet forecast methodology and the associated software tool as well as the relevant methodologies needed to forecast licensed personnel, airport capacity, airspace capacity and funding requirements.

4.4   A crucial element in the achievement of any forecasting activities is the availability of the relevant data, and ICAO is uniquely placed in this respect as it has the opportunity of enhancing its existing data collection during the upcoming Statistics Division meeting (scheduled for October 2009).

4.5   Regular reports on the progress of the implementation of the proposed forecasting process will be provided to the Committee during subsequent sessions.

5.   **FUTURE REQUIREMENTS**

The resources required to successfully implement the proposed forecasting process include human resources, data input and software tools. Measures are being taken to ensure the availability of data input and software tools, including training, in this current triennium. In order to ensure a complete, timely and successful implementation of the second phase (during the next triennium) it is expected that additional human resources will be required. There is a great potential market for this unique independent set of fleet forecasts, as they are useful to different private entities that would not have access to the detailed results of the aircraft manufacturers' forecasts. Bearing in mind the revenue-generating opportunity of this venture, a business case will eventually be made for the funding of any additional resources needed to support the activities of market research, development of methodologies, modelling and forecasting.

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