Analysis of international air passenger flow in Asia and study of improvement of air travel demand predictions

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1. Introduction

The International Civil Aviation Authority (ICAO) predicts that between 2005 and 2025, air passenger volume in the Asia-Pacific Region will approximately triple (annual average + 5.8%). Such an abrupt change of the air travel market will have a big impact on Japan's aviation and airport policies. There is no air travel demand prediction method that expressly incorporates such a changing trend. So (1) the flow of international air passengers in Asia was organized and analyzed, and at the same time, (2) the applicability of the quantitative time series analysis method was studied as part as basic research to improve air travel demand predictions.

2. Flow of international air passengers in Asia

Between 2000 and 2008, the basic structure of international air route network in Asia did not change, but overall the density of the route network was seen to increase. It confirmed that the density of the network of routes originating in China or Korea in particular increased remarkably (see Figure on right). Cluster analysis etc. has quantitatively shown that many of routes on which demand has increased remarkably originate in China, India, Vietnam, and Mongolia, which have seen spectacular economic growth in recent years.

3. Applicability of quantitative time series analysis methods to the prediction of air travel demand

The quantitative time series analysis method, which permits analysis based on data which can be obtained relatively easily, is already applied in a wide range of fields such as economics and finance. Of these, the applicability of an autoregressive moving average model (SARIMA) which can consider seasonal fluctuations, to predicting air travel demand was studied, reaching the following conclusions.

2000   2008
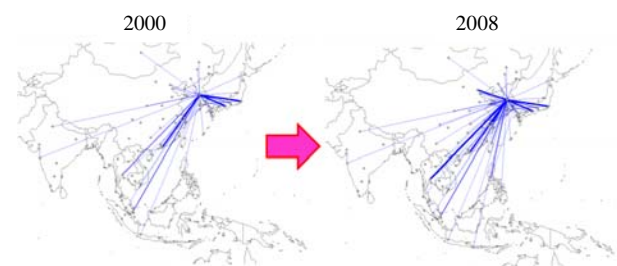
Notes:
Thickest lines: 1 million passengers/year or more
Thick lines: 500,000 passengers/year or more
Thin line: 10,000 passengers/year or more

Figure. Changes of the International Air Route Network in Asia (Korea)

(1) A time series analysis method can be effective for short term predictions (about 5 years) of domestic or international air travel passenger demand, which can be analyzed by a differential series.
(2) For a long-term prediction based on a prediction period of 5 to 10 years or longer, the hypothesized section prediction is broad and it is difficult to directly apply this method at the present time.

4. Conclusion

Based on recently organized time series data and knowledge obtained, we wish to specify all factors which will have a great impact on the international air travel market in the future, and clarify the impact on Japan's international air travel passenger and cargo flows. And a study will be performed of a model which can consider changes in the state of demand prediction methods to have a great impact on air travel demand trends.

[Reference]
Technical Note of National Institute for Land and Infrastructure Management, Nos. 643 and 652.