

# Multi-Faceted Efforts Supporting Aviation Administration

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## 1. Introduction

In 2014, Dubai International Airport in the United Arab Emirates (UAE) in the Middle East overtook Heathrow International Airport to become the world's largest airport in terms of annual airport passenger volume. Because Dubai has the shortest average flying time to the world's leading cities, including 7 1/2 hours to London and Singapore and 13 hours to New York, and connecting flights, etc. are also convenient, annual passenger volume exceeded 70 million.

Up to 2032, air passenger volume is expected to grow at an average annual rate of 6% or more in the Middle East and Asian regions. Likewise, according to statistics for 2013, passenger volume in Japan also exceeded that in the previous year on both international routes (63.29 million passengers) and domestic routes (56.25 million passengers), and showed a recovering trend continuing from the Great East Japan Earthquake of 2011.

As shown in **Fig. 1**, NILIM's Airport Department proposes tools supporting Japan's aviation administration policies that respond to this global increase in air passengers, and also carries out activities supporting infrastructure management. Here, I would like to touch on several current efforts of the Airport Department in connection with key policy issues.

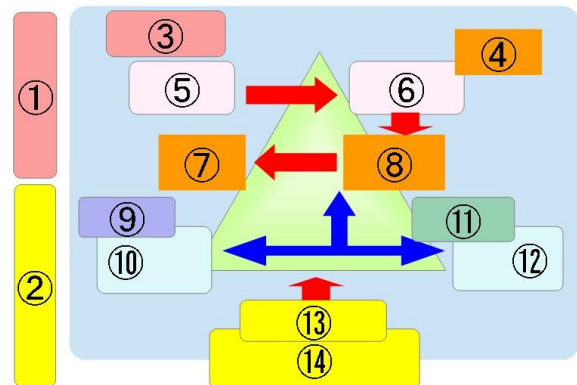


Fig. 1 Multifaceted support for airport policy and infrastructure management

- ① Civil Aviation Bureau, airlines, etc.
  - ② Airport Dept., NILIM
  - ③ Removal of restrictions by expanding arrival/departure slots
  - ④ Efforts centering on airports in metropolitan areas
  - ⑤ Decision of slots by bilateral agreements between countries (conventional)
  - ⑥ Promotion of "Open Sky" (liberalization of aviation)
  - ⑦ Ripple effect of growth to local regions through domestic network
  - ⑧ Attraction of tourist/business traveler demand, beginning with the growing Asian region
  - ⑨ Airlines
  - ⑩ Promote participation by LCC
- Provide incentives  
Countermeasures for public taxes and charges, etc.
- ⑪ Airport operation
  - ⑫ Secure airport capacity, disaster-prevention countermeasures, higher efficiency and improved service by privatization, etc.
  - ⑬ Research supporting airport infrastructure management and policy support
  - ⑭
- Risk management of airport operation against large-scale disasters
  - Technologies for forecasting air traffic demand → Forecasting of facility capacity which should be secured, and ensuring effective investment
  - Technologies for economical, efficient renewal and maintenance of runways, etc.
  - Efforts to secure/improve quality (various standards, development and dissemination of new technologies, etc.)
  - Promotion of international technical cooperation and support in ICAO (International Civil Aviation Organization)

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## 2. Multidimensional forecasting techniques for changes in aviation demand

As seen in the bankruptcy of Skymark Airlines in January 2015, cost competition between airlines has intensified, particularly due to the entry of low cost carriers (LCC) in recent years. It is also possible that passengers who had used railways in the past may switch to LCCs, which offer prices near those of railways, and there is a potential for creation of new demand for long distance travel, depending on the route.

Conventional demand forecasting techniques could not directly consider this type of switching of demand between modes of transportation and fare-cutting competition between companies responding to fare setting for the same mode and same route. The Airport Department is studying more sophisticated forecasting technologies, for example, forecasting that considers the transportation mode choice actions of passengers in response to fare setting on routes, and analysis of users' choices by questionnaires and reflection of the results in creation of new travel demand.

On the other hand, as mentioned in the introduction, the aviation network with other countries is also expanding, beginning with increases in the number of tourist visiting Japan and metropolitan airports. The basic thinking when forecasting international air passenger traffic in the past focused only on the flows of passengers with origins/destinations in Japan. However, considering the above-mentioned increase in the number of transit passengers travelling via Dubai as an example, although connecting traffic as such is not a passenger flow with its origin/destination in the country concerned, the side effect that transit passengers contribute to securing and maintaining stable international air routes for that country cannot be ignored. Thus, identifying and forecasting the characteristics not only of passenger flows with origins/destinations in Japan, but also passenger flows in related regions as a whole, beginning with the Asian region, is essential for accurate judgment of demand for

international air routes in Japan. The Airport Department is engaged in multifaceted research from this viewpoint.

As described above, we are conducting research which takes a multidimensional view of the factors that influence aviation demand in order to strengthen Japan's international and domestic air networks, with increasing aviation demand in Asia as a whole as a driving force.

## 3. Earthquake/tsunami risk management

Japan's airports have played a critical role in recovery and reconstruction efforts after large-scale disasters, including the Niigata Prefecture Chuetsu Earthquake in 2004 and the Great East Japan Earthquake in 2011. In the former case, Niigata Airport immediately became a base for transportation of emergency supplies, and Niigata-Haneda flights were established on a temporary basis, and in the latter case, Sendai Airport served as a substitute for the Tohoku Shinkansen, which was out of service for an extended period, even though the airport was also closed as a result of the tsunami. Moreover, it is particularly noteworthy that liquefaction countermeasures for airport facilities functioned effectively in both cases.

Of course, securing airport functions is not limited to runways and other hard functions, but also means securing the totality of a diverse range of functions that also includes soft functions, such as securing air traffic control, CIQ and passenger terminal systems, among others. Therefore, if the degree to which all functions are secured during an earthquake/tsunami disaster can be evaluated objectively, and those with the potential to become bottlenecks in airport functions as a whole can be extracted, a variety of countermeasures can be deployed efficiently and effectively.

In research which we are now conducting, the risks of earthquake/tsunami natural disasters are arranged as a probabilistic hazard database, and facility strength and operational system security are treated as probability distributions. As a result, it is increasingly possible to quantify the risk of airport functions by comparing and contrasting the two. For example, as shown in **Fig. 2**, it is

possible to make a trial calculation of the effect of earthquake risk on the concession-holder in the case of operation based on a concession right implementation agreement.

At present, the Civil Aviation Bureau is studying the proper form of airport facilities in wide-area earthquake/tsunami disasters, and we are now grappling with research on systematizing airport risk management for wide-area earthquake/tsunami disasters.

#### 4. Techniques/technologies for efficient operation and maintenance

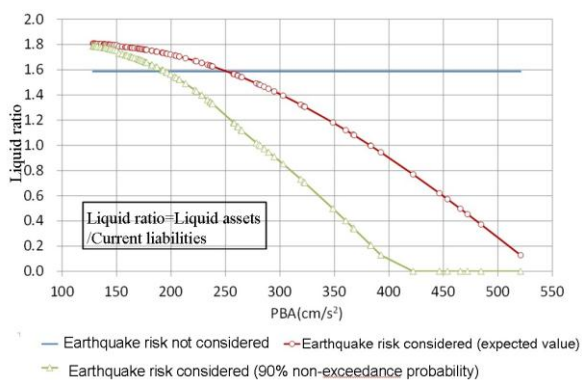


Fig.2 Reduction of liquid ratio by earthquake risk management

It is a fact that the time allocated to operation and maintenance of airport facilities is continuing to decrease due the effect of increasing numbers of flights, including night-time, particularly at airports in metropolitan areas.

However, if a runway is damaged, operation of aircraft is not permitted without repairs, even in case of delamination of only several cm<sup>2</sup> of the asphalt pavement surface. It is no easy task to carry out inspections for such damaged parts, or signs of future damage, without overlooking any problems during a limited time while using night-time lighting, and to make all necessary repairs within the available time.

In technical studies in MLIT on the problems of airport operation and maintenance, study of new inspection and repair technologies that support higher efficiency in site work, and active adoption of high durability materials and efficient construction methods in the repair stage are being promoted.

The Airport Department is promoting extraction and

evaluation of existing technologies that can contribute to efficiency and reduce workloads at the site, and confirmation of their applicability to the site. We are also engaged in research on materials that will lead to higher efficiency in paving work and long pavement durability.

In order to raise the level of technical capabilities in operation and management-related work among airport administrators as a whole, including airports administered by other public bodies, we intend to provide training, technical guidance in local areas, etc., and to conduct activities continuously on every occasion in the future.

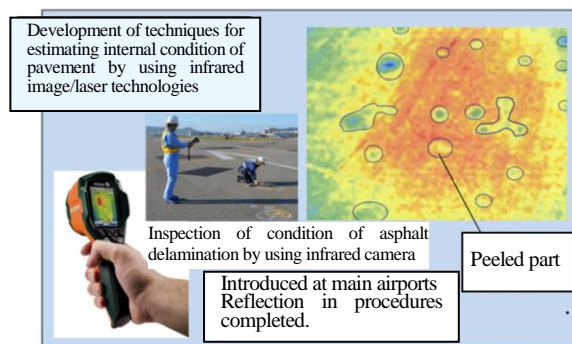


Fig. 3 Investigation for interlayer delamination of asphalt by using infrared image