

Research on airport disaster risk quantitative evaluation methods

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1. Use of capabilities of the private sector to operate airports

The Law for the Use of Capabilities of the Private Sector to Operate Government Managed Airports (Law No. 61 of 2013) has been enacted, and the Basic Guideline to Using Capabilities of the Private Sector to Operate Government Managed Airports (Notification of November 2013) issued under the same law legally obligates private companies with operation rights to set disaster phenomena caused by earthquakes and tsunami and the degrees of damage they cause and to purchase insurance, so research and development of methods of quantitatively evaluating disaster risk is an urgent challenge.

2. Introduction of inventory analysis

Based on damage caused at the Sendai Airport by the Great East Japan Earthquake, resulting conditions were hypothesized, a sample airport and earthquake etc. were set, a cause-consequence diagram of the restoration and operation process was prepared, and inventory analysis, which is a method used in the safety engineering field, was performed. For example, regarding the loss when one sample earthquake occurred, the occurrence probability (loss probability factor) and the loss 10% threshold value (predicted maximum loss: PML) were calculated by damage and form of operation.

It is possible to interpret Figure 2, which superimposes damage phenomena on Figure 1 and the cause-consequence diagram, as showing that there is a 49% probability of a case where shaking damage to

Figure 1. Loss Probability Factor/PML Calculation Example

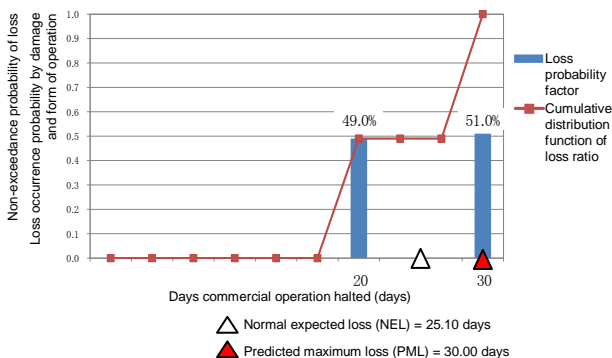
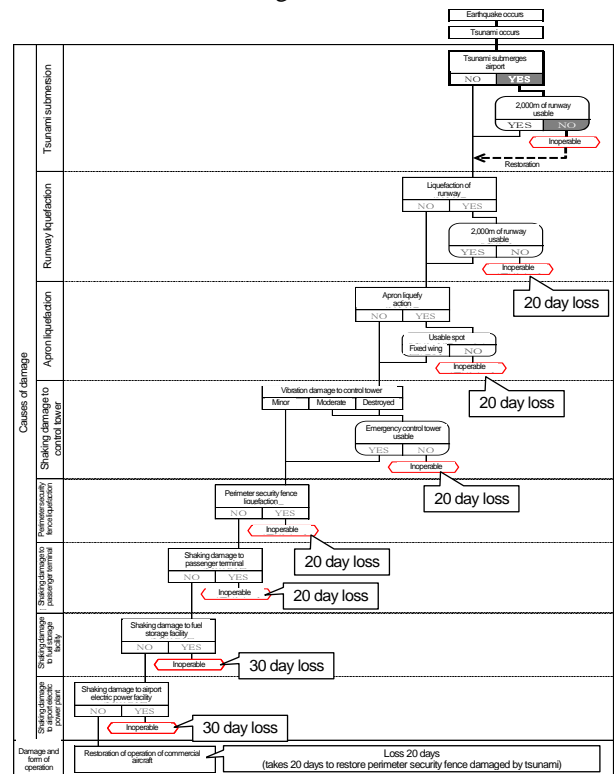


Figure 2. Cause-Consequence Diagram Overlapping Damage Phenomena



the perimeter security fence or to the terminal building closes the airport for 20 days, and a 51% probability of damage to fuel supply facilities or electric power equipment of closing the airport for 30 days. In this way, a method of visualizing or quantifying risk to provide material on which decision-makers can base countermeasure decisions was proposed.

In addition, a method of showing the probability of the occurrence and quantity of loss of each earthquake in the coming year at one airport, a method of calculating the funding necessary to measure countermeasure effectiveness, and a method of computing the restoration curve necessary to prioritize countermeasures were proposed.

3. Future challenges

We wish to continue research and development while obtaining the understanding of concerned persons in order to promote the use of the private sector: preparing more realistic predictions of

conditions considering disruption of access, fire and so on, or methods of analyzing the financial impact of an earthquake and tsunami on a company with operation rights.

[Source]

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