Airline Disruption Management
(Concepts and Methodologies)

Abdolreza Sheikholeslamy¹, Hassan Khaksar²

1- Associate Professor, Dept. of Civil Engineering, Iran University of Science and Technology
2- PHD Candidate, Transportation Engineering, Dept. of Civil Engineering, Iran University of Science and Technology

khaksar@iust.ac.ir

Abstract
Air travel is nowadays one of the most frequent modes of transportation for business, leisure, and tourism. Airline operations are subject to many uncertainties and disruptions are very common in the airline industry, which greatly impact the expected operational performance. Consequently, any disruption results in significant increases to an airlines operational costs related to additional crew overtime and increased fuel usage. In the other word, each minute a flight is delayed can result in extra fuel, crew time, and aircraft maintenance, delayed flight also drive the need for extra gates and ground personnel and inflict costs on airline customers in the form of lost productivity, wages and goodwill.

Airline Operations Control Center (AOC) in airlines is responsible for operational scheduling of flights. Safety assurance and flight efficiency in timetables are two objectives of these centers. In this paper we introduce a method of managing the delay in the airline industry and we compare the advantages and disadvantages of each of them.

Keywords: Disruption Management, Delay, Airline Schedule.

1. INTRODUCTION
The two main challenges in the development of planning tools is another obstacle in the aviation industry have created. The first issue is the size and complexity of the flight network. For example, a country may have a major airline with 500 aircrafts and more than a thousand flights on a day with tens of thousands of pairs of origin – destination and million passengers that fly each year. Many decisions that must be made and the complicated interactions between different resources (crews, aircraft, airports, etc.), the planning process has become a challenging task.

The second obstacle is the dynamic and stochastic nature of the system. Programs are usually designed on the assumption that the system every day during the planning period, which may take several weeks or months has a similar profile. The authors of English papers are requested to use Microsoft Word 2007 in Windows to create their final docx and pdf files with embedded fonts. Use Times New Roman 10 pt and single space for paper body 30 mm

Airline operations are limited to significant uncertainties. Disorders, often due to weather conditions, unforeseen maintenance issues, safety controls, security and the like will be occur each day. Bad weather, corruption of aircraft, crew unavailability are examples of the problems that will cause flight delays.

Rosenberger, et al shows that crews assignment with fewer connections to the hub, shorter cycles have better performance. They model Airline Routing Problem (ARP) as a set- packing problem with a time window and slots restrictions. In this model the objective is to minimize the cost of assigning routes to aircraft and the cost of cancelling the unassigned legs. [1]. Schaefer, et al solve crew assignment problem under uncertainty using an approximate cost [2]. Clarke, et al describe the role of airline operations control center (AOCC) in recovering the operational problems [3]. Yan and Yang show the framework to handle scheduling problems arising from aircraft crashes. Four systematic strategic models are developed by perturbing the BSPM (basic schedule perturbation model) and combining various scheduling rules. The BSPM is designed to minimize the schedule-perturbed period after an incident and to obtain the most profitable schedule given the schedule-perturbed period [4]. A decision tool for mechanizing the crew recovery problem presented by Abdelghany, et al [5]. Recovery Plan has developed a real-time allocation has impaired the crew to recover by Lettovsky, et al [6]. Eggenberg et al. introduces an extension of the time-space network model to minimize delays, cancellations and plane swappings, and make span cost [7].