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Decision tool for Demand Driven Dispatching; Airlines Perspective

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1. Introduction

This research identifies and studies the cost implications of revenue gain or loss which occurs with the demand driven dispatching and Microsoft Office Excel spreadsheet based decision support tool will identify the optimum re-assignment of aircraft with maximum revenue gained. When reassigning aircraft with actual demand, the following six cost components are considered:

a. Changes in Fuel Cost
b. Changes in Crew Costs
c. Changes in Air Navigational Charges
d. Changes in Airport Charges
e. Loss of Revenues from Swapping Aircraft in a Scheduled Route (First leg)
f. Loss of revenues from Placing a Different Aircraft in a Scheduled Flight Arc (second leg)

After identifying these cost components, they will be compared with the additional revenue gained from the fleet after swapping. The following are the two-revenue generation components considered.

a. Revenue Gained in Each and Every Swapped Pair in First Leg
b. Revenue Gained in Each and Every Swapped Pair in Second Leg

All cost components and revenue generation will be summed and compared with every possible swapping iteration in order to identify the swapping iteration with maximum revenue gain.

2. Problem Statement/Need for the study

Demand driven dispatching is the reassignment of aircraft to flights close to departure to improve operating profitability. It is a post- event decision to prevent spills due to unconstrained demand. This research deals with identifying and evaluating costs incurred with single/multiple aircrafts swappings according to Demand Driven Dispatching principles and then comparing revenue gained with these single/multiple swappings with costs incurred, in order to identify best swappings with maximum revenue gain.

3. Research process

When it comes to swapping aircraft, aircraft may belong to one of two types of vessels: those which are idling may be considered for swapping, as may aircraft which are already assigned to a flight but have conflicting flight schedules. Aircraft which are already assigned but do not have conflict flight times also considered as idling aircraft. For this research, aircrafts which are assigned and have conflict flight time will only considered.

Then we will define current state of network and available state of network. The current state of the network contains basic information about the flight. The available state of the network also contains similar information but this includes the aircraft sorted according to the swapping requirement. Aircrafts sorting happens in a way that when swapping aircrafts, the actual bookings are less than the capacity of the objective aircraft. Then those aircrafts will be sorted. This sorting happens to prevent huge losses such as image loss, decrease in market share, and other revenue losses.

After identifying the available state of the network, the proposed methodology of decision support will be used to identify the cost incurred with swapping and the revenue gain/loss for each possible swapping iteration to identify the best reassignment of fleet with maximum revenue generation.

4. Research objectives

Objectives of this research are as follows:

- ✓ Identifying the best reassignment of fleet according to the swapping requirement with maximum revenue generation which may result from single or multiple swappings by satisfying all stakeholder objectives and with no disruptions or losses to airline image or bringing business catastrophe to the airline.
- ✓ Optimising revenue management principles used by the airline through increased the efficiency of yield management, which ultimately results increased load factor.

5. Research scope

For this research legacy carrier will considered with point-to-point operations only. This carrier fleet is compromise of five different type of Airbus aircrafts. Accessibility to real time information for every calculation is not available and for those not available real time simulated/averages according to the bureau of transportation statistics, United States Department of Transportation are used. This decision support tool can be used under following circumstances only.

- ✓ Guaranteed ticket purchases for the objective flight should be existed from any means ticket sales
- ✓ For swapping decision making only aircrafts with conflict assignments are considered. Idling aircrafts are not considered.
- ✓ Number of seats booked in aircrafts with conflicts assignments should be less than capacity of objective aircraft.

6. Significance of the study

This research thesis will help organisations as a decision support tool for demand driven dispatching, which will help organisations to identify maximum revenue gain with single or multiple number of swappings using simple Microsoft Excel spread-sheet analysis.

7. Methodology

Equations will be used to calculate cost incurred and revenue generated for each cost component and revenue generation components.

8. Research findings and conclusion

Data has been collected and analysed for an airline with as available state of network with five aircraft and findings are as follows (for the available state of network with five aircrafts, there are 63 different iterations):

Total revenue Gain or Loss

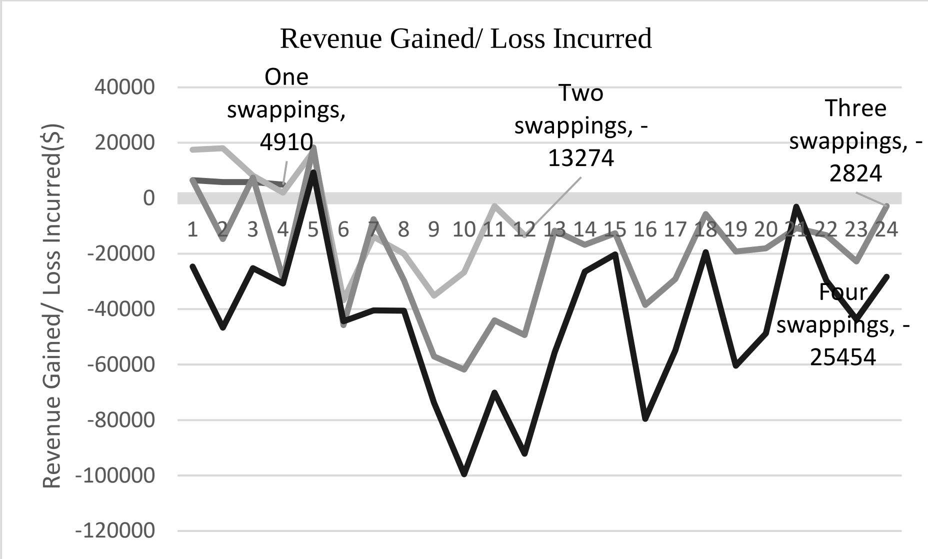

Figure 5: Revenue gain/loss - iteration-wise

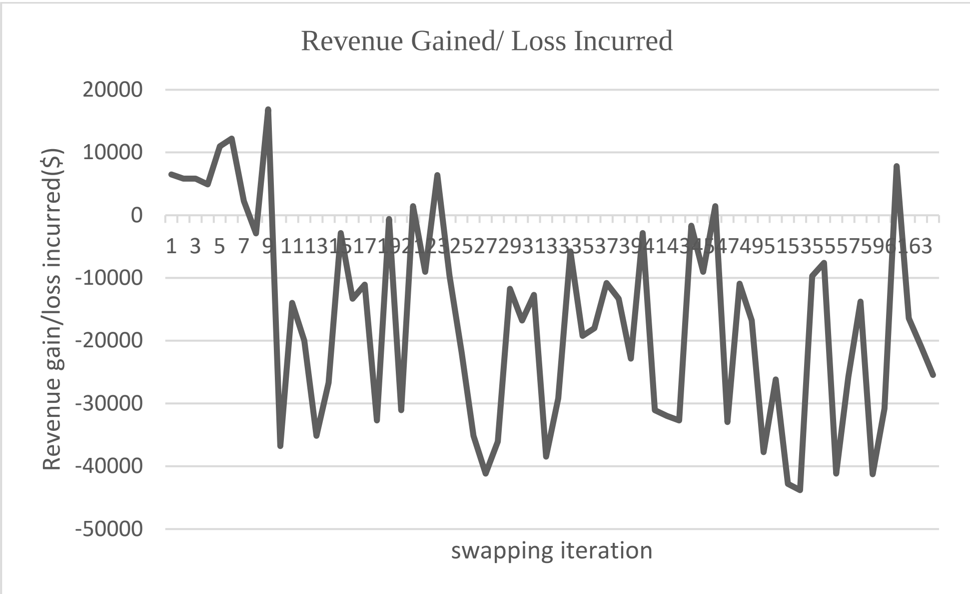

Figure 6: Revenue gain/loss for each iteration

9. Conclusion

The conclusion of this research is that multiple swappings also can used for the reassignment of fleet according to demand driven dispatching principles, which may also ultimately result in optimum revenue when considering every possible number of iterations for the given fleet. The benefits of implementing practical demand driven dispatch with multiple swappings are beneficial and important, as are the many researchers continuing research on the topic.

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Appendices

Microsoft excel spreadsheet analysis

https://drive.google.com/file/d/0BwrgOsLQYGkYcHQwQU9wRWNRVXM/view?usp=sharing

Keywords: *demand driven dispatching, revenue management, fleet planning, capacity optimisation, yield management*