Calculative planning to enhance profitability within the sphere of gleaming deman...

[Transportation](), [Airlines]()

Executive Summary

The airlines are in constant analysis of the trade routes and seeking to add new destinations to these route network based on the route evaluations for profitability. In this context, the aim of every move is to maximize profitability in the process of increasing demand. The demand forecasts become the root of hub connectivity, availability, and competitions. For this reason, there is need for calculative planning to enhance profitability within the sphere of gleaming demand for passengers. For this planning to be effective, four issues are critical; demand forecasting, connectivity at the airline hubs, aircraft availability, and matching the airline competitions. Among these four issues, the various models of transportation becomes typical of a decision making process under the certainty having considered each shipping route cost, the demand of each destination, as well as the supply of each source.

Considering the assumptions that are made in the transportation models, a transportation problem that is balanced involves a situation where the total demand from all the destinations are exactly equal to the total supply from all the sources. In an otherwise event, and the problem is not balanced, it is either the demand or the supply constraints that must have inequalities (Bertsimas & Patterson, 2018). For this reason, transportation model like the minimal spanning model is used in this paper as the optimal way of connecting all the nodes in the network together in the process of minimizing the total distance between the nodes, reflecting a minimal total costs. The main objective of the model is to minimize the distance from the origin to the destination while connecting all the nodes in the trade routes to maximize the profit to the airline.

Northeastern Airlines Service Area

This study deals with the a New England States regional airline called Northeastern Airlines serving nine cities in New York, New Jersey, and in Pennsylvania. There is a possibility of having non-stop flights for some routes. However, to maximize on the profit within the limits of the flight demands, it is necessary for the airline to have connective flights. The network in the figure below shows the cities that are served as well as the profits that are made per passenger in each of these routes.

Burlington, VT Orono, ME

12

Syracuse, NY

10

14

21 13

Nashua, NH

12 22 18

15

12 Boston, MA

16

Providence, RI

17

Hartford, CT

9

14

Newark, NJ State

College, PA

Flight Operations map

To develop a flight operation maps that serves the each of the nine cities while maximizing the Northeastern Airline per passenger, it is effective to use the Maximal-spanning model.

The maximal-Spanning tree model

The aim of the maximal spanning tree model is to demonstrate a maximization case in modeling by connecting all the nodes based on the weight each node has, from the smallest to the largest weight in the network so that they are networked to form a tree-like graph (Sarkar, et al. 2015). In this study, the existing algorithms for the maximum spanning tree are analyzed based on costs, rather than weight to develop a flight operation map for the Northeastern Airline Company.

Maximum costs allocations for transport

Trans.

Costs 1 2 3 4 5 6 7 8 9

Name PA NJ CT RI MA NH ME VT NY

1 PA 0 14 31 43 52 70 83 95 15

2 NJ 14 0 17 29 38 56 69 81 91

3 CT 31 17 0 12 21 39 52 64 12

4 RI 43 29 12 0 9 27 40 53 63

5 MA 52 38 21 9 0 18 31 43 33

6 NH 70 56 39 27 18 0 13 25 35

7 ME 83 69 52 40 0 13 0 12 22

8 VT 25 39 22 41 32 14 12 0 10

9 NY 15 29 12 24 32 24 22 10 0

Starting arbitrarily from State college (PA), the shortest route is through Newark (NJ). The next route is through CT to NY to VT to ME to NH to MA to RI to RI to CT and back to PA through

NJ (where CT-Hartford, NY-Syracuse, VT-Burlington, ME-Orono, NH-Nahua, MA-Boston, and RI-Providence).

After all the routes (nodes) are connected, the total cost = 14+17+12+10+12+13+18+9+12+16= 133

For a complete revolution across all the cities, each plane would make $133 per seat. This would reflect to 133*122*16=$259, 616 for the Northeastern to operates a fleet of sixteen 122-passenger Embraer E-195 jets per trip.

The flight operations map that still serves each of the nine cities would be as shown in the excel sheet below:

Trans.

Costs 1 2 3 4 5 6 7 8 9

Name PA NJ CT RI MA NH ME VT NY

1 PA 0 14 16 43 52 70 83 95 15

2 NJ 14 0 17 29 38 56 69 81 91

3 CT 31 17 0 12 21 39 52 64 12

4 RI 43 29 12 0 9 27 40 53 63

5 MA 52 38 21 9 0 18 31 43 33

6 NH 70 56 39 27 18 0 13 25 35

7 ME 83 69 52 40 0 13 0 12 22

8 VT 25 39 22 41 32 14 12 0 10

9 NY 15 29 12 24 32 24 22 10 0

10 12

VT

NY ME

21 14 13

15 12 NH

22 18

16

PA CT MA

14 17 12 9

NJ RI

The main objective of the maximal spanning tree, shown above is in-line with the main objective of the management of the Northeastern Airlines, which is to reduce costs while increasing profitability. The economic perspective is that when costs are reduced, revenues are increased, thus suggesting that the profit margin goes higher according to the increase in the revenues.

Considering the maxima spanning tree model above, the solution on how to assign the 16 jet for the company to run across all the flight routes is available. Assuming arbitrarily that the starting point is the State College, the jets should move to Harford through the Newark route. From Hartford, the jets can move to Syracuse through State College or directly. From Syracuse, the flight should lead to Burlington and to Nashua through Orono. From Nashua, the route should take to Boston and to Providence. Eventually, the jets should pass through Harford to State College again.

As indicated earlier, the main objective of any flight company is to deal with demand forecasting, connectivity at the airline hubs, aircraft availability, and matching the airline competitions. Considering the fact that there are many airlines that may operate within the same routes, it is important to realize the magnitude of competition in the same industry. Airlines therefore must be very strategic as far as connecting to new and every hubs available as an uphill task. Availability of the aircraft is an issue of demand for airlines which dictate the demand forecast. In the same way, connectivity between the routes at the lowest cost is very critical for all the flight companies. Thus, for ensuring that Northeastern Airlines covers all routes to maximize on the profits at the lowest costs is to follow the routes illustrated above.