Route Planning and Evaluation

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Dr. Peter P. Belobaba
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Route Planning and Evaluation

• Given a fleet plan, the process of route planning and evaluation involves the selection of routes to be flown

• Economic considerations dominate route evaluation:
  – Forecasts of potential passenger and cargo demand (as well as expected revenues) for planned route are critical to evaluations
  – Origin-destination market demand is primary source of demand and revenues for a given route, but far from the only source
  – In large airline hub networks, traffic flow support to the new route from connecting flights can make it profitable
  – Airline’s market share of total forecast demand for the new route depends on existence of current and expected future competition
  – The fundamental economic criterion for a planned route is potential for incremental profitability in the short run, given the opportunity cost of taking aircraft from another route
Route Evaluation Issues

• **Practical considerations can be just as important:**
  – Technical capability to serve a new route depends on availability of aircraft with adequate range and proper capacity
  – Performance and operating cost characteristics of available aircraft in the airline’s fleet determine economic profitability
  – If the route involves a new destination, additional costs of airport facilities, staff re-location, and sales offices must be considered
  – Regulations, bilaterals, and limited airport slots can impose constraints on new route operations, to the point of unprofitability

• **Strategic considerations can overlook lack of route profit:**
  – Longer term competitive and market presence benefits of entering a new route even if it is expected to be unprofitable in short run
• Route Planning Models

• Route planning requires a detailed evaluation approach:
  – Demand, cost and revenue forecasts required for specific route, perhaps for multiple years into the future
  – Assumed market share of total demand based on models of passenger choice of different airline and schedule options
  – Depends to a large extent on presence and expected response of competitors to route entry

• “Route Profitability Models”
  – Computer models designed to perform such route evaluations, but ability to integrate competitive effects is limited
  – Profit estimates entirely dependent on assumptions used
Review: Basic Airline Hub Economics

• Routing flights and passengers through a hub is more profitable for the airline if:

  **COST SAVINGS** from operating fewer flights with larger aircraft and more passengers per flight
  IS GREATER THAN

  **REVENUE LOSS** from passengers who reject connecting service and choose a non-stop flight instead, if it exists

• Passenger preference for multiple connecting departures vs. 1 or 2 non-stops per day:
  – Large multiple hub network operated by Delta, for example, provides over a dozen daily connections Boston-San Diego
Hub Impacts on Route Planning

• New routes to smaller spoke cities become much easier to justify in an established hub network:
  – An airline needs only 1 or 2 passengers per flight to each of 30+ connecting destinations to make a 100-seat aircraft “profitable”
  – However, such incremental analysis leads to a tendency to overlook potential displacement of other traffic on connecting legs
  – Same “incremental” logic makes it more difficult to stop service to a potentially unprofitable destination, which provides connecting traffic support to other flights

• Difficult to justify a new non-stop service to by-pass the hub, as it might steal traffic from hub flights:
  – However, large number of departures in a connecting market can allow airline to build market share and perhaps introduce a non-stop flight supported by many connecting opportunities
Recent Trends: Hub Strengthening

• Despite forecasts of more non-stop flights, a trend toward bigger and stronger hubs has re-emerged:
  – Largest US and European airlines have cut virtually all flights that do not originate or terminate at their hubs
  – Several smaller, weaker US hubs have been shut down

• Factors that continue to reinforce hub growth:
  – Liberalized bilateral agreements have allowed airlines to fly even low-density international routes from their hubs (e.g., CVG-MUC)
  – Small regional jets are being used to increase frequency of service to small spoke cities, not to over-fly the hub with non-stop service
  – Airline alliances focus on linkages between major hub networks

• With recent economic downturn, importance of hub operations will likely continue
Measuring Route “Profitability”

• Airline costs are driven by fleet and flight schedule
  – Fleet drives fixed costs (capital costs) and variable cost rates (fuel burn rates, maintenance rates)
  – Flight schedule drives utilization and thus variable costs
  – Costs are incurred on a flight basis and on a network basis

• Airline revenues are driven by O-D markets
  – Prices are set by competitive considerations or by regulation
  – Revenues are earned on a passenger itinerary basis

• Scheduling decisions are often made at the route and flight departure level
  – Airline managers must decide which flight legs to remove so that other flight legs can be added
Approaches to Flight Profit Measurement

• Ideally, add/change/remove a flight leg and then measure the profitability given that the rest of the network can be re-optimized
  – Captures interactive or network effects of both costs and revenues
  – Not easy as it requires a good model of the entire operation

• Another approach – allocate all costs and revenues on a flight leg basis and then treat each leg as being independent of the rest of the network
  – Allocation schemes are always subjective
  – Does not capture network effects, very important in most cases
  – But, much easier to conceptualize
Sample Network (Baldanza Article)
Flight-Level Profitability

- Incremental Revenues
- Incremental Costs
- Measures of Profitability
- Network Contributions and Costs
Incremental Revenues (SYR-OMA)

• Two sources of incremental passenger revenues
  – Passengers boarding in SYR and deplaning in OMA (Local Revenue)
  – Passengers boarding in SYR and connecting in OMA to LAX or SFO (Connecting Revenue)

• Connecting O-D revenues allocated to each flight leg
  – Proration methodology needed to split O&D fare into component parts (e.g. mileage, ratio of full fares)
  – Or, assign total connecting O-D fare to flight leg being analyzed

• Implicit assumption is that all revenues from a flight segment will be lost if the segment is cancelled
  – Reality is that airline might recapture some of this revenue
Incremental Costs (SYR-OMA)

- **Variable Operating Costs**
- **Aircraft Ownership Costs**
  - Equivalent leasing costs based on duration of flight segment
- **Overhead and Non-Operating Costs**
  - Equivalent share of other fixed costs based on duration of flight segment
- **Fully allocated flight costs equals the variable operating costs plus the aircraft ownership costs plus the allocated overhead and non-operating costs.**
Network Contributions and Costs

- **Contributions to Rest of Network**
  - Additional revenue on other segments due to presence of SYR-OMA segment

- **Costs to Rest of Network**
  - Cost of processing SYR connecting passengers at OMA
  - Incremental cost of having more passengers on the connecting segments out of OMA
  - Opportunity Costs of selling seats beyond OMA, which could have been occupied by passengers from other O-D markets (known as “network displacement costs”)
Revenues & Costs for Sample Network

- Local SYR-OMA O-D revenue: $6,000
- Connex prorated to SYR-OMA: $1,500
- Connex proration to other legs: $4,000
- Variable operating costs: $4,500
- Aircraft ownership costs: $2,000
- Allocated overhead & non-operating costs: $1,500
- Network variable costs: $700
- Network opportunity costs: $500
SYR-OMA Profitability for Sample Network

• Variable Leg Profitability with Network Contribution: $6,300
• Variable Leg Profitability with Network Contribution and Opportunity Costs: $5,800
• Variable Leg Profitability with Aircraft Ownership and Network Contribution: $4,300
• Variable Leg Profitability with Network Contribution, Aircraft Ownership and Opportunity Costs: $3,800
SYR-OMA Profitability for Sample Network

- Fully Allocated Profitability with Network Contribution: $2,800
- Fully Allocated Profitability with Network Contribution and Opportunity Costs: $2,300
- Variable Leg Profitability: $3,000
- Variable Leg Profitability with Aircraft Ownership: $1,000
- Fully Allocated Leg Profitability: ($ 500)
What is the right profitability measure?

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<thead>
<tr>
<th>Decision Process</th>
<th>Relevant Profitability Measure</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Short-term scheduling optimization</td>
<td>Variable with network contribution</td>
<td>In the very short term, ownership and overhead costs are fixed. Flight and market level need the network contribution to be useful.</td>
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<tr>
<td>Middle-term scheduling optimization</td>
<td>Variable plus ownership with network contribution</td>
<td>In the middle term, aircraft may be fungible.</td>
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<td>Hub profitability for a single month</td>
<td>Variable profitability, no network contribution</td>
<td>In aggregation, adding network contributions would double-count revenues.</td>
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<td>Hub profitability for six months</td>
<td>Variable plus ownership, no network contribution</td>
<td>A combination of the middle-term scheduling and single-month hub profits example.</td>
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<tr>
<td>Hub viability</td>
<td>Fully allocated profitability</td>
<td>Over time, every cost is variable.</td>
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