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:**

  <u>COST SAVINGS</u> from operating fewer flights with larger aircraft and more passengers per flight

  IS GREATER THAN

  <u>REVENUE LOSS</u> 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**

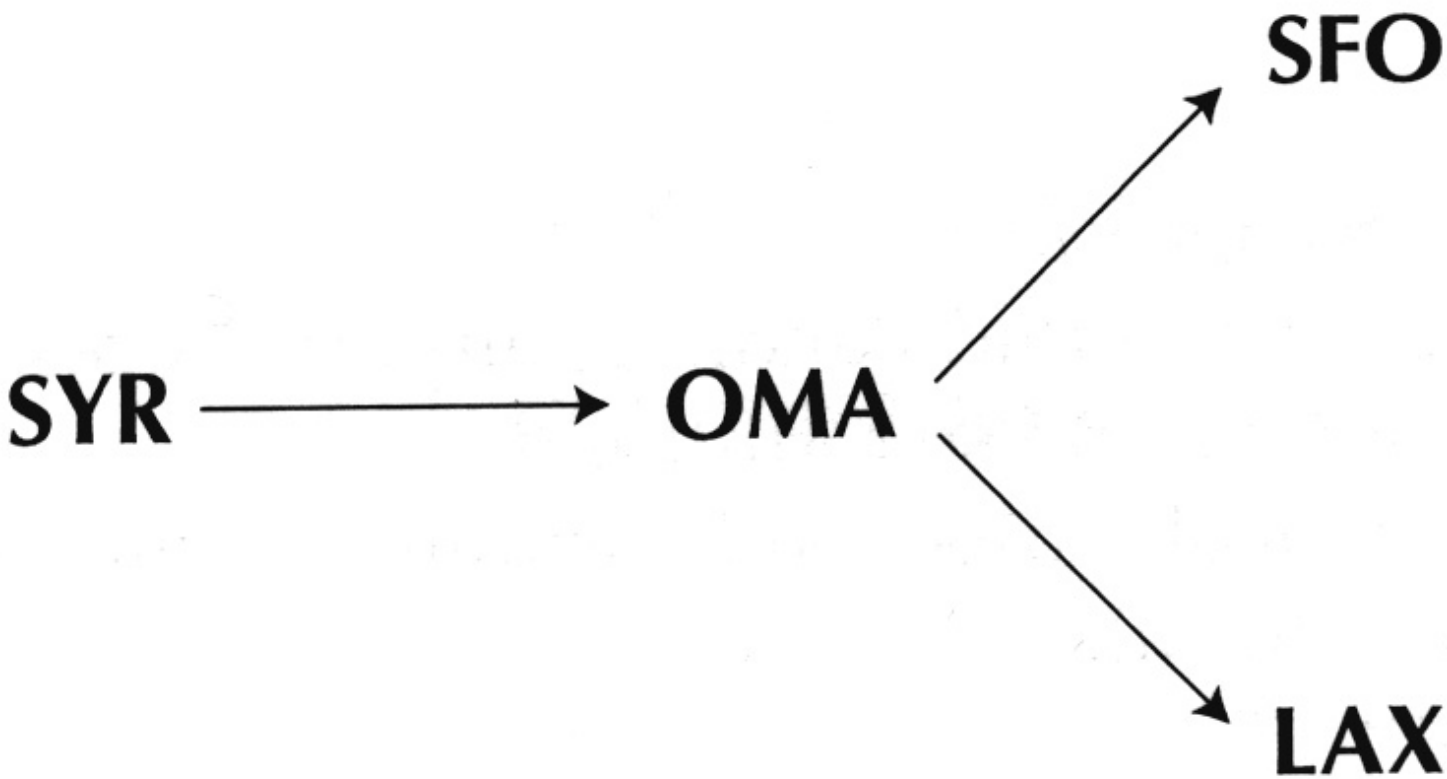
Measuring Route "Profitability"

- **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?

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