TURKISH AVIATION ACADEMY

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Route Planning and Profit Evaluation

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Network, Fleet and Schedule

Strategic Planning

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Lecture Outline

- **Route Planning and Evaluation**
  - Route evaluation issues
  - Route planning models
  - Practical and strategic issues
- **Route Evaluation Example: Boston-Rome**
  - Profit estimates for daily DL non-stop service
- **Measuring Route Profitability (Baldanza article)**
  - Incremental revenues and costs of a flight/route
  - Network contribution and costs
  - Example: Different estimates of route profitability

Route Planning and Evaluation

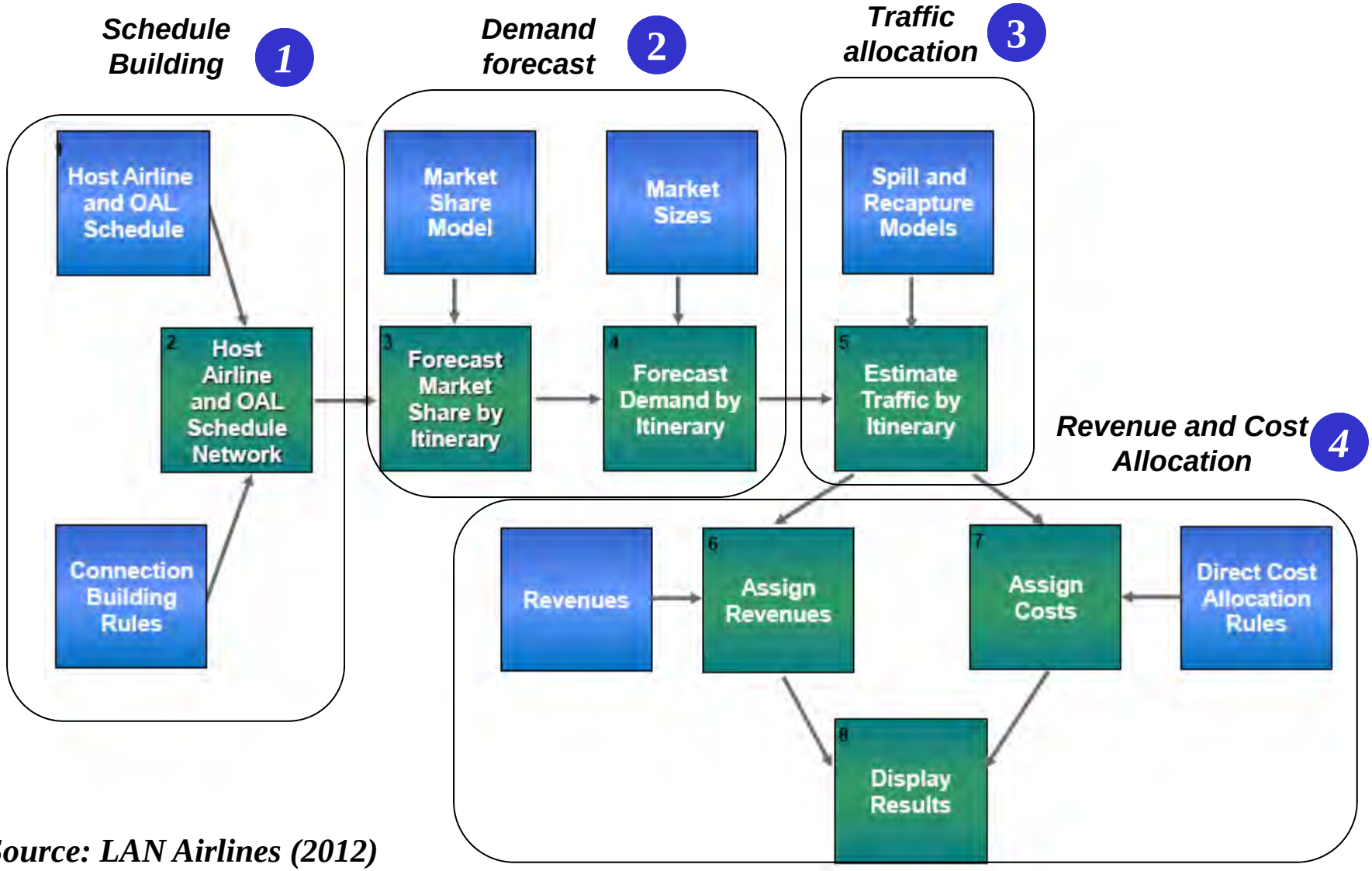
- **The process of route planning and evaluation involves the selection of routes to be flown**

- **Route selection is both strategic and tactical:**
  - Essential component of an integrated network strategy or “vision”
  - Route characteristics affect the types of “products” offered to travelers (e.g., need for business and first class products)
  - Stage length and route characteristics affect airline cost structure, as longer routes flown with bigger aircraft have lower unit costs
  - Route requirements provide feedback loop to fleet planning
  - Unexpected route opportunities occur with changes to environment (bankruptcies, competitor withdrawals, new bilateral agreements)

Route Planning and Profitability

- **Estimating route profitability 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

Example: Airline "Profit Manager"



Source: LAN Airlines (2012)

Route Evaluation Issues

- **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

Practical and Strategic 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 Evaluation Example: Boston-Rome

- **Case Study – Delta Air Lines considers introduction of new daily non-stop flights between Boston and Rome:**
  - **No current year-round non-stop (AZ via Milan)**
  - **Cooperation with AZ as SkyTeam member**
  - **Delta wishes to build up international gateway at Boston**

FLIGHT OPERATING INFORMATION

Total Annual Flights (each direction) (Reflects 98% completion of daily schedule)	358
Block Hours BOS to ROM	08:00
Block Hours ROM to BOS	09:00
Non-stop miles BOS/ROM	4087

Estimated DL Operating Costs

Direct Operating Costs

Aircraft Type	B767-300
Number of Seats	204

Cost per Block-Hour:

Crew Cost	1050
Fuel/Oil	2400
Ownership	970
Maintenance	650
Total per Block-Hour	**5070**

Indirect Operating Costs

Passenger Service	0.015	per RPM
Traffic Servicing	$26	per Enplanement
Aircraft Servicing	$1,700	per Departure
Promotion and Sales	9.00%	of Passenger Revenues
General and Administrative	$0.002	per ASM

Boston-Rome Revenue Estimates

DEMAND AND FARE ESTIMATES FOR 2006	DEMAND	PRORATED DL One Way Revenue	REVENUE
Total BOS-ROM Local O-D passengers (both directions)	96,000		
Expected Market Share for one daily flight	70.00%		
Local BOS-ROM passengers on new flight	67,200	$440	$ 29,568,000
Additional Traffic (Estimated for DL at BOS)			
Connections US destinations behind Boston to/from ROM	22,400	$380	$ 8,512,000
Connections to/from BOS beyond ROM	9,600	$330	$ 3,168,000
Connections behind BOS to/from destinations beyond ROM	3,200	$350	$ 1,120,000
Total passengers (both directions)	102,400		$ 42,368,000
Additional Cargo Revenue	11 percent of passenger revenue		$ 4,660,480
		TOTAL	**$ 47,028,480**

Estimated Annual Operating Profit

Aircraft Type	**B767-300**
Number of Seats	204
ASM	596,963,568
Seat Departures	146064
Passengers Enplaned	102400
Average Load Factor	70.11%

DIRECT OP COSTS	$ 30,856,020
PAX SERVICE	$ 6,277,632
TRAFFIC SERVICE	$ 2,662,400
AIRCRAFT SERVICE	$ 1,217,200
PROMOTION/SALES	$ 3,813,120
GEN ADMINISTRN	$ 1,193,927
OPERATING COSTS	$ 46,020,299
OPERATING PROFIT	**$ 1,008,181**

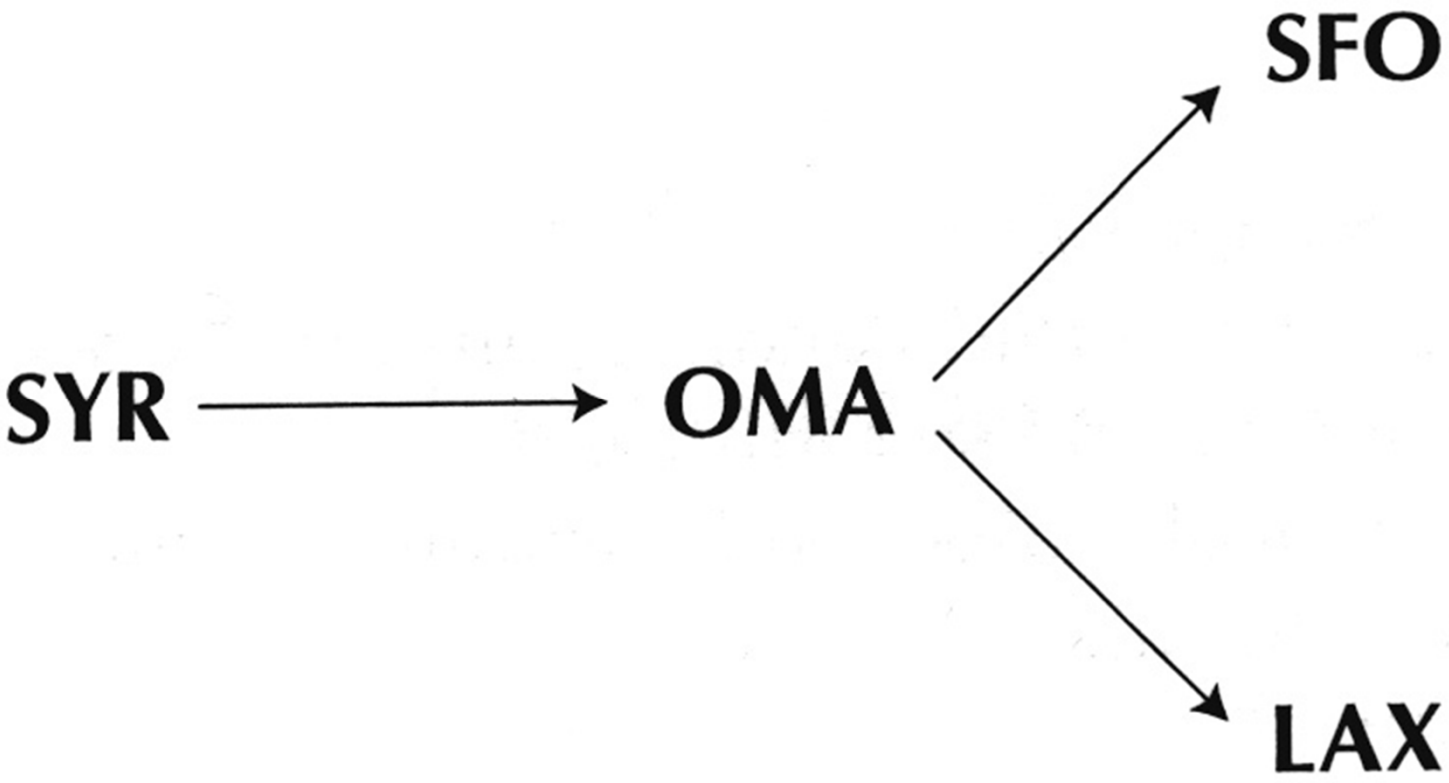
Measuring Route "Profitability"

- **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.