ePODS Airline Management Educational Game

Dr. Peter P. Belobaba

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Evolution of PODS

Developed by Boeing in early 1990s

- ✈ Simulate passenger choice of airline/paths given schedule alternatives (Decision Window Model)

Joint development with MIT since 1994

- ✈ Refinement of choice models for different fares and restrictions
- ✈ Integration of realistic airline RM capabilities

Now widely recognized as “state of the art” RM simulator with realistic competitive impacts

PODS Capabilities

PODS simulates interaction of RM systems and passenger choice in *competitive* markets:

- ✈ Two or more competitors in large hub network
- ✈ Airlines must forecast booking demand from actual (previously simulated) historical data
- ✈ Assumes passengers choose among O-D paths/fare types and airlines based on availability
- ✈ Choice also affected by competitive schedules, fares, restrictions, path quality, preferences

ePODS Base Network Characteristics

Five airlines, 5 hubs serving 40 spoke cities

- ✈ Each airline has one hub serving 10 cities on each side; including flights to other hub cities
- ✈ Each hub has two directional connecting banks per day (2 eastbound, 2 westbound)
- ✈ Each spoke city served by 1-5 competing airlines, based on population
- ✈ Airlines will be able to add/remove flights on spoke routes from own hub, as well as initiate new non-stop “bypass” flights

Airline Fleets

Each airline operates a fleet of 20 aircraft

- ✈ 4 different types (and sizes) with different costs and range capabilities
- ✈ Ownership costs based on lease rates

Airline fleet decisions

- ✈ Players can (eventually) acquire additional aircraft of all types, subject to game limits
- ✈ Fleet assignment -- airlines choose aircraft sizes to match demand on “schedule turns”

ePODS Fleet Characteristics

A/C Type	Seats	Op Cost / block hr	Daily Ownership	Cost per departure
S120	120	$1700	$5450	$750
M150	150	$1850	$7200	$800
L180	180	$2380	$8100	$900
X220	220	$2950	$9200	$950

Route Decisions

Airlines can change routes and frequency of flights, subject to several constraints

- ✈ Add or delete spoke routes to/from own hub only
- ✈ Choose from set of feasible “schedule turns” to maintain aircraft rotation balance
- ✈ Each aircraft can make one east-west-east or west-east-west round-trip per day
- ✈ Each spoke city may be served once or twice daily (maximum of two connecting banks in each direction)

Schedule Decisions

Hubs and number of connecting banks fixed

- ✈ Airlines can move connecting bank times
- ✈ Schedule decisions based on feasible “schedule turns” out of hub to spoke and back
- ✈ Schedule.xls worksheets allow only feasible schedule turns, and ensure total aircraft use remains within available fleet limits
- ✈ Excel interface with user-friendly “point & click” functionality for making schedule changes

Scheduling Information

Schedule times for all aircraft:

- Block time = 0.67 + 0.001967*distance (miles)
- Minimum turn time at spoke cities = 40 minutes

Connecting banks:

- Connecting bank duration = 1 hour
- All inbound aircraft scheduled to arrive at same time; outbound aircraft depart at same time
- Moving bank start times affects spoke departure times and can change feasible spoke cities

Pricing Decisions

Initial fare structure to be fixed for all airlines

- ✈ 4 fare classes per market; fixed price ratios
- ✈ Unrestricted Y fare; 3 discount fares with increasing restrictions
- ✈ All airlines have same RM systems

Airline teams to have limited pricing flexibility

- ✈ System-wide changes to fare structures possible, with match or no-match

Base ePODS Fare Structure

Fare Class	Adv. Bkg.	Min. Stay	Chge Fee	Non-Refund	Fare Calculation	1000 mi Example
Y	0	None	No	No	4.00 * Q	$360
M	7 days	Sat. night	No	No	2.00 * Q	$180
B	14 days	Sat. night	Yes	No	1.50 * Q	$135
Q	21 days	Sat. night	Yes	Yes	$50 + 0.04 * d	$90

“Vanilla” RM System

Airlines’ RM systems forecast fare class demand for each flight leg departure:

- Moving average (“pick-up”) forecasts of bookings to come
- Unconstraining of based on booking curve probabilities.

Leg-based EMSRb seat protection model:

- Booking limits for each fare class on each flight leg departure, revised 16 times in booking process.

No overbooking or no-shows in ePODS.

Data Available to Teams

Complete estimates of operating costs

- ✈ Direct costs per block hour, per aircraft departure, per passenger carried

Up to date competitive information

- ✈ Schedules and prices of airlines in all markets, after each game iteration

Historical market data with time lag

- ✈ O-D market traffic, average fares and airline market shares (like DOT 10% database)

Additional Operating Costs

Reservations and Sales

- ✈ 14.2% of Passenger Revenues

Traffic servicing at airports

- ✈ $16 per passenger enplanement

Passenger servicing on board

- ✈ $0.015 per RPM flown

Output Reports to Teams

Operating statements after each game iteration

- Detailed traffic and revenue reports by market, flight and system
- Average flight load factors, fare mix and yields
- Operating costs by category and total contribution
- Aircraft schedule and utilization summaries

Game Administration

Competitive airline planning game

- ✈ Aircraft fleets, route selection, frequency and timing of flights, pricing decisions

Each iteration is a “typical day” of operations

- ✈ Objectives to maximize contribution, increase market share and revenues, reduce operating costs, improve operational efficiency
- ✈ In 16.75, will be run for 6 iterations, approximately once per week +.