香港城市大學
City University of Hong Kong

396EM Airline Operations and Scheduling / 6075MAA Airline Scheduling and Operations

Lecture 8
Summary & Beyond

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Airline Operations and Scheduling Problems

Two Approaches:

Analytical methods (L1-L4) :

- Integer Linear Programming with open source tools: LPSolve, R and Excel Solver
- Applications: flight routing and network, fleet planning and assignment, crew scheduling, manpower planning, gate assignment, irregular management and revenue management

Computer Simulation (L5-L8)

- Tools: Flowchart (draw.io, ClickChart), Excel, Simul8 (Professional Commercial Software)
- Particular application: Queuing (check-in, arrival)

General Problems Solved by Integer Linear Programming

- These problems could be applicable in other industries.
- Their applications are not limited to Airline Operations
- Shortest Path (LT1c)
- Minimum cost flow problem (LT1c)
- Maximum flow problem (LT1c)
- Manpower Planning (LT4)
- Flowchart Model(LT5)

Airline Specific Problems Solved by Integer Linear Programming

- The following topics are specific to Airlines Operations
- Airline Scheduling and Hub Network (L2)
- Fleet Assignment (L2, L3)
- Aircraft Routing (L3)
- Crew Planning (i.e. Crew Pairing and Crew Rostering) (L3)
- Irregular Operations (L4)

Queue Operations By Computer Simulation

- The application of computer simulation is not limited to Airline Operations
- Simulation Concepts (L5)
- Simulation Modelling & Flow Chart (L5)
- Queuing (L5)
- Input Preparation & KPI analysis (L6)
- Experiment Design (L7)
- Simulators (L7)
- AsIs and WhatIf (L6-L8)

OptQuest

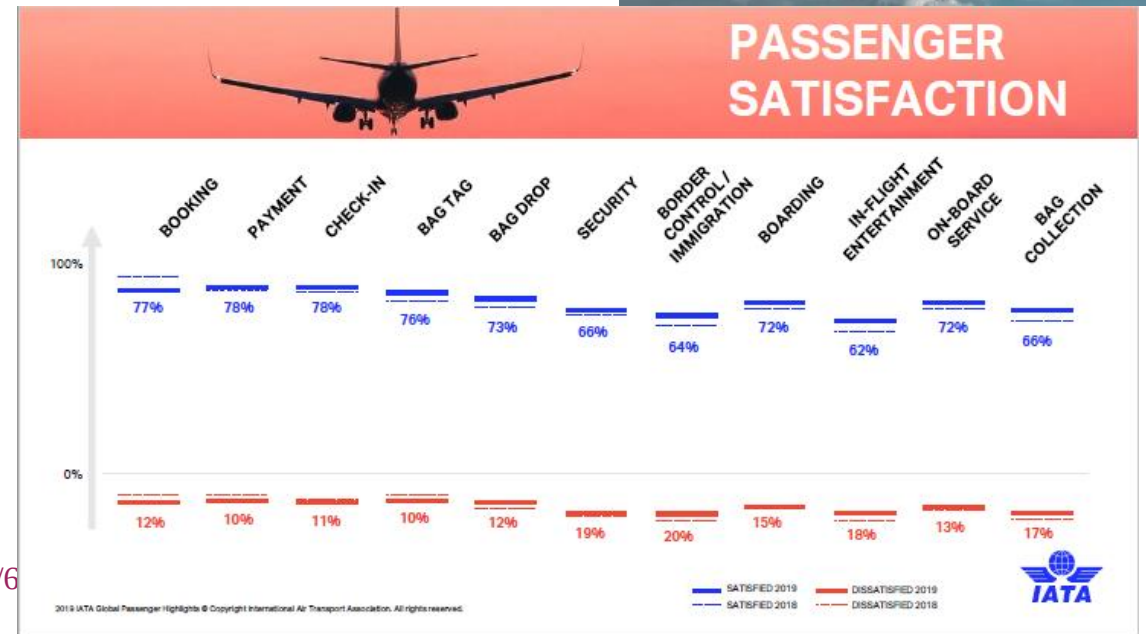
- A SIMUL8 plug-in that automatically searches for a best possible solution to an objective
- KPI analysis
- Objective variables
- E.g. Makepack2.S8 (From SIMUL8 official support page)

Some Simulation Projects

- Examples in SIMUL8
- Examples from CU

IATA Global Passenger Survey 2019

- *From IATA official web site*



Air Traffic Forecasting

- ICAO - Manual on Air Traffic Forecasting
- Third Edition 2006
- Doc 8991

https://www.icao.int/MID/Documents/2014/Aviation%20Data%20Analyses%20Seminar/8991_Forecasting_en.pdf

- Other Reference:

https://www.icao.int/sustainability/Pages/Tools.aspx

- *From ICAO official web site*

Videos on Aviation Industry

HKIA – Under the Blue sky series

https://www.youtube.com/watch?v=qZEmfcCtJXU&list=PLqKdGzMSFEROYHAmQJg7qo6NxBqNE_yvS

A Very British Airline - British Airways Behind the Scenes - Episode 1 BBC

https://www.youtube.com/watch?v=ZKMVvKI87yw

References

- Lecture Notes 1-8
- SIMUL8 official web site https://www.simul8.com/
- IATA official web site
  http://www.iata.org/publications/store/Pages/global-passenger-survey.aspx

  https://www.iata.org/contentassets/952a287130554b4880563edca1c8944f/iata-2019-gps-highlights.pdf
- ICAO official web site

  https://www.icao.int/Pages/default.aspx
- Youtube – HKIA and BBC airline channel

CW2 Q &A

More for SIMUL8

(Demo)