Airports in the 21st Century

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Air Transportation Management
M.Sc. Program

Airport Planning and Management
Module 02
January 2017
Focus of this Presentation

• Top Airports – Passengers and Cargo
  ➔ Shifts in Ranking, Causes
  ➔ Importance of Transfer Hubs

• Rise of Low Cost Carriers
  ➔ Drive Traffic Growth, especially at Second Airports
  ➔ Demands for “low cost” facilities and operations

• Technological developments
  ➔ People movers for passengers at large airports
  ➔ IT for electronic check-ins, border controls

• Current Major Airport Projects
## Airport Ranking: By Passenger Traffic

### Note Importance
**Transfer airports:** Atlanta, Chicago, Dubai, Dallas/Fort Worth, Istanbul, Amsterdam, Denver, Bangkok

**Note relative growth of**
Dubai, Chicago, Hong Kong, Istanbul

<table>
<thead>
<tr>
<th>RANK 2015</th>
<th>RANK 2014</th>
<th>AIRPORT CITY / COUNTRY / CODE</th>
<th>PASSENGERS (Enplaning and deplaning)</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
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<td>6</td>
<td>DUBAI, AE (DXB)</td>
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<td>20</td>
<td>22</td>
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</tbody>
</table>

*Introduction Review of Industry/ RdN*
Learning from Airport Rankings

Passenger Traffic

• Hub Effect
  ➔ Notice that relatively small cities (Atlanta, Dubai, Dallas) with modest levels of origination/destination traffic are among biggest – due to transfer traffic

• Shift in Traffic
  ➔ Rise in importance of Middle East and Asia (Dubai and Hong Kong)
  ➔ Overtaking Frankfurt and Jakarta
# Top Cargo Airports, 2015

<table>
<thead>
<tr>
<th>RANK 2015</th>
<th>RANK 2014</th>
<th>AIRPORT CITY / COUNTRY / CODE</th>
<th>CARGO (Metric tonnes)</th>
<th>Loaded and unloaded</th>
<th>Percent change</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>HONG KONG, HK (HKG)</td>
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<tr>
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<td>2</td>
<td>MEMPHIS TN, US (MEM)</td>
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<tr>
<td>3</td>
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<td>SHANGHAI, CN (PVG)</td>
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<tr>
<td>4</td>
<td>5</td>
<td>ANCHORAGE AK, US (ANC)*</td>
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<tr>
<td>5</td>
<td>4</td>
<td>INCHEON, KR (ICN)</td>
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<tr>
<td>6</td>
<td>6</td>
<td>DUBAI, AE (DXB)</td>
<td>2 505 507</td>
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<td>7</td>
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<td>LOUISVILLE KY, US (SDF)</td>
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<td>8</td>
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<td>TOKYO, JP (NRT)</td>
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<tr>
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<td>PARIS, FR (CDG)</td>
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<td>TAIPEI, TW (TPE)</td>
<td>2 021 865</td>
<td>-3.2</td>
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<tr>
<td>12</td>
<td>12</td>
<td>MIAMI FL, US (MIA)</td>
<td>2 005 174</td>
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<tr>
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<td>15</td>
<td>LOS ANGELES CA, US (LAX)</td>
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<td>BEIJING, CN (PEK)</td>
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<tr>
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<td>13</td>
<td>SINGAPORE, SG (SIN)</td>
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<td>CHICAGO IL, US (ORD)</td>
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<tr>
<td>20</td>
<td>24</td>
<td>DOHA, QA (DOH)</td>
<td>1 454 952</td>
<td>46.0</td>
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</tr>
</tbody>
</table>

Source: Airport Council International

Notice Role of “All Cargo” Airports
Memphis, Anchorage, Louisville

Relative Growth of Paris, Los Angeles, Chicago
Learning from Airport Rankings

Cargo Traffic

• Hub Effect
  ➔ As for Passengers, some really small cities (Memphis, Anchorage, Louisville), with very low levels of origination/destination traffic, are among biggest cargo airports – due to transfer traffic especially from integrated carriers Fedex, UPS

• Shift in Traffic
  ➔ Rise in importance of Middle East (Doha, Dubai)
  ➔ Stagnation, losses at traditional centers in Asia (Tokyo, Singapore) and Europe (Amsterdam, Frankfurt)
Impact of Low Cost Carriers

• **Phases of Competition with Legacy Carriers**
  - Much lower costs of operation, thus of fares
  - Develop new markets, gain market share
  - Come to dominate National and Regional Markets
  - Legacy Airlines reduce costs to compete
  - CONVERGENCE OF COSTS AND SERVICE

• **Impacts on Airports**
  - Use of Secondary Airports
  - Faster Turn around times -- fewer gates
  - Smaller aircraft – more compact terminals
  - Shared Use of lounges – space economies
  - Eliminate VIP space, etc. – more savings
  - Example: JetBlue Terminal at New York/Kennedy
## Southwest LCC Dominates Domestic Competitors

Southwest has been top carrier for US domestic market for about 10 years

<table>
<thead>
<tr>
<th>Airline</th>
<th>Passengers</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest</td>
<td>118</td>
<td>20</td>
</tr>
<tr>
<td>American + US Air</td>
<td>99</td>
<td>17</td>
</tr>
<tr>
<td>Delta</td>
<td>96</td>
<td>16</td>
</tr>
<tr>
<td>United</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total USA</strong></td>
<td><strong>584</strong></td>
<td><strong>100</strong></td>
</tr>
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</table>

Source: US DoT, BTS, Air Carrier Domestic Market 2014
Ryanair dominates in Europe

<table>
<thead>
<tr>
<th>Country (Cap m)*</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK (117)</td>
<td>easyjet</td>
<td>BA</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Germany (112)</td>
<td>Luft</td>
<td>Air Berlin</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Spain (105)</td>
<td>easyJet</td>
<td>Vueling</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Italy (85)</td>
<td>AF-KLM</td>
<td>Iberia</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>France (72)</td>
<td>TAP</td>
<td>easyJet</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Portugal (19)</td>
<td>easyJet</td>
<td>easyJet</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Belgium (15)</td>
<td>SN Brussels</td>
<td>Jetairfly</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Ireland (15)</td>
<td>Aer Lingus</td>
<td>BA</td>
<td>46%</td>
<td></td>
</tr>
<tr>
<td>Poland (15)</td>
<td>LOT</td>
<td>Wizz</td>
<td>26%</td>
<td></td>
</tr>
<tr>
<td>Morocco (12)</td>
<td>RAM</td>
<td>easyJet</td>
<td>12%</td>
<td></td>
</tr>
</tbody>
</table>

*Cap Stats Departing Seats 2014
Similar story elsewhere

- LCCs dominate India in 2016, having ~90% market share overall
  - Indigo 46%; SpiceJet 23%; Jet 13%; GoAir 8%
  - And the National Indian Airways less than 10%

- Pegasus 28% share of Turkey traffic in 2015, but situation not clear for 2016 your information?
In 2005, Southwest Costs were only 2/3 of that of Legacy Carriers

Airline Seat-Mile Costs, 2010 Q4

5 years later, Convergence: Cost gap narrowed

Use of Secondary Airports

• Low cost airlines have typically started operations at Secondary airports, where they were protected from competition
  → Dallas/Love, Miami/Fort Lauderdale (Southwest)
  → London/Stansted (Ryanair)
  → London/Luton (easyJet)
  → Frankfurt/Hahn (Ryanair)
  → Bangkok/Don Mueang (Nok)
  → Istanbul/Sahiba Gökçen (Pegasus)

• Later, have moved to Major Airports
  → Southwest at Philadelphia, Boston/Logan
Faster Turn Around Times: Fewer Gates

- Southwest (and other LCCs) aim to “turn around” flights within 30 minutes, sometimes 20.
- They can serve many more flights at each gate than airlines needing 1 hour or more for turn around.
- Boston example
  - Annual Passengers per gate ~ 500,000 for JetBlue
  - About twice as much as Delta for domestic service!
Smaller Aircraft: Terminals More Compact

- **Low Cost Carriers** specialize in smaller aircraft:
  - Southwest – 100% 737s (>90% Next Gen)
  - Ryanair – 100% Next Gen 737s
  - easyJet – 100% Airbus 319 and 320s
  - AirAsia – 100% Airbus 320s
  - Pegasus – 72% 737s, 28% Airbus 320s

- **Terminals for LCCs** thus are simpler and need smaller gate separations.
Shared Departures Lounges: Savings in Spaces

- Low Cost Carriers commonly share departure areas between gates – and other activities

- Great savings in space needed for this function – easily 30%
  - To the extent that flights do not leave on time, passengers for later flights can use the space associated with earlier flights.

- JetBlue terminal New York/Kennedy – departure space is also food court space!
Jetblue Terminal at New York/Kennedy

A tour using slides provided by Gensler Architects
Prof. Richard de Neufville

Plans before construction as built details differ
Airside
Plan view

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Relationship to Saarinen Bldg

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Landside and Airside

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Airside

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Plan view, passenger level

Note the shared departure areas!

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Check-in Area

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Courtyard past security

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
Alternate view past security

Jetblue terminal New York/Kennedy  Slides courtesy of Gensler
Down corridor onto field

Jetblue terminal New York/Kennedy

Slides courtesy of Gensler
At departure gates, instead of rows of uncomfortable seats filled with grumpy passengers … travelers find clusters of seats around counters, where they can order food on a touch-screen monitor and have it delivered in the gate area.

Instead of being on the floor, passengers sit comfortably and charge their electronic devices at conveniently placed outlets.
JetBlue Wooftop

THE T5 WOOFTOP

DEPT. OF BARKS & RECREATION RULES:

1. Please pick up after your pup.
2. Re-leash the hounds! (Keep dogs on leash outside of dog park.)
3. Keep your terriers in their carriers in the terminal.

THANK YOU!
Technological Developments

Two important elements to discuss today

• People movers
  - These are automated “trains” that connect passengers in groups across 500 to about 5000m.
  - They have revolutionized the configuration and design of large modern airports.

• Information Technology for Passengers
  - Remote (at home or office) check-in or via kiosks. This has largely made big check-in halls obsolete
  - Use of Wi-fi throughout with need of sufficient support (bandwidth and charging stations)
People Movers

- **Solution to central issue for airport design:**
  - Need to connect passengers from
  - Central ticket, metro, parking, shop areas
  - To many gates, widely separated, long distances

- **People movers at all new airports in top 10.**
  - Los Angeles is planning people mover as part of its Landside Modernization Program
  - Tokyo/Haneda has a monorail to airport

- **People movers connect central facility to:**
  - Aircraft gates, satellite terminals (airside)
  - Rental car, Parking facilities, Railroads (landside)
IT for Passengers

• **Electronic Ticketing, check-in**
  - Big Savings ~$3 billion each year
  - $1 per E-ticket vs. ~$10 per paper ticket
  - Less staff, less space, less rent…
  - LCCs forced “100%”: Southwest, JetBlue, Ryanair.
  - Nearly all tickets worldwide
  - Kiosks complement check-in from home, office

• **Wi-Fi for all, everywhere, all the time**
  - Airlines and Passengers expect Wi-fi throughout for passenger control and convenience
  - Needs support (bandwidth and charging stations)
Major “New Airport” Projects

- **Istanbul**: 5-Runway Greenfield Airport
- **Rome**: 12 billion Euro makeover in prospect
- **Dubai**: Al Maktoum Second 4-Runway airport. Officially “open” ~ 1 million pax /year…
- **Berlin/Brandenburg**: 2018 opening? Disastrous history – now 7 years behind schedule.
- **Mexico City**: Second Airport contract award Jan ‘17
- **Beijing**: Daxing Second Major Airport to open 2019 constructed for 45 million pax, later to 100 million.
Beijing 2nd Major Airport Daxing

Design for Terminal by ADPI Aéroports de Paris Internat’l

4 Runways (6 later?)
Major Runway Projects

- **Chicago/O’Hare**: “airport modernization program” completely reconfigures many runways
- **Brisbane**: Second parallel runway
- **Singapore**: Third parallel commercial runway (a fourth is reserved for military use)
- **Calgary**: Opened second parallel 4,267mi (14,000ft) runway in 2014. Longest in Canada.
- **Projects projected**: Melbourne, Munich, Perth, Prague, etc.
Major Terminal Building Projects

- **Singapore**: New T4, redo of T1, Massive T5
- **Shanghai/Pudong**: New satellite Terminal
- **Seoul/Incheeon**: New T2, open 2017…
- **London/Heathrow**: New T2
- **London/Gatwick**: £2.8b ($4billion) makeover
- **Frankfurt**: Construction on new T3 (for 2023?)
- **Los Angeles/International**: All Terminals …
- **New York/LaGuardia**: Complete makeover
- **Brazil**: 2016 Olympics extensions at São Paulo, Rio de Janeiro/Jobim, Campinas/Viracopos
Seoul/Incheon T2 (plan)

Design for Terminal by ADPI Aéroports de Paris Internat’l
Take aways

• Top Airports, Passengers and Cargo feature transfer hubs.

• Shifts to Asia, Middle East

• Rise of Low Cost Carriers drives growth of second airports, push for ‘low cost” design of airport terminals

• Technological developments feature widespread use of people movers, and emphasis on convenient IT and Wi-fi

• Continual Stream of Major Airport Projects