Airport capacity expansion strategies in the era of airline multihub networks

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Outline

- Hubbing in Europe
- Hubs are factories to create route density
- Hubs are factories to create connectivity
- The rise of multihub networks
- Specialization in multihub networks
- Implications for airport capacity expansion strategies
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EU liberalization resulted in adoption and intensification of airline hub-and-spoke networks

Number of EU airline home bases with wave-system

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Home Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>10</td>
</tr>
<tr>
<td>1999</td>
<td>25</td>
</tr>
<tr>
<td>2003</td>
<td>24</td>
</tr>
<tr>
<td>2011</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: wave system analysis based on OAG
Istanbul, Dubai, Frankfurt and Amsterdam on the rise; Heathrow and Paris stagnating

Source: SEO Netscan
Geographical specialization

Source: SEO Netscan (2012)
Heathrow one of the European hubs with most overlap in the connecting market
Competition in the connecting market of Heathrow: many substitutes

Percentage of markets overlapping with Heathrow

Source: SEO Netscan
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Hubs are factories to create route density

% of local versus transfer traffic at intercontinental KLM routes

Source: Achtergronddocument mainport Schiphol
..and they produce more with every direct flight added: the multiplier effect of hubbing

Source: SEO Netscan; OAG (2009)
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Hubs are factories to create long-haul connectivity for European metropolitan regions.

The diagram shows a scatter plot with the number of long-haul destinations on the y-axis and population within 100km range of primary airport on the x-axis. The plot includes symbols for hubs, de-hubbed 2000-2012, and non-hubs.
Benefits of hubbing for metropolitan areas

- Direct connections reduce travel costs for consumers: more direct flights, shorter travel times, higher frequencies
- These benefits “ripple” through rest of economy, e.g. agglomeration effects, inbound tourism
- Regional-economic benefits

- Bel & Fageda: 10% increase in the number of direct intercontinental flights at European airports leads to a 4% increase in international headquarters
- Vinciguerra et al: significant relationship between connectivity and R&D activities in European regions
- Frontier Economics: relationship between trade and direct connectivity to emerging economies
- ...
But it is not only about direct flights and the home-based hub carrier: visiting network carriers important as well

Consumer benefits per passengers of Emirates entering the AMS-DXB market

More competition

- More frequencies
- More destinations
- More competition

Direct service level already high: limited effect

Source: SEO Netcost
Consumer welfare benefits per year (mln euro) of direct routes at Amsterdam
What makes a good hub airport attractive?

- Central geographical location vis-à-vis the most important traffic flows and feeder airports
- Peak-hour capacity to facilitate an efficient wave-system structure of the hub airline
- Strong hub carrier being part of a global airline alliance
- Availability of traffic rights (market access)
- Short Minimum Connecting Time
- One terminal concept
- Competitive visit costs
- Good landside accessibility
- Available options for future growth
- Airport amenities
Becoming a hub is not easy; losing a hub is irreversible, at least in the short run

- **Path dependency**
  - Airline add new flights to existing hubs rather than new ones
  - Air transport agreements favour existing hubs
  - Few airports have sufficient capacity for a substantial hub operation

- **Dehubbing:**
  - Redondi et al. (2010):
    - De-hubbed airports do not recover original traffic within 5 years time
    - De-hubbing likely to be irreversible
  - Tan (2012):
    - Average air fares increase after legacy carrier de-hubs an airport
# The airline hub graveyard

<table>
<thead>
<tr>
<th>Airport</th>
<th>Airline</th>
<th>Year of dehubbing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montreal Mirabel/Dorval</td>
<td>Air Canada</td>
<td>1980s</td>
</tr>
<tr>
<td>Kansas City Int. Airport</td>
<td>TWA</td>
<td>1982</td>
</tr>
<tr>
<td>Denver</td>
<td>Continental</td>
<td>1994</td>
</tr>
<tr>
<td>Nashville</td>
<td>American</td>
<td>1995</td>
</tr>
<tr>
<td>San Jose</td>
<td>American</td>
<td>1995</td>
</tr>
<tr>
<td>Raleigh-D.</td>
<td>American</td>
<td>1996</td>
</tr>
<tr>
<td>Gatwick</td>
<td>BA</td>
<td>2000</td>
</tr>
<tr>
<td>Brussels</td>
<td>Sabena</td>
<td>2001 (restart 2010)</td>
</tr>
<tr>
<td>Basle</td>
<td>Swissair/Swiss</td>
<td>2001</td>
</tr>
<tr>
<td>Nice</td>
<td>Air Littoral</td>
<td>2001</td>
</tr>
<tr>
<td>Raleigh-D.</td>
<td>Midway</td>
<td>2001</td>
</tr>
<tr>
<td>Baltimore</td>
<td>US Airways</td>
<td>2001</td>
</tr>
<tr>
<td>Zurich</td>
<td>Swissair</td>
<td>2001 (restart 2002)</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>US Airways</td>
<td>2003</td>
</tr>
<tr>
<td>Clermont-F.</td>
<td>Air France</td>
<td>2004</td>
</tr>
<tr>
<td>Miami</td>
<td>Iberia</td>
<td>2004</td>
</tr>
<tr>
<td>Barcelona</td>
<td>Iberia</td>
<td>2006</td>
</tr>
<tr>
<td>Milan MXP</td>
<td>Alitalia</td>
<td>2008</td>
</tr>
<tr>
<td>Athens</td>
<td>Olympic</td>
<td>2009</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>SAS</td>
<td>2001-2008</td>
</tr>
<tr>
<td>St. Louis</td>
<td>TWA/AA</td>
<td>2001-2010</td>
</tr>
<tr>
<td>Barcelona</td>
<td>Spanair</td>
<td>2012</td>
</tr>
<tr>
<td>Budapest</td>
<td>Málev</td>
<td>2012</td>
</tr>
</tbody>
</table>
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Three major multihub airline networks in Europe

![Bar chart comparing the number of non-European flights per week for Air France-KLM, IB-BA, and LH Group to destinations like CDG, AMS, LYS, BCN, MAD, LHR, LGW, DUS, FRA, MUC, VIE, ZRH, FCO, MXP, BRU, DUS, FRA, MUC, VIE, ZRH, FCO, MXP.](chart.png)
Single hub solution generally to be preferred. So why do airlines operate multihub networks?

1. Capacity shortages at the primary hub
2. Bilateral constraints and aviation law
3. Spatial coverage and market access
4. Level of demand
5. Frequency game
6. Strategic positioning and entry deterrence
7. Better aircraft utilization
8. Unions
9. Path dependency
Multihub specialization

- Large destinations served from multiple hubs
- Small destinations: unique service from single hub
- Relative size of the O&D market important for choice for primary or secondary hub service on small destinations

Other variables:
- Size of premium markets
- Size of the European feeder network
- Capacity
- Bilaterals
- Competition level
- Service level by alliance partners
- Location of the hub
Specialization pattern Amsterdam versus Paris CDG

Legend:
- Blue: uniquely service KL from AMS
- Red: unique service AF from CDG
- Purple: service from both hubs by 1 carrier

Size of European market

Number of seat per week from Europe to destination

Relative size local OD market Paris versus A'dam (when x=100, local OD market AMS=local OD market CDG)

OD market AMS larger ◄ ► OD market Paris larger
Specialization pattern at the aggregate level

Size of European market

OD market secondary hub larger

OD market primary hub larger

OD ratio: if OD ratio=100, OD volume at primary hub equals OD volume at secondary hub
Specialization pattern at the aggregate level

1. Nearly always multihub service

2. Choice between multihub and primary hub service

3. Primary hub service

4./5. Primary hub service

6./7. Secondary hub service

8. Choice between multihub and secondary hub service

OD ratio: if OD ratio=100, OD volume at primary hub equals OD volume at secondary hub

Type of service
- Unique service from secondary hub
- Unique service from primary hub
- Dual hub service

Size of European market

OD market secondary hub larger → OD market primary hub larger
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Implications for capacity expansion strategies

- Split hub operations result in connectivity loss
- Hub operation less important for short-haul connectivity then for long-haul connectivity
- Without capacity expansions, LHR hub will have few opportunities for operating in unique long-haul markets (with higher yields)
- Large local market makes London preferred hub in any multihub airline network
  - Except for markets where secondary hub benefits from geographical location and unique O&D demand
Implications for capacity expansion strategies (cont.)

- Second hub carrier?
  - Vast and high-yield London market one of few European metropolitan areas that could support two substantial hub operations
- Optimizing airport capacity use through a “selectivity policy”
  - Demand management measures
- Experiences in the Netherlands: prioritization of network segments:
  1. Hub operation
  2. Long-haul business
  3. Short-haul business
  4. Cargo
  5. Point-to-point/leisure
- The risk of sticky airlines when ‘old’ airport is kept open