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Airport Dubai - Evaluation of Dubai as a First Choice Hub for International Travellers

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Uher, Michael

Airport Dubai – Evaluation of Dubai as a First Choice Hub for International Travellers

Herausgeber: die Professoren des Instituts für Transportwirtschaft und Logistik
Airport Dubai - Evaluation of Dubai as a First Choice Hub for International Travellers

Michael Uher

Vienna University of Economics and Business Administration
Institute of Transport Economics and Logistics
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<td>Association of European Airlines</td>
</tr>
<tr>
<td>ANA</td>
<td>All Nippon Airways</td>
</tr>
<tr>
<td>ASK</td>
<td>Available Seat Kilometre</td>
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<tr>
<td>ATC</td>
<td>Air Traffic Control</td>
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<td>Available Tonne Kilometre</td>
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<td>Computer Reservation System</td>
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<td>Decision Making Unit</td>
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<td>(US) Federal Aviation Administration</td>
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<td>Frequent Flyer Programme</td>
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<td>Full Service Network Carrier</td>
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<td>International Civil Aviation Organization</td>
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Abstract

The aviation industry is in a state of radical antagonisms. Passengers demand quick and cheap transport on the one hand, but expect the highest comfort in terms of service, schedule convenience or non-stop travel on the other hand. The development of more efficient and economical aircraft supports the trend of falling tariffs together with better accessibility. Aspects of comfort on the ground as well as in the air are changing, since falling yields force airlines to reconsider their strategies to attract passengers. The market has become instable somehow. Customers have interesting choices, when it comes to select the favourite airline for their European–Asian travel. They are free to choose the transfer point of their journey. Dubai has emerged to become a reasonable alternative to the overcrowded classic mega-hubs (London, Paris or Frankfurt) in Europe. The airport convinces with little minimum connecting times, low aeronautical charges and a growing number of new destinations. Rising traffic figures justify an evaluation of this Arabian hub.

This paper analysis, if a shift to Dubai makes sense for the international traveller, when he has to travel from Europe to Asia; discussing the idea of the hub and spoke system, measuring customers, their demands along with their expectations. It aims to offer more insight into the problem with the help of accessibility methods in general including theories applicable to the aviation industry. Hub-structures as well as -models are evaluated to understand airports’ problems and demonstrate passengers’ demands.

The main part of the study seeks to develop and interpret air travellers’ individual choices among a representative selection of connecting airports on the basis of a large number of empirical surveys. According to Doganis’ evaluation, the following parameters help to measure passengers’ tradeoffs among travel decision - together with the route preference - in order to create a conceptional framework: Price, taxes (which affect the choice of route, as airlines add taxes plus other surcharges to the ticket fare), safety, schedule-convenience (incl. total travel time), connectivity-ratio, comfort-quality-image and the airlines’ frequent flyer programmes. Finally the value of (travel) time plays an important role in cost benefit analysis and relativity towards price, total travel time plus service benefits. The empirical results provide indications, that Dubai makes a good job to compete with the classic mega-hubs. The airport is leading with the lowest aeronautical charges and offers the cheapest fares on selected routes. In terms of service aspects Dubai - together with the home airline Emirates - offers outstanding standards. Both partners, however, suffer from long total travel times and a missing alliance, which leads to an unattractive frequent flyer programme. Although the basis for a successful future exists, there is still a great job to do!
1. Introduction and Historic Process

Profitability has always been an fundamental goal for the airline industry, which is in constant motion. The continuing growth of passengers and aircraft movements necessitates a rise of investments in airport and aircraft capacity. Unfortunately, “the airline industry presents an enigma: high growth rates during the last forty years have produced only marginal profitability.” ¹ The events of September 11, Severe Acute Respiratory Syndrome (SARS), crisis in Iraq or development and growth of the Low Cost Carriers (LCC) have only exacerbated existing weaknesses. Yields drop down, as airlines compete with each other for the lowest prices. Full Service Network Carriers (FSNC)² report losses and announce layoffs. Although government assistance has been forthcoming, it is by far not enough to repair the industry. Up to this very moment it is still too early to predict winners and losers in this environment. What we can forecast is that competitive advantage will go to the airport and airline that can respond quickly and decisively to increased pressure to restructure, consolidate and segment the industry.

This constraint gathers speed and demands immediate attention from every member of the aviation industry. There is no doubt that the increasing economic pressure will force an industry wide restruction. Although the impact might vary across air-carriers, none will completely avoid the combined effects of lower demand, rising insurance, security costs and lower yields.³ Airlines cut staff, defer marketing expenses, reduce capacity, retire equipment early and postpone plane deliveries.

This negative effect does not apply to the airports. As there exists only little competition, they enjoy some kind of monopoly. They do, however, face other kind of complications: capacity restrictions (lack of space/terminals, runways, etc.), regulation of traffic hours (night traffic termination) and suffer from the consequences of ATC Air Traffic Control irregularities.

¹ Doganis (2002), p.1
² see Pels / Nijkamp / Rietveld (1997), p.4
³ see Merrill Lynch (2003b), p.10
Nevertheless, airports have enough funds to provide and improve the perfect departure or arrival facilities for their partners in this business-field. The future of world’s airports is directly linked with airlines’ success and vice versa. Therefore this study focuses on both airports together with airlines, as an individual approach fails to understand the real problems (and challenges) of the industry.

In the Middle East, Dubai International Airport DXB and its home airline Emirates do not seem to participate in this market trend. The carrier seeks for new employees, orders a large amount of aircraft and boosts capacity. The airport increases the number of total passengers including revenues and introduces one giant enlargement project after the other. What might be the reason for this outstanding success in contrast to the slow growth of the whole industry? Traditionally European passengers are more seduced into choosing local carriers, rather than to select Dubai as their transit station. It definitely has to be more than a marketing strategy, as facts and quality rankings validate impressions of success and approbation. What is the reason, why Dubai Airport in cooperation with Emirates has a high likelihood to win customers’ satisfaction and voyage decision? This paper measures travel possibilities for a journey between Europe and Asia in terms of accessibility, compares product and service of selected major competitive airlines as well as airports. As a result it will provide an answer to all these questions! Samples are taken from several airlines, alliances and airports around the globe, which provide the global attitude of this work.

“Since antiquity, the Middle East has been a land bridge between Europe and Asia and Europe and Africa.”4 Airline Deregulation in 1978 has generated new demand for air travel, as fares have become lower and level of service improved. With reference to the Table of March 2004 Monthly International Statistics 5, „there was an exceptional growth record by Middle Eastern carriers who posted March year on year same month jumps of 40.2%.“ 6

„Over the first quarter Middle Eastern carriers posted results that were not less impressive: 30.7%.“ 7 All figures refer to passenger traffic.

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4 Fletcher (2003), p.239
In comparison to the Middle East, the North American sector had only a 9.6% and the European Sector 8.5% growth over the first quarter. International Traffic Trends for a period of 12 months show a similar positive course for the Middle Eastern region. 

These figures determine the importance of the region. Dubai International Airport together with the best-known airline in the Gulf: Emirates, this topic is undoubtedly worth to be discussed. “Dubai Airport is the largest airport in the region. In 2002, it handled 19 million passengers compared with just 4.5 million in 1989.” The Department of Civil Aviation is committed to build an airport which will not only be among top airports in the world but will be known as the 21st century airport hub. The airport’s capacity will increase up to 100 million passengers in 2025.

Figure 1: International Traffic Trends by Region RPK % Change 2002 vs. 2001 and 2003 vs. 2002

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11 Graham (2003), p.173
13 see Newton (2003), p. 6
The successive impacts of September 11, a world economic slowdown and SARS have been devastating. Industry losses in 2001 and 2002 amounted to US$ 25 billion.\textsuperscript{14} However, traffic figures go back to normal. “Traffic grew in all regions! The industry is showing clear signs of its ability to match capacity to demand.” \textsuperscript{15}

![Airport passenger growth by world region since 11 Sept. 2001](image)

Figure 2: Airport Passenger Growth by World Region since 11 September 2001\textsuperscript{16}

Finally, “the number of passengers grew by 20.3\% in the first quarter of 2004 compared to 2003. The Middle East had an increase of 44\%, Asia of 35\%, North America of 20\% and Europe of 13\%.” \textsuperscript{17}

Consequently two questions arise: Would travellers use Dubai airport as a hub for their European – Asian journey? Moreover, will Dubai succeed in convincing passengers to consider the airport as an international hub under the sign of technical developments and changes such as the Airbus A380, A340-500 or Boeing’s B7E7? In terms of monetary factors, this work will answer the question, if Dubai Airport is the cheaper or more expensive travel opportunity.

\textsuperscript{14} see ATA (2003b), in: http://www1.iata.org/pressroom/pr/2003-06-02-04.htm
\textsuperscript{15} IATA 2004b), in: http://www1.iata.org/pressroom/pr/2004-05-03-10.htm
\textsuperscript{16} see Graham (2003), p.254
\textsuperscript{17} APA (2004a), in: www.apa-defacto.at
The paper gives a detailed overview about the idea of the hub-and-spoke system. Accessibility theories help to understand the essence of the measurement analysis. General concepts and studies about the comparison of hubs include a presentation of crucial aviation subject matters.

The study draws attention to the European – Asian Air Traffic. It compares Dubai International Airport with other primary hubs in Europe: Paris CDG, Frankfurt FRA, London Heathrow LHR and discusses questions like, “Would Business and Leisure Travellers use Dubai International Airport as a first choice hub?”. It introduces measurement analysis in order to determine differences and advantages between the selected primary hubs. Focus is on the measurement criteria: price, benefit, time, comfort, service, safety, schedule convenience, image as well as frequent flyer programmes and alliances. Attention, however, is also on value of time as it plays an important role in a cost benefit analysis and relativity towards price, total travel time as well as service benefits.

The paper evaluates travellers’ individual choices. Additionally it obtains detailed information about their characteristics, preferences and attitudes towards airport as well as air-carrier services. Development and interpretation of passengers’ choices among a representative selection of connecting airports rests on the foundation of a large number of empirical surveys in this field including an enormous amount of literature.

Finally, a forecast determines Dubai’s role in the international aviation industry with references to market, commercial, infrastructure and technical driven changes. It reveals if Dubai can attract enough passengers and participate in the booming European-Asian air traffic.

for Prime Hub classification see The Boston Consulting Group (2004), p.20
2. Basic Terms and Definitions

Airlines deal with various severe problems in daily business life. "They provide network services that are non-durable (in the sense that once a flight leaves, it has been 'consumed'). For any flight there is a finite capacity involving the carriage of variety of different clients,... but also various classes of passenger.

These different classes extend beyond explicit divisions into such categories as 'business class' and 'coach' and embody differences in time preferences, fares and ticket flexibility that characterize the vast diversity of users of air transportation. Airlines provide an intermediate product ... and air transportation imposes externalities on third parties ... .

There are also various forms of economy associated with scale of services provided, the length of time an operator has served a market and the structure the network adopted. To support airline operations a large and technologically sophisticated infrastructure is required."20

2.1. Airport

"The general definition for airports in legislation refers to any area of land or water used or intended to be used for the landing or taking off of aircraft and includes, ..., special types of facilities like seaplane bases, heliports and those facilities to accommodate tilt rotor aircraft. An airport includes an appurtenant area used or intended to be used for airport buildings and facilities, as well as rights of way together with those buildings, facilities." 21

The arrangement of airports varies: either according to legal criterion, technical criterion or to the function. 22

"The statue further defines airports by categories that include commercial service, primary, cargo service, reliever and general aviation airports." 23

19 US airlines also refer ‘coach’ class to ‘economy’ class
22 see Maurer (2003), p. 70 ff.
Technical scales according to International Civil Aviation Organization (IACO) – standard are dimensions of the runways (length: 900 m up to 2500 m and over; minimum width: 30 m up to 60 m) as well as load-carrying-capacity per wheel of the aircraft (six different classes exist: 7000 kgs up to 45000 kgs). Additionally we distinguish airports according to the Instrumental Landing System (ILS) equiped for the operating approach: Cat. I , II or III.24

2.2. Hub

2.2.1. General Definition of a Hub

A hub in the aviation business is characterised, as “a special net-design, within the traffic between two points is not directly linked, but via a central point called hub.” 25 It accumulates and distributes passengers from and to outlying points 26; or – in other words – carriers feed services into small number of major airports and distribute them to their final destinations.27

According to the Association of European Airlines, a hub is “a single airport at which one or several airlines offer an integrated network of connecting services to a wide range of destinations at a high frequency” 28 or the airport functions "as a central transfer point of an airline." 29

“Hubs are airports that have a large preponderance of flights operated as part of an essentially radial network by one carrier. In a few rare cases there is a general recognition that a hub has two main carriers but this only applies to a few major airports.” 30 (i.e.: Chicago O’Hare: American Airlines, United Airlines; Tokyo – Narita: ANA All Nippon Airlines, JAL Japan Airlines, United Airlines, Northwest Airlines; London – Heathrow: British Airways, Virgin Atlantic, British Midland).

24 see Maurer (2003), p. 71 ; Pompl (2002), p. 165
25 Mayer (2000), p. 6
26 see Stephen Holloway (2003), p.449
27 see Button / Haynes / Stough (1998), p. 20
29 Austrian Airlines (1998), p.110
30 Button / Stough (2000), p.233
With reference to Button & Stough, "academic studies have thought a hub to entail carriers feeding three or more banks of traffic daily through an airport from some 4 or more cities." 31

“In particular, the following features typify the hub city when compared to urban areas with airports offering other forms of air transport services:“ 32

- More frequent flights
- More direct flights
- More opportunities for same day return flights
- Greater likelihood of international flights
- Services geared to local market needs (e.g., serving destinations attractive to residents) ...

... 

- At the same time, residents of hub cities have the same opportunities of linking to other major hubs as do those living in non-hubs

Historically seen the hub and spoke system “has often been less a consequence of market forces and more the result of institutional arrangements”33 created by relaxation of regulations within the EU area. “The concept of hubbing was first developed in the 1970s by Federal Express” 34. Financial crises in the early 1980s led to industry consolidation and the creation of the hub and spoke system 35 “for both costs and revenue reasons“ 36. “While this may entail passengers taking longer over any trip than would be the case with direct flights, it generally means that users have a much wider selection of services to choose from. The airlines can also offer lower average fares because of the economics of scale, scope and density that they can reap.” 37

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32 Button / Stough (2000), p.238
33 Button / Haynes / Stough (1998), p. 21
34 Doganis (2002), p.254
35 see Rhoades / Waguespack (2000), p.88
36 Button / Stough (2000), p.233
2.2.2. Types of Hubs

There are different perspectives found in the literature when talking about the several types of hubs. One fact, however, applies to all theories: “The importance of hubs ranges from small regional hubs up to large continental mega hubs. ... The design of the hub varies a lot according to the function of the whole network.” 38

2.2.2.1. Joop Krul

Joop Krul distinguishes between: 39

- Prime hub
- Secondary hub
- Feeder airport
- Origin&Destination O&D airport

2.2.2.2. The Boston Consulting Group

A recent study by The Boston Consulting Group describes similar forms of hubs: 40

- Primary international hubs
- Secondary hubs
- International “Origin and Destination” (O&D) airports
- Regional airports

The authors of this study also introduce the term “mega hub”. An airport has to meet certain criteria in order to become such a mega hub. It must be home to a leading along with financial secure carrier.

This airline has to be a major player in its respective alliance. A central location together with a large, affluent catchment area is mandatory. The airport’s focus has to be on the dominant member of the alliance, providing outstanding service and innovative products in order to remain vital.

38 Fauska (2003), p.11
39 see Krul (2004), p. 19
40 see The Boston Consulting Group (2004), p.4
<table>
<thead>
<tr>
<th>Forms of hubs</th>
<th>Key characteristics</th>
<th>Airline</th>
<th>Example</th>
<th>No. of airports</th>
</tr>
</thead>
<tbody>
<tr>
<td>International hubs</td>
<td>High share of transit traffic</td>
<td>Main hub of major international airline</td>
<td>Atlanta ATL</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Large catchment area</td>
<td>Leadership role in alliance</td>
<td>PAX: 79M</td>
<td></td>
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<td></td>
<td>PAX in excess of 40M</td>
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<tr>
<td>International O&amp;Ds</td>
<td>Lower share of transfer traffic</td>
<td>Main hub of international long-distance airline or secondary hub of major airline</td>
<td>Sydney SYD</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Large catchment area</td>
<td>Subordinate or niche player in alliance</td>
<td>PAX: 22M</td>
<td></td>
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<tr>
<td></td>
<td>PAX in excess of 20M</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Secondary hubs and O&amp;Ds</td>
<td>Low share of transfer traffic</td>
<td>Main hub of regional airline or secondary hub of major airline</td>
<td>Vienna VIE</td>
<td>~150</td>
</tr>
<tr>
<td></td>
<td>Sizeable catchment area but often overlapping</td>
<td>Subordinate role in alliance</td>
<td>PAX: 12M</td>
<td></td>
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<tr>
<td></td>
<td>PAX around 10M</td>
<td></td>
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<tr>
<td>Regionals</td>
<td>No transfer traffic</td>
<td>Regional airlines</td>
<td>Albany ALB</td>
<td>~2400</td>
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<tr>
<td></td>
<td>Smaller or remote catchment areas</td>
<td>Low Cost Carrier LCC</td>
<td>PAX: 1.5M</td>
<td></td>
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<tr>
<td></td>
<td>PAX below 10M</td>
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</table>

PAX...Passenger(s)  M...Million  O&D...Origin and Destination

Table 1: Forms of hubs

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41 The Boston Consulting Group (2004), p. 4
Furthermore a mega hub is an origin for international long-haul flights and junction for domestic or short-/medium haul flights. Increasing cost pressure in addition to airline consolidation is leading to a concentration of long haul traffic into a few mega hubs. The Boston Consulting Group including Airbus, Boeing, IATA and ACI presume approximately nine potential mega hubs. These likely candidates are Chicago O'Hare, Dallas/Fort Worth, Atlanta, Singapore, Hong Kong, Tokyo Haneda HND, London Heathrow, Paris CDG or Frankfurt and will enjoy the greatest growth in the future. The subject mega hub is also discussed in the chapter “Forecast”.

Figure 3 :Mega Hub Consolidation
2.2.2.3. Rüdiger Sterzenbach, Roland Conrady and Walter Fauska

All three authors have equal definitions of hubs: 47

a) **Regional hub**: The regional hub is a link between long haul and regional destinations. Airlines use smaller aircraft for feeding long distance flights, which is the main criterion for this kind of hub.

b) **Secondary hub**: The secondary hub should assist associated long haul hubs, like a branch without competition. Distance between main and secondary hub is not big. Examples would be Lufthansa’s Frankfurt and Munich hubs 48 or All Nippon Airways’ (ANA) Tokyo Narita and Osaka Kansai hubs.

c) **Hourglass hub**: An hourglass hub bundles flights from one direction (north) to another direction (south).

d) **Fortress hub**: Domination of an airport (in terms of slots, etc.) and missing possibilities for capacity enlargements characterize a fortress hub.

e) **Double hubbing**: “A double hub is the case if an airline runs two different hubs with two networks. These two hubs are linked with each other.” 49

h) **Direction hub**: When a direct flight connects two airports, the expression direction hub is used. “The concept of a direction hub replaces this direct connection with additional inter hubs. These inter hubs have just two spokes directed to the main hubs. The inter- or direction hubs do not offer connections to any other directions.” 50

g) **Mega hub**: “The mega hub presents the highest form of competition between different airlines. An airport is called a mega hub if many different airlines have established an own hub there.” 51 Examples are present on every continent, i.e.: Tokyo-Narita, London-Heathrow, Frankfurt, Chicago O’Hare, etc.

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48 see Pompl (1998), p. 337
49 Fauska (2003), p. 16
50 Fauska (2003), p.19
51 Fauska (2003), p.18
f) Multiple hubbing: We can talk about a multiple hub system, in case an airline runs several hubs (more than two). A direct service links all hubs. United Airlines serves the US-market via Chicago, Washington D.C., San Francisco, Los Angeles and Denver. “International alliances have led to de facto multi-hub services with a carrier in, say, Europe basing its operations around a hub but linking its services with those of a US airline that has its own domestic hub-and-spoke network.” 52 (i.e. British Airways and American Airlines link One World’s home bases London and Chicago so good, that both carriers are able to adjust their operations and offer smoothest connections).

Furthermore SAS has a multinational multiple hub system. The Scandinavian airline from Denmark, Norwegian and Sweden has Copenhagen, Oslo and Stockholm as its hubs, serving 3 continents.

Former Qualiflyer Group 53 introduced a “small hub” idea in the late nineties. Instead of one -or a few- large transit airport(s), which consequently leads into long connecting- and waiting times, the Qualiflyer Group offered an eleven-hubs system in Europe with small airports, respective short distance between the gates, clear number of transit-passengers etc. These eleven airports (Brussels, Euro Airport Basel-Mulhouse-Freiburg, Istanbul, Lisbon, Milan-Malpensa, Montpellier, Nice, Paris-Orly, Salzburg, Vienna and Zurich) linked 200 cities within Europe. Alliance focus was mainly on Europe.54

i) Rolling hub: Rolling hubs do not have any harmonized connecting flights. Compared to a “normal” hub, if lacks of flights coordination.

2.2.2.4. Kenneth Button, Kingsley Haynes, Roger Stough

Button, Haynes and Stough delineate hub-and-spoke structures: 55

- linear networks simply link separate airports and there is no dominant focus
- simple hubs involve various ‘spoke’ services operating independently from each other

52 Button / Stough (2000), p.56
53 Qualiflyer Group Airlines at that time: Swissair, Austrian Airlines, Sabena, TAP Air Portugal, Turkish Airlines, AOM French Airlines, Crossair, Lauda Air, Tyrolean Airlines, Air Littoral and Air Europe
54 see The Qualiflyer Group (1999), p.1
55 see Button / Haynes / Stough (1998), p. 20
• complex hubs involve flights connecting with arrivals and departures scheduled within a short period
• directional hubs from an hour-glass pattern with, for example, flights from the east coordinating with those to the west but with limited coordination with either south or north traffic
• multiple hubs exist when the operations of an airline through several hubs are coordinated; often this may involve combining directional hub activities especially when there are long-haul operations involved.

2.2.2.5. Wilhelm Pompl

Wilhelm Pompl distinguishes between the following forms of hubs: 56

• Hourglass hub
• Regional hub
• Multi-hubbing
• Secondary hub
• Mega hub

2.2.3. Focus City

For the seek of completeness the term Focus City has to be discussed too. As investments for new hubs needs the appropriate city location, but also a huge amount of money, airlines tend to build “Focus Cities” instead. Trans World Airlines (TWA) introduced San Juan, Puerto Rico as its Focus City in the Caribbean. The airline offered non-stop services to Aruba, Boston, Fort Lauderdale, Los Angeles, New York, Orlando, St. Louis and Santo Domingo. 57

Along with the success of San Juan, TWA had “announced Los Angeles as its second focus city, ... . TWA defines a focus city a major base for operations without the cost or commitment of a hub.” 58

56 see Pompl (1998), p.337
57 see Trans World Airlines (1999), p.7
58 World Airline News (2000), in: www.findarticles.com/p/articles/mi_m0ZCK/is_29_10/ai_63644639
Some airlines even downsized former hub operations to focus cities due to economical reasons: In May 2004, US Airways demoted Pittsburgh from a hub to a focus city. This meant a cut to 240 daily flights to 65 cities, compared with 373 daily flights to 102 cities before the change.59

Consequently, a focus city is an airport, “where airlines have a big enough concentration of revenue to create stand-alone flight schedules.” 60 “The focus cities are like very small hubs that allow ... to diversify ... route structure.” 61

3. Accessibility Theories and Methods

3.1. Accessibility Theories and Studies of Various Authors

The term “accessibility” has many different forms of definition in basic literature:

Basically, accessibility is the ability to get in contact with a person or a thing. 62 It defines the ability to reach a destination of choice (spatial). 63 Statically accessibility is a state of attachment. The number of physical links determines the level of accessibility. 64 Therefore, we can consider accessibility as some kind of symmetric model, 65 which means: the way London is linked with Paris is also valid for the contrary!

“Spatial mobility indicates at the same time the propensity and the facility of a person to move and the realisation of this propensity in the form of the movement; a movement being understood as an act aiming at cancelling the distance separating two places within the framework of a given activity ... Access and accessibility are the two sides of the same medal: access expresses a request – derived from the request for transport – while accessibility expresses the supply’s level of the system of the transport (or communication), which allows the realisation of a need for common life.” 66

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63 see FHWA (n.av.), in: http://www.fhwa.dot.gov/planning/toolbox/accessibility_overview.htm
66 Swiss National Science Foundation (2004)
Accessibility certainly influences both progress of population and improvements on traffic-infrastructure. They, however, have an impact – dependent on investments in infrastructure - on the progress of accessibility and vice versa.

67 Swiss National Science Foundation (2004), p.2
Geopolitically, accessibility is defined by direct or indirect, temporary or constant admission to the traffic system.  

3.1.1. R.J. Johnston

R.J. Johnston describes accessibility “as the ability to move to particular destinations.”

Accessibility is “the relative opportunity of interaction and contact. In human geography, accessibility has usually been treated in purely geometric terms.

Location analysis uses Graph Theory to identify patterns of differential accessibility through a two-stage reduction of contact networks:

a) they are transformed into simple graphs, from which a series of topological indices can be derived and
b) these graphs are then reexpressed as connectivity matrices whose successive power expansions bring out higher-order network structures.”

3.1.2. Brian S. Hoyle and Richard D. Knowles

The basic components of accessibility are people and facility (or activity)!

![Components of Accessibility](image)

“Resident in location A seeks access to location B in order to acquire goods or services … transport is needed to overcome the distance barrier that separates them” “… the numbers and relative location of local facilities constrain the length, cost and choice of possible journeys … qualified by its frequency, timing and fare level.”

---

69 see Maier / Atzkern (1992), p.179
70 see Johnston (1999)
71 Johnston (1999), p. 499
72 Johnston (1999), p. 2
73 see Hoyle / Knowles (1992), p. 137 ff.
74 Compiled by the author
75 Hoyle / Knowles (1992), p. 137
76 Hoyle / Knowles (1992), p. 140
Accessibility over time assuming the decline of local facilities and rural depopulation:

![Accessibility over Time Diagram](image)

Figure 7: Accessibility over Time

3.1.3. Gösta Ihde

Qualitative and quantitative elements help to describe the infrastructure of mode. Factors of quantity are network’s length, density index (proportion length of traffic flow to the covered space) and design index (corresponding to the proportion of stretch to air-range). Costs of transport, comfort or environmental compatibility are the basis for the factors of quality. Descriptive elements are index of accessibility, isochrones and rate of air-range (travel time referred to the air-range between two points).

Catchment indices count the number of destinations (i.e. jobs) $j$ - and consequently $x_j$ structural signs (i.e. office, airport, etc.) - within a threshold travel cost $t_{max}$ from a defined location $i$.  

---

77 Hoyle / Knowles (1992), p. 141
Therefore, accessibility serves as a qualitative element to describe the infrastructure of mode. Transport reliability, speed, network’s structure and network’s density – who are characteristic features of infrastructure - influence rate of accessibility.

3.1.4. ETH Zürich: Axhausen/Tschopp/Fröhlich/Keller

“Accessibility is defined as the extent to which the land use transport system enables [groups of] individuals or goods to reach activities or destinations by means of a [combination of] transport mode[s].”

\[
\text{AccPop}_i = \sum_{j=1}^{j=2903} A_j \exp(-\beta c_{ij})
\]

- \( \text{AccPop}_i \): accessibility to people living in municipality, \( i \)
- \( A_j \): the number of residents of municipality, \( j \)
- \( c_{ij} \): travel time by private vehicle between the municipality \( i \) and municipality, \( j \)
- \( \beta \): exponent

---

80 See Tschopp / Fröhlich / Keller / Axhausen (2003)
The reasons why accessibility is desirable are:\textsuperscript{82}

- Wide selection of opportunities (better adjustment of demand and supply)
- More opportunities to reach additional customers / to set activities
- Improve financial strength for network development

Accessibility can either be measured from one source to one destination or from one source to all/several destinations:\textsuperscript{83}

From one source to one destination:

- Connection (with a certain level of quality available)
- Travel time below a certain/fixed marginal value
- Generalized costs below a certain/fixed marginal value

From one source to all/several destinations:

- Number of cities that can be reached according above-mentioned criterion
- Sum of opportunities that can be reached according above-mentioned criterion
- Sum of weighted opportunities (potential):\textsuperscript{84}

\[
A_i = \ln \sum X_j f(k_{ij})
\]

\[k_{ij} < k_{max}\]

\[k_{ij} = 0\]

\[A_i\] Accessibility from a destination i
\[X_j\] Opportunities for interaction/activity
\[k_{ij}\] exponentially weighted generalized cost of travel
\[i\] Location of origin i
\[j\] Destination j

\textsuperscript{82} see Axhausen (2004), p.11
\textsuperscript{83} see Axhausen / Fröhlich (2004), p.4
\textsuperscript{84} for additional information and explanation please also refer to the chapter Accessibility in Civil Aviation
The potential-theorem presumes that each attraction of $X_j$ exudes a certain utility. Utility, however, is weighted by $k_{ij}$ and decreases if travel costs grow. The total attractiveness of location $i$ is the sum of all partial attractions ($X_j f(k_{ij})$).  

Another frequently used approach is the isochronic-theorem: It counts the number of activities that can be reached within a certain travel time from a specific location.

<table>
<thead>
<tr>
<th>Traffic-system</th>
<th>Supply</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low utility costs</td>
<td>Larger markets</td>
<td>Superior selection</td>
</tr>
<tr>
<td>Higher traffic performance</td>
<td>Specialization &amp; higher wages</td>
<td>Better quality</td>
</tr>
<tr>
<td>Superior capacity</td>
<td>Productivity growth</td>
<td>Lower prices/fares</td>
</tr>
<tr>
<td>Additional funds for preservation/extension</td>
<td></td>
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</tbody>
</table>

Table 2: Logic of Accessibility

With reference to M.E. O’Kelley and M.W. Horner (2001) ETH Zürich studies introduced a sub from of accessibility, called “accessibility per person (ApP)” which is the quotient of: zone $i$’s accessibility and zone $i$’s population.

$$\text{ApP}_i = \frac{\sum A_i}{\sum P_i}$$

3.1.5. Siamak Baradaran and Farideh Ramjerdi

Although there is no universal acknowledged definition of accessibility, measures are classified by travel-costs, gravity, constraints-based, utility and composite approaches. Basically, the location needs notes connected or not. “The extent of accessibility can also be calculated as the number of different links and modes to which the specific location has access.”

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85 see Gätzi (2004), p.20 f.
86 see Gätzi (2004), p. 3
87 see Axhausen / Fröhlich (2004), p.6
88 translated from the original term: Erreichbarkeit pro Person (EpP)
89 see Gätzi (2004), p.21
Accessibility indicators describe characteristics of the physical infrastructure (i.e.: accessibility to certain links, the network or modes). Objective – or process – indicators reveal the level of service of the infrastructure network from the supplier’s perspective. Comprehension of differences between accessibility indicators necessitates classification:

- travel-costs approach
- gravity or opportunities approach
- constraints-based approach
- utility-based surplus approach
- composite approach

Travel distance, travel time and generalized travel costs help to measure the degree of spatial separation between locations. Generalized travel costs include costs of vehicle use, fares, taxes, etc. Travel time does also include waiting-, transfer- and auxiliary times in addition to in vehicle time and fares. The perception of utility derived from waiting time is not equal to the in-vehicle time.92

3.1.6. Britton Harris 93

The noun access is the habit or power of getting near or into contact with somebody or something according to the Oxford English Dictionary.

“Generally access is symmetrical: if A has access to B, then B has access to A. Its measurement, however, may be asymmetrical.

Accessibility is a set of measures of varied form and content that makes it possible to overcome local myopia. As a quality of places, it varies from place to place independent of any local conditions except connections with the rest of the region. Thus, accessibility’s fundamental source is the distribution of properly specified activities over the region, but it also depends on the costs of the means of interaction between places, ... and on the separation from the place of measurement from the target activity to be accessed.

First, we select a target being viewed as it is distributed over all locations in the region. Second, we identify those variations in costs of access between the viewing point and other locations that will influence choices. Third, we decide how a view will evaluate these costs as diminishing the importance of less accessible targets.

Valid measurements of separation include airline distance, route distances, travel time, costs, lack of safety or convenience, amenity and weighted combinations of these. These measurements may vary by mode and time of day, and according to personal choice procedures for routes.  

3.1.7.  Piet Rietveld and Frank Bruinsma

Rietveld and Bruinsma describe accessibility as the potential of opportunities for interaction. Accessibility is precise per type of user and per trip purpose, so aspects have to be profoundly defined. Both authors give to understand, that it becomes a trip purpose specific. In order to measure accessibility, information like the location of nodes, the length of links or data on transport costs such as travel time, fares, et al are mandatory. Some types of definition require additional material (i.e. data on spatial interaction patterns, parameters of models describing these spatial interactions).

Rietveld and Bruinsma list a number of possible operationalizations, as a large number of surveys exist. This table gives a detailed overview about the different definitions.

96 see Rietveld / Bruinsma (1998), p.33
97 see Rietveld / Bruinsma (1998), p.36
98 see Rietveld / Bruinsma (1998), p.34 f.
<table>
<thead>
<tr>
<th></th>
<th>Definition</th>
<th>Assumptions/ Remarks</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acc1</td>
<td>A node has access to a network if a link exists between the node and the network</td>
<td>Accessibility actually means access or connectivity; accessibility is a binary variable: 1 or 0</td>
<td>The city of Bonn is connected to the German autobahn network</td>
</tr>
<tr>
<td>Acc2</td>
<td>The accessibility of a node with respect to a network is the distance one has to travel to the nearest node on the network</td>
<td>If accessibility defined as according to acc1 equals 1, acc2 attains its most favourable outcome (acc1=1 implies acc2=0)</td>
<td>The distance of village A to the nearest point of entry of the national expressway system is 16km. The distance from Gent to Brussels airport is 60 km</td>
</tr>
<tr>
<td>Acc3</td>
<td>The accessibility of a node in a network is the total number of direct connections with other nodes</td>
<td></td>
<td>From Rotterdam airport one can fly to 12 destinations without changing planes</td>
</tr>
<tr>
<td>Acc4</td>
<td>The accessibility of a node in a network is the total number of links connected to this node</td>
<td></td>
<td>From Hanover the railway lines extend in four directions</td>
</tr>
<tr>
<td>Acc5</td>
<td>The accessibility of a node to another node is measured as the travel cost between these nodes</td>
<td>This definition considers accessibility in a strictly bilateral way without summation across destinations</td>
<td>It takes 2,5 hours to fly from London to Lisbon; the costs of a round-trip are USD 460</td>
</tr>
<tr>
<td>Acc6</td>
<td>The accessibility of a node in a network is the weighted average travel cost between the particular node and all nodes in the network</td>
<td>Weights may relate to the masses of the nodes, or to the total number of trips made to the nodes</td>
<td>The average distance from Vienna to all major cities in Europe weighted by population size is 880 km; when weighted by the shares in the total number of trips it is 350 km</td>
</tr>
</tbody>
</table>
| Acc7 | The accessibility of a node in a network is the expected value of the maximum utility of a visit to any node | Utility of a visit to a certain node is assumed to depend on:  
- the mass of the node  
- the travel costs of a trip to the node  
- a stochastic term | The accessibility of Milan for road transport in Europe is 56 compared with Frankfurt 100 (index) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acc8</td>
<td>The accessibility of a node in a network is (proportional to) the spatial interaction between the node and all other nodes</td>
<td>The spatial interaction between nodes may be directly measured or computed by means of a spatial interaction model</td>
<td>See acc7</td>
</tr>
<tr>
<td>Acc9</td>
<td>The accessibility of a node in a network is the total number of people one can reach from the node within a certain transport cost limit</td>
<td>The transport costs limit can be formulated in any dimension: distance, travel time, etc.</td>
<td>From Copenhagen one can reach 80 million people within a time interval of 4 hours</td>
</tr>
<tr>
<td>Acc10</td>
<td>The accessibility of a node is the inverse of the balancing factor in a singly or doubly constrained spatial interaction model</td>
<td>This interpretation has been given by several authors</td>
<td>See acc7</td>
</tr>
<tr>
<td>Acc11</td>
<td>Accessibility is measured by means of expert judgement</td>
<td>No formal definition is given</td>
<td>The five European cities with the best accessibility are: A, B, C, D and E</td>
</tr>
</tbody>
</table>

Table 3: Alternative operationalizations of accessibility

---

3.1.8. **Scottish Executive CRU** \(^{100}\)

The Scottish Executive CRU does not define accessibility. The paper draws attention on measuring accessibility only and describes three generic, but overlapping types of indicators:

Simple indicators are the number of opportunities within a given travel cost or –time; measures of the travel cost, time, etc. are required to reach a given number of opportunities. Opportunity measures are the sum of all available opportunities and weighted by a measure of deterrence based upon how easily the opportunities can be reached. Value measures define the attractiveness of the available opportunities to represent their values as a transport choice.

In order to observe accessibility opportunity terms, we need to express deterrence functions and the sizes of the zones. The type of opportunity depends upon consideration of origins or destinations. Origin accessibility examines the opportunities available to an individual or a business (opportunity term based upon the land use of alternative destinations). Destination accessibility considers the catchments for a destination (opportunity term based upon land uses and type of traveller at alternative origins). Land-uses of interest include employment, education, health, social, shopping and leisure. Types of travellers take account of mobility, employment status and age.

Factors as time, travel cost, distance or generalised cost/time measure deterrence function and must include effects of different types of travel, the costs associated with each as well as effects of time waiting for a vehicle.

In terms of the zoning system, strategic transport improvements will require a wide geographical coverage, but a fairly coarse zoning system may be adequate! \(^{101}\)

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\(^{100}\) see Scottish Executive CRU(2000) , in: http://www.scotland.gov.uk/cru/kd01/blue/accessibility-01.asp

\(^{101}\) see Scottish Executive CRU(2000), in: http://www.scotland.gov.uk/cru/kd01/blue/accessibility-01.asp
3.2. Accessibility Theories and Methods in the Civil Aviation Industry

In civil aviation, there is no specific or in other words, “no universally acknowledged definition of accessibility”\textsuperscript{102} found in books equal to the previous chapters. Travel restrictions and number of reachable structural elements help to measure accessibility. Resistance may be night closure for traffic at an airport or speed and noise limits. Examples for structural elements are workplace, city or trading centre. Time and cost-constraints are mandatory general set-ups.\textsuperscript{103} Indications are based upon simple elements like price (travel cost), travel-time (including waiting time), distance, cost of transport or frequencies\textsuperscript{104} and specify the potential of possible interaction.\textsuperscript{105}

In terms of accessibility’s travel indicators, we have to consider that travel time includes:\textsuperscript{106}

- Access time to departure airport (average of public transport and car access)
- Transfer time (change of traffic mode)
- Check-in time (destination- and airport specific)
- Flight time including connecting time
- Access time from arrival airport to central station destination

Accessibility measure in the aviation industry: \textsuperscript{107}

\[ A_i = \ln \sum X_j f (k_{ij}) \]

\[ k_{ij} < k_{\text{max}} \]

\[ k_{ij} = 0 \]

\textsuperscript{103} see Ihde (1997), p.1184; Ihde (2001), p.115
\textsuperscript{105} see Baradaran / Ramjerdi (2001), in: http://www.bts.gov/publications/jts/v4n23/index.html
\textsuperscript{106} see Axhausen / Bleisch (2003a), p.14; Axhausen / Bleisch (2003b), p.9
\textsuperscript{107} see Axhausen / Bleisch (2003a), p.8
The choice of a measure derived from welfare economics: the log sum term of destination choice model. Elements are opportunities for interaction/activity $X_j$ and exponentially weighted generalized cost of travel $k_{ij}$.

$A_i$ Accessibility from a destination $i$
$X_j$ Opportunities for interaction/activity
$k_{ij}$ exponentially weighted generalized cost of travel
$i$ Location of origin $i$
$j$ Destination $j$

Bruinsma’s and Rietveld’s theory even include frequency, airport’s operation-time, time for check-in or checkout process.\textsuperscript{108}

$$A_i = \frac{P_i}{t^c_i} + \sum P_j / T^c_{ij}$$

$A_i$ Accessibility of location $i$
$T_{ij}$ Travel time between location $i$ and $j$
$C$ Parameter with the value 1
$P_j$ Population of location $i$
$P_i / t^c_i$ Internal interaction within an agglomeration

Travel time is described as $T = V + RT + I$

$V$ is traveller’s penalty, as he has to consider airport restrictions ($E$) in terms of operation times and frequencies ($F$): $V = \frac{1}{4} \times (E / F)$. Net travel time ($RT$) and “loss” of time for check-in and check-out process ($I$) are added.

International rankings reveal that London, Paris and Frankfurt are the leading regions in terms of accessibility.\textsuperscript{109} That is the reason why those airports are the most likely candidates for the category: mega-hub.

3.3. Accessibility: Empirical Analysis of Hub-and-Spoke Systems\textsuperscript{110}

“The quality (w) of a certain hub-airport ... is influenced by a lot of different quality factors (f) ... and the weighting factor (g).” \textsuperscript{111}

Quality factors are:

- Flight connections of the hub-airline FCH
  (fixed and a positive indication, weighting ration: 0,2)

- Connecting time CT
  (fixed and a negative indication, weighting ration: 0,125)

- Change of terminals CHT
  (fixed and a negative indication, weighting ration: 0,05)

- Number of total hub-destinations NTD
  (fixed and a positive indication, weighting ration: 0,1)

- Delayed flights of the hub-airline DFH
  (variable and a negative indication, weighting ration: 0,25)

- Length of the flight delay LD
  (variable and a negative indication, weighting ration: 0,25)

All these factors finally result in the formular:

\[
 w = ( f ) \times ( g )
\]

\textsuperscript{110} see Fauska (2003), p.35 ff.  
\textsuperscript{111} Fauska (2003), p.35
3.4. Application of the Concepts and Studies to the Thesis

This paper examines accessibility between Europe and Asia. Focus of this European – Asian conveyance study, is the measurement of European prime hubs' and Dubai International Airport’s influence on the transit traffic. Starting points of the analysis are a group of selected European airports. Simple indicators (and therefore factors of spatial separation) are frequency, generalized travel costs (fare level, taxes, surcharges) and travel distance in the form of travel time (including waiting-, transfer- and auxiliary times). The value of (travel) time has an own chapter, in order to underline the importance of quick transfer. In this study access costs do not influence traveller’s decision process, which hub he should choose, since they are steady. The starting point of the journey is always the same European airport, apart from the three prime hubs (which have connecting purpose only). In order to make it a valid measurement of separation the thesis includes safety as well as various forms of amenity on the ground and in the air too.

112 Selection of airports presented in the chapter: “Hypothesis and Analysis”
113 see Scottish Executive CRU (2002), in: http://www.scotland.gov.uk/cru/kd01/blue/accessibility-01.asp
4. Studies and Concepts about the Comparison of Hubs

4.1. Characteristics of Hubs

“Since the enactment of the Airline Deregulation Act, the major US domestic carriers have developed hub-and-spoke structures for their operations. These have been instrumental in helping to reduce the overall costs of air travel to the US public and to increase the travel options that are available. This hubbing effect also means that the quantity and quality of air services varies quite considerably between cities in the country.” 116

With the hubbing structure, “flights are funnelled in banks into a number of large hubs where substantial numbers of passengers change aircraft to complete their journeys. These banks involve the coordinated arrival of large number of flights in a short space of time and then equally coordinated departure of flights within a narrow time window. Larger hubs may well have up to seven or more such banks a day. Travel time would be longer for many people but fares fell and the range of potential flight combinations available to any particular destination expanded considerably.” 117 “Users have a much wider selection of services to choose from.” 118

Airline mergers and strategic alliances created multiple hubs, especially in a very large market as in the entire US or linked alliance markets (i.e. Europe and USA). 119 Main competition “is generally between the alternative networks rather than over individual links.” 120 An example is the Chicago – London (both are One World and Star Alliance hubs) route: One World Alliance’s members American Airlines and British Airways compete with Star Alliance’s United Airlines. The same competition applies for the New York – London route. Additionally Delta Airlines (from New York JFK) and Continental Airlines (from Newark EWR) offer alternative flights to London Gatwick LGW. Virgin Atlantic – presently independent from any major alliance – serve London Heathrow LHR, London Gatwick, New York JFK and Newark.

Once again, main competition is between alliances' hubs. To understand the importance of a hub, the London – New York route is a perfect illustration to show

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120 Button / Stough (2000), p.57
effects of competition or mistakes to avoid, as seven airlines offer non-stop service and it has always been some kind of “battle-route”.


This effect harmed a former global player: Trans World Airlines. Suffering financial problems TWA sold its traffic rights between New York and London Heathrow to American Airlines for US$ 445 million (price also included 2 additional routes)\footnote{see Hanlon (1999), p.109} and had to move to London Gatwick instead. Consequentially they faced a sheer decline of yields on this route (Revenues declined by US$ 1 Bill.). London Gatwick does not seem to attract so many high yield passengers and has not so many connecting flights to international destinations as London Heathrow offers. London Heathrow is the gateway to Europe. After the airline has sold all of its U.S. routes to London (total amount for sold rights to American Airlines and USAir\footnote{now US Airways} was US$ 700 million), international business travellers’ options of flying TWA were severely limited.\footnote{see Jenkins (1999), in: http://www.planebusiness.com/perspective/p060899jenkins.html}

According to a survey made at London’s airports in 1998/99 in order to find out passengers’ reasons for choice of Heathrow airport, 19% chose London Heathrow because of good connecting flights, whereas only 6,8% favoured London Gatwick.\footnote{see Graham (2003), p. 185} Travelling from the USA or Asia to any European city via London, would make London Heathrow the preferred choice, in order to avoid long journeys between these two airports.\footnote{Minimum connecting time between London Heathrow and London Gatwick is 230 minutes, including a coach journey of at least 60 minutes} European connections out of Gatwick are limited to leisure destinations - operated by charter or low cost airlines - and only selected business destinations, with less frequencies than out of Heathrow.\footnote{see BAA (2004), in: http://www.baa.co.uk/main/airports/gatwick/terminal_information_frame.html}
But this is not everything, that makes an airport the perfect hub. The decision on the right location effects hub’s success or failure. The airline has to consider important factors like:  

- Geographic position  
- Competition at the hub  
- Distance to an alliance or competitive hub  
- Connection with other modes of transport  
- Catchment area  
- Airport infrastructure (incl. competitive minimum connecting time, shopping facilities, lounges, hotels, check-in counters, distance to own catering logistic, office buildings, space for maintenance, aircraft and hangars, aso.)  
- Airport enlargement (incl. slots, seize of the terminals, number of runways, aso.)

In conclusion, direct influential factors of hub-and-spoke networks are demand, cost and strategic considerations.  

There is no doubt that “airlines have a strategic advantage at their hub airports compared to their non-hub competitors.” Nevertheless we have to consider all advantages and disadvantages a hub and spoke system generates:

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129 Maurer (2002), p.321  
130 see Pels / Nijkamp / Rietveld (1997), p.4  
131 Gayle (2004), p.17  

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Figure 8: Creation of a Hub

Creation of a hub

- Introduction of short- and medium-haul flights  
- higher load factor  
- more frequencies  
- larger aircraft  
- Inauguration of intercont. flights  
- Creation of a hub  
- short connecting time  
- Creation of a hub  
- further optimization  
- new destinations  
- more frequencies  
- larger aircraft
4.1.1. Advantages of the Hub-and-Spoke System

Hubs have a large number of positive effects on the airports themselves, on the home-based airlines and also on their regions.  

a) Economies of Scope

Economies of scope come from the ability to spread costs across the range of services (ability to feed high volume of traffic through large terminal on banks of flights from a variety of origins with passengers destined for a variety of other cities). "A better use of aircraft and crew help to save costs. A carrier that offers a larger network of services is more attractive to the traveller."  

b) Economies of Density

Economies of density result from high – most possible - utilization of infrastructure. “Early analysis indicated, for instance, that due to economies of density, a 1% rise in the number of passengers an airline carried resulted in a 0.8% reduction in total costs, although more recent analysis indicated savings could be greater.” “Unit cost declines when the airline adds flights or seats on existing routes. Higher route frequency decreases travellers’ time costs: self-reinforcing demand, known as the Mohring effect.” Samples would be feeder- or connection code sharing.

c) Economies of Scale

There is also the opportunity to enjoy cost savings from fleet standardization and “lower unit costs can be obtained by large scale producers” (sample: larger aircraft with lower costs per passenger-tonne km ). As each flight produces fixed and variable cost per seat, cost per passenger decreases with aircraft seize.

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133 see Button / Stough (2000), p.233  
134 see Button / Stough (2000), p.233  
135 see Button / Stough (2000), p.233  
137 Fridström (2003), p. 22  
138 see Pompl ( 2002), p.146  
139 see Button / Stough (2000), p.233  
140 Shaw (2004), p.77  
141 Pompl (2002), p.146  
142 see Brückner (2002), p.2
d) Loadfactor

Since the airline bundles all flights via a hub, it generates higher load factors within the entire network. This results in profit improvement of the flights within the network. Although smaller aircraft operate on low demand destinations only, they consolidate additional passenger traffic, influence the network’s load factor and allow airlines to capitalise on the economies of aircraft seize.  

143

e) Network enlargement

Hub and spoke networks increase flight frequency and aircraft size, while stimulating local traffic in and out of the hub. 144 “An important advantage in hub and spoke networks, in which routes radiate from a central hub airport to a number of outlying spoke airports, is the effect they have in multiplying by permutation the number of city pairs an airline can serve. When airports are linked via a hub, the number of available city pairs is much greater than when they are linked directly...”. 145

<table>
<thead>
<tr>
<th>Number of spokes</th>
<th>Maximum number of connecting markets</th>
<th>Number of local markets</th>
<th>Maximum number of city pair markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>( n(n-1)/2 )</td>
<td>N</td>
<td>( n(n+1)/2 )</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>45</td>
<td>10</td>
<td>55</td>
</tr>
<tr>
<td>25</td>
<td>300</td>
<td>25</td>
<td>325</td>
</tr>
<tr>
<td>50</td>
<td>1225</td>
<td>50</td>
<td>1275</td>
</tr>
<tr>
<td>100</td>
<td>4950</td>
<td>100</td>
<td>5050</td>
</tr>
</tbody>
</table>

Table 4: Markets in a Hub and Spokes System 146

“If there are \( n \) spokes, an airline can provide through connecting services for up to a theoretical maximum of \( n(n-1)/2 \) city pairs. When these are added to the \( n \) city pairs to/from the hub itself, the total possible city pair markets is \( n(n+1)/2 \).” 147

143 see Fauska (2003), p.21 f.
144 see Brückner (2002), p.19
145 Hanlon (1999), p.84
146 Hanlon (1999), p.85
147 Hanlon (1999), p.85
“Network enlargement can be described as one of the ultimate advantages of hub-and-spoke-systems. Within a hub-network an airline is enabled to offer more destinations with the same number of flights.”  

f) Control of flight operations

An airline can place aircraft and flight crew at its home base hub. Consequently it can distribute these substitute aircraft or flight crews more efficiently and limit or even avoid further delays. 

g) Competition and more travel options for the customers

“In the decade after the 1978 deregulation and largely as a result of the hub-and-spoke structure of operations that emerged, the number of passengers emplacements rose by 55% to over 140 million per annum, with revenue passengers miles rising by over 60%. The real costs of air travel fell by about 17% on the major routes, although by somewhat less on routes involving smaller markets.”  

“Given the number of alternative air transport networks available … (transit) passengers normally have a choice of whether to take a direct flight or to transit through one of

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148 Hanlon (1999), p.84  
149 Fauska (2003), p.22  
150 see Mayer (2001), p.26  
151 Button / Stough (2000), p.234
several hubs. The fact that a hub is dominated by a single carrier does not constitute a monopoly position because people can opt for alternative routings. The hubs effectively compete with each other for" 152 transit traffic.

Established airlines control slots, gates and other ground service facilities at their home hubs. A new competitor can hardly gain an economically necessary amount of slots. For that reason the airline successfully avoids or at least hinders competition. 153

In times “when travel demand is low, when flights are expensive to operate and when passengers place a high value on flight but are not excessively inconvenienced by the extra travel time required for a connecting trip” 154 airlines do prefer hub and spoke networks.

h) Environmental situation

“The concentration of flights on a certain hub location leads to less environmental pollution because hubbing-system reduces the number of necessary flights. Nevertheless the environment of a hub-location will have to face an increased pollution of emissions and noise because of the concentration of air and ground traffic at this specific airport.” 155

i) Market penetration

The use of small aircraft allows to operate economical flights to smaller cities or destinations with lower demand. 156 “The hubbing airline is able to go deeper into the market and to attract new passengers.” 157

j) Fortress Effect

As soon as one airline dominates a hub, competitors can hardly hit it. In order to establish new destinations and frequencies successfully, the competitive airline needs

154 Brückner (2002), p. 19
155 Fauska (2003), p. 24
156 See Pompl (1998), p. 338
157 Fauska (2003), p. 21
not only high volume of initial costs, but also available slots. The dominating airline can attack with low prices or increase frequencies and parentheses the other flights.\textsuperscript{158}

**k) Effects of multiplication**

“Revealed preference shows that many airlines benefited from hubbing... Passengers benefited from lower fares and increased frequency of service (destinations may be reached via a range of possible hubs on flights that leave at different times as well as by direct routings).”\textsuperscript{159}

Giant United Airlines offers the following service from Los Angeles LAX to New York Kennedy JFK or La Guardia LGA:\textsuperscript{160}

- LAX – JFK
- LAX – SFO – JFK
- LAX – IAD – JFK
- LAX – ORD – LGA
- LAX – DEN – JFK

There are either non-stop flights between these two cities (Los Angeles and New York City) or connections via United Airlines’ US hubs: San Francisco SFO, Washington IAD, Chicago ORD and Denver DEN mostly at the same price. So customers can choose between a wide selection of departure times that fit their schedule.

“Travellers also prefer single-carrier services when it is necessary to change planes because this reduces uncertainty and other transaction costs.”\textsuperscript{161} (i.e. two separate tickets exclude airline liability in case of misconnection, as passengers have two independent contracts with different airlines).

Studies made after Deregulation in the US revealed interesting real price figures between different kind of hubs. Although the purpose of the study was to show the changes in fares, these figures give an interesting insight of real costs of air travel between the various forms of hubs:

\textsuperscript{158} see Pompl (1998), p.338  
\textsuperscript{160} Information taken from CRS Amadeus Reservation System  
<table>
<thead>
<tr>
<th>Market type</th>
<th>Real price (US cents per mile)</th>
<th>1979</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large hub – large hub</td>
<td>4.4</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Large hub – medium hub</td>
<td>4.7</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Large hub – small hub</td>
<td>4.9</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Large hub – non hub</td>
<td>5.3</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Medium hub – medium hub</td>
<td>4.9</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Medium hub – small hub</td>
<td>5.1</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Medium hub – non hub</td>
<td>5.5</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>Small hub – small hub</td>
<td>5.4</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>Small hub – non hub</td>
<td>5.7</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>Non hub – non hub</td>
<td>6.2</td>
<td>5.8</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Real Price of Hubs \(^{162}\)

Finally airports - and especially hubs - create, attract and stimulate business as well as its region. Hub might be an important reason why corporation decide to settle in (or at least close to) a city. Their existance can easily boost a company with the help of a global air-link or even influence investment decisions.

Figure 10: How Important was Frankfurt Airport and Lufthansa's Hub for Your Investment Decisions and Choices of Location in Favour of the Rhein-Main Region? \(^{163}\)


\(^{163}\) Lufthansa Konzern (2004b), in:
Lufthansa asked companies around Frankfurt Airport about the importance of direct flights. About 78% of the interviewees consider direct flights out of Frankfurt as very important.

Without the advantages that an airport or hub offers, companies are more likely tempted into moving to any alternative location.\(^{164}\) Attracting large corporations guarantees constant income as a result of rising demand.

### 4.1.2. Disadvantages of the Hub-and-Spoke System

Although the number of advantages a hub creates is very long, we also have to consider the disadvantages it causes: \(^{165}\)

**a) Flight delays and reduction of comfort**

Travelling via a hub extend travel time compared to direct flights. Changing flights reduces the comfort of travel. \(^{166}\)

**b) Fluctuating demand of capacity**

Before and after the peak period personnel as well as infrastructure capacities are not fully stretched and therefore cause additional costs. \(^{167}\)

**c) Air traffic control**

During peak time numbers of arrivals and departures increase rapidly. Capacities of the airport infrastructure and personnel capacities are overloaded. \(^{168}\)


\(^{166}\) see Mayer (2000), p. 27

\(^{167}\) see Mayer (2000), p. 28

\(^{168}\) see Mayer (2000), p. 27
d) Increasing landing and handling fee

Airport authorities improve infrastructure in order to meet the high standard an international hub requires. However, “the hub airport responds to price increases of airlines by increasing its own price. The same holds true for its response to price increase of other airports.” As monopolies, airports have been able to pass on the costs of excess capacity to the carriers in the form of higher charges – costs that few of today’s financially unstable airlines can afford (i.e. San Francisco airport raised landing and terminal charges by 23.8%).

171 see Gazvinian (2002), p. 55
172 see Mayer (2000), p. 29

e) Ground infrastructure

“The fact is that operating without a hub can translate into enormous savings, since airlines do not have to fund the staff and infrastructure necessary to accommodate connecting traffic.”

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f) Critical public opinion towards environmental pollution

Noise, car traffic and air pollution are the direct consequence of increasing aircraft traffic at a hub.

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However, “the fact that a hub is dominated by a single carrier does not constitute a monopoly position because people can opt for alternative routings. The hubs effectively compete with each other for” 174 transit traffic.

Monopolist’s flight frequency, traffic volumes and aircraft size are inefficiently low according welfare analysis.175

As the hub airline dominates the hub, there is a de facto market partitioning between flag carriers. Very few routs exhibit more than two airlines.176

| Airline     | City        | Hub Airport | Airline's percentage of hub departures
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>in 1999</td>
</tr>
<tr>
<td>SAS</td>
<td>Copenhagen</td>
<td>Kastrup</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Stockholm</td>
<td>Arlanda</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Oslo</td>
<td>Garremoen</td>
<td>43</td>
</tr>
<tr>
<td>Finnair</td>
<td>Helsinki</td>
<td>H.-Vantaa</td>
<td>64</td>
</tr>
<tr>
<td>British Airways</td>
<td>London</td>
<td>Heathrow</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gatwick</td>
<td>64</td>
</tr>
<tr>
<td>Lufthansa</td>
<td>Frankfurt</td>
<td>Rhein-Main</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Munich</td>
<td>F.J.Strauss</td>
<td>50</td>
</tr>
<tr>
<td>KLM</td>
<td>Amsterdam</td>
<td>Schipol</td>
<td>44</td>
</tr>
<tr>
<td>Iberia</td>
<td>Madrid</td>
<td>Barajas</td>
<td>55</td>
</tr>
<tr>
<td>Air France</td>
<td>Paris</td>
<td>C.D.Gaulle</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orly</td>
<td>47</td>
</tr>
<tr>
<td>Alitalia</td>
<td>Rome</td>
<td>Fiumicino</td>
<td>53</td>
</tr>
</tbody>
</table>

Table 6: Selected Airlines’ Hub Domination in 1999 and 2000 177

In terms of alliance foundation and –monopoly it has to be noted that an “alliance increases traffic and reduces fares on spoke-to-spoke markets; whereas ... on hub-to-hub markets ... decreases traffic and increase fares for travel between hubs.” 178

The majority of European airports depend on one main carrier, exceeding 50% of flight share. In Asia only Bangkok exceeds with 51%. At the other airports airline monopoly is not yet present.179

175 see Brückner (2002), p.19
176 see Fridström (2003), p. 24
177 Fridström (2003), p.26
178 Bilotkach (2002), p.2
179 see The Boston Consulting Group (2004), p.16
Figure 11: Main Carriers at European and Asian Airports\(^\text{180}\)

i) Price increase

In order to attract transit passengers, airlines use a common strategy of indirect flights’ cross-subsidization with the help of direct flights out of their hubs. (Business) Passengers have to accept a “hub premium” for a better “service” and higher number of destination, which is used to reduce feeder flight fares.

In practice, the price charged on a leg can even exceed the price charged on a path including the leg, as interhub competition and lack of competition on spoke markets exist. An airline compensates passengers with higher frequencies or via the price for indirect travels. Besides, according K. Button being no hub has the advantage of cheaper ticket fares, but less numbers of direct flights on the other hand. Finally, the creation of an alliance increases fares for travel between hubs of the newly formed partnership, decreases fares for travel on the spoke-to-spoke market and leaves all other fares unchanged.

4.1.3. Critical Review

Hub and spoke networks bring benefits to all types of passengers (business as well as leisure). Larger aircraft and therefore better level of comfort, lower seat-mile costs, higher frequencies and lower fares are the positive results of a network that is based upon a hub and spoke principle. However, in case of airport or hub domination by single airlines, fares will increase, as an effect of monopoly power.

“Compared to the model of point-to-point routing the hubbing system enables airline companies to offer flights even to smaller regional airports or destinations with lower passenger and cargo flow.”

Competitive connecting procedure reduces transfer times and increases customer service (travel comfort). In case passengers face longer transfer connections, high yield passengers have to be attracted and entertained with the help of unique lounges or other products: Virgin Atlantic’s Clubhouse at London Heathrow for instance offers music room, library, beauty salon, video-games area plus different food and drink

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184 Fauksa (2003), p.31
options. Primarily hubs accommodate such facilities. In addition to lounges, a wide range of shopping and business facilities characterize hubs, so travellers can find entertainment to kill time or simply work. Coordination of flight schedules within an alliance or the share of facilities at the hubs (check-in counters, transfer desks, lounges,...) makes travel easier and more attractive to the passengers.

Flying via hubs, however, results in longer travel time. Bundling of flights effects traffic congestions and flight delays. It depends on the priority of the departing flight, if the aircraft waits for transfer passengers or not.

As flights with the shortest minimum connecting time (MCT) sell best, airlines are interested to limit MCTs for their hubs. EU-law regulates ranking of flight display on CRS computer reservation systems: On top of the screen, the system has to show non-stop flights assorted according departure times, followed by direct-(one-stop)-flights without a change of the aircraft and connecting flights. The latter must be sorted in obedience to total travel time. In case of a little delay, however, passengers are not able to reach their connecting flights and airlines have to rebook them. The consequences are dissatisfaction, anger, stress, decrease of comfort and finally avoidance of the hub, where the irregularity has happened.

4.2. Criteria Affecting the Choice of Airports

Customers can choose between a wide selection of airports. Competition has become tougher than it was in the past, when each city had only one main airport. International air travel has increased, slots have become very rare at most airports and congestion in the air as well as on the ground have got worse. Facility extension or creation has become the logical result of this booming industry. Some cities like - New York or London - have three airports or even more (New York Kennedy, La Guardia, Newark respectively London Heathrow, Gatwick, Stansted, City, Luton). Therefore it is not always a question of the home carrier - who dominates flights out of a city - why passenger choose a certain airport.

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185 see Virgin Atlantic (2004), in: www.virgin-atlantic.com/engb/whatsonboard/clubhouse/lhrclubhouse.jsp
186 Neutral search for flights with the help of CRS computer reservation systems like Amadeus, display flights with the shortest travel time first
187 see Sterzenbach (1996), p.65
Several factors influence the decision about departure and arrival airport. The most important parameters of competition are: 188

- Number of daily flights (cross border European or intercontinental flights)
- Number of international airlines offering flights from the appropriate airport
- Accessibility with ground transport facilities including ease of operation
- No – or at least limited - night traffic restrictions
- Level and structure of aeronautical infrastructure charges (departure/arrival tax, ground handling fee, etc.)
- Level of security (departure/arrival area, passenger and baggage checks)
- Additional service infrastructure (hotel, shops, cultural sights, communication centres)
- Slot availability and reduced delays due to Air Traffic Control (ATC)

4.2.1. Passengers’ Perspectives

Passengers must decide on both an airline and an airport for their travel. From their point of view, the following factors are relevant, when it comes to choose an airport for the journey: 189

- Destinations of flights
- Flight fare
- Flight availability and timing
- Frequency of service
- Image and reliability of an airline
- Airline alliance policy and frequent flyer programme
- Surface access costs to the airport
- Ease of access to the airport
- Car parking costs
- Range and quality of shops, catering and other commercial facilities
- Image of the airport and ease of use.

188 see Aberle (2003), p.35
189 see Graham (2003), p.184
A survey made in 1998/99 at London Heathrow and Gatwick airport clearly shows the reasons why passengers chose one airport rather than the other.

<table>
<thead>
<tr>
<th>Reason for choice</th>
<th>London Heathrow</th>
<th>London Gatwick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near home</td>
<td>12,8 %</td>
<td>20 %</td>
</tr>
<tr>
<td>Flights/package available</td>
<td>38 %</td>
<td>51,3 %</td>
</tr>
<tr>
<td>Connecting flights</td>
<td>19 %</td>
<td>6,8 %</td>
</tr>
<tr>
<td>Near business</td>
<td>6,1 %</td>
<td>2,4 %</td>
</tr>
<tr>
<td>Near leisure</td>
<td>4,5 %</td>
<td>2,4 %</td>
</tr>
<tr>
<td>Economic/cheaper</td>
<td>6,2 %</td>
<td>7,5 %</td>
</tr>
<tr>
<td>Prefer airport</td>
<td>2,7 %</td>
<td>2,2 %</td>
</tr>
<tr>
<td>Timing of flights</td>
<td>4,6 %</td>
<td>2,2 %</td>
</tr>
<tr>
<td>Better surface access</td>
<td>0,1 %</td>
<td>0,7 %</td>
</tr>
<tr>
<td>Other</td>
<td>6 %</td>
<td>4,5 %</td>
</tr>
</tbody>
</table>

Table 7: Passenger Choice Survey London

Several historic studies focus on the subject airport choice. Generally speaking, access time to airport as well as frequency of service from the airport to the desired destination dominate the process of airport preference. A combination of access time and cost finally measure airport access. Views about price signification differ considerably (no influence on business traveller – influence for leisure traveller ...), thus different travellers consider different sets of alternatives. Decision’s hierarchy, however, might depend on various factors, such as travel purpose or sensitivity to price/cost and time. This summary of major findings gives an overview of miscellaneous results.

\[190\] Graham (2003), p. 185
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Variables Considered in Model(s)</th>
<th>Important Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. E. Skinner Jr., 1976</td>
<td>Air carrier level of service measures, ground accessibility measures, flight frequency</td>
<td>Improvements in airport access are the most effective means of capturing more passengers</td>
</tr>
<tr>
<td>G. Harvey, 1987</td>
<td>Airport access time, relative and direct flight frequency</td>
<td>Airport access time and flight frequency provide good approximation of airport choice. Beyond a threshold level, additional direct flights to a destination do not make an airport more attractive</td>
</tr>
<tr>
<td>N. Ashford, M. Benchemane, 1987</td>
<td>Travel time to airport, number of flights per day, air fare</td>
<td>Business travellers most sensitive to airport access time, while leisure travellers are most sensitive to air fare and airport access time</td>
</tr>
<tr>
<td>N. N. Ndoh, D. E. Pitfield, R. E. Caves, 1990</td>
<td>Airport access time, average journey time, average connection time to hub, number of seats, flight frequency</td>
<td>Business travellers value access time the most over any other variable</td>
</tr>
<tr>
<td>J. David Innes, D. H. Doucet, 1990</td>
<td>Ticket type, length of stay, who paid the trip, trip purpose, aircraft type, flying time (direct vs. non-stop)</td>
<td>Type of aircraft plays significant role in airport choice (air travellers are willing to travel far for access to jet service). Passengers prefer direct flights versus connecting, and shorter flights routes.</td>
</tr>
<tr>
<td>A. I. Ozoka, N. Ashford, 1989</td>
<td>Airport access time, flight frequency, air fare</td>
<td>Improving ground access to airport is the best (and possible only) means of increasing an airport’s market share.</td>
</tr>
<tr>
<td>A. Thompson, R. Caves, 1992</td>
<td>Airport access time, flight frequency, air fare, number of seats</td>
<td>Those departing from origins closer to the airport are more sensitive to access time than those living further away.</td>
</tr>
</tbody>
</table>
### Table 8: Airport Choice – Historic Overview of Various Authors

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Variables</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Furuichi, F. Koppleman, 1994</td>
<td>Access travel cost valued more highly than line-haul travel cost. Both business and pleasure travellers have very high values of access and line-haul time, as well as flight frequency.</td>
<td></td>
</tr>
<tr>
<td>R. Windle, M. Dresner, 1995</td>
<td>Airport access time and flight frequency are significant. Airport experience comes out to be significant, but could be proxy for omitted variables.</td>
<td></td>
</tr>
<tr>
<td>E. Pels, P. Nijkamp, P. Rietveld, 2001</td>
<td>Passengers first choose departure airport, then choose airline is statistically favourable to the opposite. Little difference between business and leisure travellers.</td>
<td></td>
</tr>
<tr>
<td>E. Pels, P. Nijkamp, P. Rietveld, 2003</td>
<td>Access time most significant variable in airport choice.</td>
<td></td>
</tr>
</tbody>
</table>

#### 4.2.2. Airlines’ Perspectives

Even airlines try to take advantage of airports’ competition. The impact of aeronautical charges on airline operations has become an crucial factor since 11th Sept. 2001. Economic recession, poor financial position as well as reduced passenger demand force airlines to measure their external costs such as airport charges. Passengers expect high level of quality (in relation to the fare) and they have become choosy. Therefore the question of airport selection is more important than ever and depends on:  

---

○ Catchment area and potential demand
○ Competition
○ Airport fees and availability of discounts
○ Other airport costs (i.e.: fuel, handling)
○ Ease of transfer connections
○ Environmental restrictions

○ Slot availability
○ Network compatibility
○ Marketing support
○ Range and quality of facilities
○ Maintenance facilities
○ Airport efficiency

This selection includes important aspects for all airports and airlines, as it causes “a strategic advantage at their hub airports compared to their non-hub competitors” 193, since “potential passengers are more likely to choose itineraries where the origin airport is a hub.” 194 However, price competition between airports apparently has little effect on the airline’s choice where to locate its hub. Hubs will be located in nodes with the highest level of demand. Consequently nodes that compete for a hub position should try to increase their market share at the expense of alternative hubs.195

4.3. Approach to Hub Measurement

Each single area has its own characteristic. The USA is characterized through its high “volume of traffic and seize of the airlines.” 196 “The US majors’ short haul fleet is double that of the AEA and the Orient airlines combined.” 197 Due to the greater distances they have to cover throughout their networks, the Orient airlines own a large number of long-range aircraft such as Boeing B747s, B777s or Airbus A340s, Airbus A330s. Additionally they have attracted attention by firm orders of the Airbus A380.

Europe, however, as a more compact and centre concentrated airport scenario, shows a 860 km average journey distance for international traffic. In contrast to Europe, average journey distance in the USA is 1410 km and 1350 km in the Orient.198

“Both US and Orient airlines enjoy particularly low infrastructure charges – en-route and landing fees – than the Europeans. In case of the Far East carriers, this accounts for almost half the unit costs differential.” 199

193 Gayle (2004), p.17
194 Gayle (2004), p.17
195 see Pels / Nijkamp / Rietveld (1997), p.15
196 AEA (1995), p. 16
197 AEA (1995), p. 16
198 see AEA (1995), p. 17
199 AEA (1995), p. 17
The local traffic potential of an airport is determined through:

- natural factors, it cannot directly influence
- range and supply-policy of services

Legal basic conditions limit scope for action.

<table>
<thead>
<tr>
<th>Natural determination factors:</th>
<th>Supply-political determination factors</th>
<th>Supply-political determination factors</th>
<th>Natural determination factors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic structure of the airport’s region</td>
<td>Quality of airport’s performances</td>
<td>Quality of airport’s performances</td>
<td>Geographic location within the patterns of international air traffic movement</td>
</tr>
<tr>
<td>Density of population and social demographic structure of the airport’s region</td>
<td>Airport’s Pay policy</td>
<td>Airport’s Pay policy</td>
<td>Economic structure within the airport’s original catchment area</td>
</tr>
<tr>
<td>Geographic location</td>
<td>Efficiency of the connecting feeder modes on ground</td>
<td>Efficiency of the connecting feeder modes on ground</td>
<td>Density of population and social economic structure of the airport’s original catchment area</td>
</tr>
</tbody>
</table>

Table 9: Local Traffic Potential

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200 see Wolf (2003), p. 14
201 Wolf (2003), p.14
Figure 12: European Airport Landscape

Figure 13: Asian Airport Landscape

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### World's biggest airports

<table>
<thead>
<tr>
<th></th>
<th>Passengers</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Atlanta</td>
<td>41.396.286</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Chicago</td>
<td>36.391.038</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>London</td>
<td>32.254.174</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Tokyo</td>
<td>29.529.791</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Los Angeles</td>
<td>29.362.911</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>Dallas/Ft. Worth</td>
<td>29.261.888</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>Paris</td>
<td>24.377.551</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Frankfurt</td>
<td>24.303.089</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: World’s Airport Ranking in Terms of Passengers 1st Quarter 2004

### Air Traffic Measurement

<table>
<thead>
<tr>
<th>Airport</th>
<th>Mio. passengers</th>
<th>Departures/Arrivals</th>
</tr>
</thead>
<tbody>
<tr>
<td>London Heathrow LHR</td>
<td>65</td>
<td>467</td>
</tr>
<tr>
<td>Frankfurt</td>
<td>49,3</td>
<td>447</td>
</tr>
<tr>
<td>Paris</td>
<td>48,3</td>
<td>518</td>
</tr>
<tr>
<td>Amsterdam</td>
<td>36,6</td>
<td>432</td>
</tr>
<tr>
<td>Rome</td>
<td>26,3</td>
<td>283</td>
</tr>
<tr>
<td>Zurich</td>
<td>22,6</td>
<td>325</td>
</tr>
<tr>
<td>Stockholm</td>
<td>18,5</td>
<td>279</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>18,4</td>
<td>304</td>
</tr>
<tr>
<td>Dubai</td>
<td>16,0</td>
<td>394</td>
</tr>
</tbody>
</table>

Table 11: Air Traffic Measurement

### 4.3.1. Strategic Quality of a Hub

The strategic quality of a hub depends on various factors:

#### 4.3.1.1. Geographic Centrality

“The more central a hub is to its flows it is serving, the less route deviation it imposes.”

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204 Reischl (2004), p.46
205 Dubai International Airport (2004), in: http://213.42.52.88/DIAInternet/About+DIA/Statistics/ ;
207 Holloway (2003), p.380
4.3.1.2. **Strength of Feed**

“Any type of network grows stronger with each connection that is added to it.” \(^{208}\)

**a) Regional feed**

Regional carriers link secondary and tertiary points more efficiently due to better suited fleet and cost structures to short haul routes. Lufthansa uses service from its regional partners: Air Dolomiti, City Line, Eurowings, Augsburg Airways and Contact Air.\(^ {209}\)

**b) Feed for long haul international services**

“Significant international hubs generally rely on either or both regional and short-/medium-haul mainline feed. Emirate’s extensive feed from the Indian subcontinent into its Dubai hub allows it to operate a daily non-stop Dubai-Birmingham (UK) service tapping ethnic O&D markets.” \(^ {210}\)

**c) Alliance feed**

Passengers are exchanged within the alliance partners’ networks throughout their hubs. This determines the need for strong alliance partners. “Around $500 million of Delta’s approximately $16 billion revenue in 2000 was attributable to alliance flows.” \(^ {211}\)

**d) Intermodal feed**

It is common to sign a cooperation-agreement with speed train services (i.e. air-rail code share into Newark EWR: Continental and Amtrak \(^ {212}\); United has code share ground links with SCNF French Rail ex Paris CDG within France and with Thalys International Rail from Paris CDG to Brussels \(^ {213}\); Lufthansa has a cooperation with Deutsche Bahn DB ICE trains between Frankfurt and Munich or Berlin and Cologne and Hamburg: Coach nr. 12 is exclusively reserved for Lufthansa passengers.

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\(^{208}\) Holloway (2003), p.382
\(^{209}\) see Lufthansa (2004c), p.8
\(^{210}\) Holloway (2003), p.383
\(^{212}\) see Holloway (2003), p.384
\(^{213}\) see United Airlines (2001), p.84f.
Each seat has a Lufthansa seat number corresponding with seats on board of an aircraft (1A, 9F,...) \(^{214}\) or with trucks to feed freight. Additionally airlines offer code shares with bus companies in case ultra short haul flights are not reasonable enough: Lufthansa introduced bus services from Innsbruck and Salzburg into Munich or between Frankfurt and Strasbourg \(^{215}\), Austrian Airlines had a bus service from Almaty ALA to Bishkek FRU or still offers bus service between Montreal and Ottawa together with its code share partner Air Canada \(^{216}\). United Airlines offers extensive bus groundlink from its hubs Denver, Chicago O’Hare, San Francisco but also from Portland PDX \(^{217}\). Generally the airline checks through the baggage and the passenger receives a boarding pass until his final destination. Additionally members of the frequent traveller programme earn miles when using such code share partners on ground. Both intermodal feed and straight O&D competition from trains will help to release slots at those hubs that are well connected to the rail network.

### 4.3.1.3. Local Traffic

Besides the presence of connecting passengers, local traffic is the basis of a successful hub. “An ideal minimum of total hub traffic range from 25 to 40 per cent. Insufficient local traffic was one of the reasons behind withdrawal from some of their secondary hubs by US majors in the 1990s. Absence of strong, high-yield local traffic may leave a hub over-dependent on flow traffic which can in some cases be relatively low yield business if other airlines are competing to attract it over alternative hubs.” \(^{218}\) Small home markets make it difficult for airlines, regardless of quality or service. In case of a connecting flight (in cooperation with alliance partners), the profit is smaller, as every participating airline receives a prorate of the ticket fare.

This sample ticket was issued for the route Linz – Vienna – Washington D.C. on Austrian Airlines (OS962/OS93) with a connection on United Airlines from Washington D.C. to Chicago (UA563). The homebound travel with Lufthansa originated from Washington D.C. to Frankfurt and ended in Linz (LH419/LH3522). The total cost of the ticket was EUR 725,- excluding and EUR 935,- including all taxes and surcharges (Fare Basis: MLPX/HLSX6MW). It shows the prorate each airline gets for its own leg. Connecting flights like Linz – Vienna or Frankfurt – Vienna have a value of EUR 47,-

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\(^{214}\) see Lufthansa (2001b), p.11 and p.362  
\(^{215}\) see Lufthansa (2001b), p.298  
\(^{216}\) see Austrian Airlines (2004), p.15  
\(^{217}\) see United Airlines (2001), p.74 ff.  
\(^{218}\) Holloway (2003), p.385
each (for the respective airline). The carrier operating the long-range flight absorbs the rest of the ticket price.

<table>
<thead>
<tr>
<th>DOCNO</th>
<th>257 83XXXXX69 0</th>
<th>257 83XXXXX70 CPNNO</th>
<th>PROTYP 4 Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION SALE</td>
<td>COUPON 01</td>
<td>COUPON 02</td>
<td>COUPON 03</td>
</tr>
<tr>
<td>FROM/TO</td>
<td>LNZ / VIE</td>
<td>VIE / IAD</td>
<td>IAD / ORD</td>
</tr>
<tr>
<td>CARRIER/CLASS</td>
<td>OS / M</td>
<td>OS / M</td>
<td>UA / M</td>
</tr>
<tr>
<td>FAREBASE/TD</td>
<td>MLPX</td>
<td>MLPX</td>
<td>MLPX</td>
</tr>
<tr>
<td>FB/TD PRORATE</td>
<td>PRT/ESAC</td>
<td>PROV.CUR/AMT USD</td>
<td>PRORATE EUR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>58,83</td>
<td>348,01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47,19</td>
<td>279,19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47,19</td>
<td>348,01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40,12</td>
<td>237,31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50,01</td>
<td>296,81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40,12</td>
<td>237,31</td>
</tr>
<tr>
<td>FARECALC:</td>
<td>LNZ OS X/E/VIE OS X/WAS UA CHI M472.85/-WAS LH X/FRA LH LNZ M407.15NUC880.00END</td>
<td>ROE0.823772XT EUR8.72AT3.85Y8.35Y10.56US10.56US2.39X5.39XY3.86Y3.86Y40.00 YQ10.43RA45.00XP3.47XF</td>
<td>IAD4.5</td>
</tr>
</tbody>
</table>

Table 12: Ticket Prorate

Ticketnumbers show only first and last digits, according code of privacy.

4.3.1.4. Hub Dominance

Hub dominance is measured through:

- Percentage of aircraft departures
- Slot control
- Gate control
- Terminal space
- Terminal space

Hub dominance finally results in:

- "Supply-curve" effects
- Economies of scope
- Economies of density
- High station resource utilisation
- Premium yields from local traffic
- Local marketing strength
- Protection behind a significant structural barrier to enter (especially at slot-constrained airports)

\(^{219}\) compiled by the author according Austrian Airlines ticket scanning system

\(^{220}\) see Holloway (2003), p.385
“Dominant carriers charge a higher price to passengers originating from its hub, without being punished for it by lower demand.” 221 Lijesen, Rietveld and Nijkamp’s study show, that Lufthansa, Swissair and Air France charge significant premiums for direct flights from their hubs. 222 Button and Stough add, that “the fact that a hub is dominated by a single carrier does not constitute a monopoly position because people can opt for alternative routings. The hubs effectively compete with each other for” 223 transit traffic. There is no doubt, that the home carrier not only serves the largest number of destinations, but it also does it at a higher frequency than its competitors do (with the competitor’s hub as the sole exception).

In the United States half of the biggest airports had a dominant carrier with 70% or more of the passenger traffic and at most remaining airports the major carriers had a 50-70% share by the late 1990s. 224 In Europe, however, the dominance was not so clear. At only two of the major European airports does the base airline offer more than 65% of the seats available. This may be because all the European airports are also international gateways. Further, European airlines generally operate only one single hub, though some are trying to develop a second one. 225 In Asia share of main carrier never exceeds 50% - except Bangkok reached 51% in 2004 – with an average value of 40% at major airports. 226

<table>
<thead>
<tr>
<th>Airport</th>
<th>% of flights/frequencies by lead 3 carriers in 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHR</td>
<td>BA: 39,8%  BD: 13,2%  LH: 4,0%</td>
</tr>
<tr>
<td>FRA</td>
<td>LH: 59,1%  BA: 3,6%  OS: 3,0%</td>
</tr>
<tr>
<td>CDG</td>
<td>AF: 5,6%  BA: 5,4%  LH: 4,8%</td>
</tr>
<tr>
<td>AMS</td>
<td>KL: 42,9%  BA: 5,4%  U2: 4,6%</td>
</tr>
<tr>
<td>BKK</td>
<td>TG: 44,6%  PG: 9,2%  CI: 2,9%</td>
</tr>
<tr>
<td>HKG</td>
<td>CX: 25,0%  KA: 12,8%  MU: 8,1%</td>
</tr>
<tr>
<td>SIN</td>
<td>SQ: 39,7%  MH: 6,9%  MI: 6,4%</td>
</tr>
<tr>
<td>NRT</td>
<td>JL: 22,0%  NH: 12,8%  NW: 11,8%</td>
</tr>
<tr>
<td>HND</td>
<td>NH: 39,9%  JD: 29,1%  JL: 22,5%</td>
</tr>
</tbody>
</table>

Table 13: Airports’ Main Carriers 227

221 Lijesen / Rietveld / Nijkamp (2000), p.2
222 see Lijesen / Rietveld / Nijkamp (2000), p.15
225 see Doganis (2002), p.256
226 see The Boston Consulting Group (2004), p.16
### Share of passenger service at main European hubs by leading global alliances

<table>
<thead>
<tr>
<th>Airport</th>
<th>One-world</th>
<th>Sky Team</th>
<th>Star Alliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amsterdam Schipol</td>
<td>6,6 %</td>
<td>58,9 %</td>
<td>8,1 %</td>
</tr>
<tr>
<td>Paris Charles de Gaulle</td>
<td>8,8 %</td>
<td>55,9 %</td>
<td>12,5 %</td>
</tr>
<tr>
<td>Frankfurt Rhein-Main</td>
<td>6,9 %</td>
<td>4,6 %</td>
<td>65,9 %</td>
</tr>
<tr>
<td>London Heathrow</td>
<td>46,1 %</td>
<td>5,3 %</td>
<td>26,6 %</td>
</tr>
<tr>
<td>Munich FJ Strauss</td>
<td>3,8 %</td>
<td>5,7 %</td>
<td>55,0 %</td>
</tr>
</tbody>
</table>

Members of the Wings alliance (KLM, Alitalia, Continental and Northwest) are now members of the Sky Team. Figures already include these new airlines

Table 14: Alliance Hub Dominance

Once an airline has established dominance, it is very difficult for the others to set up a rival hub at the same airport. The hub operator occupies most of the terminal gates and runway slots are limited. Moreover, the home carrier is hub’s best client and major source of financing, with the result to deter entry or even hinder competitors.

#### 4.3.1.5. Expansion Capacity

“Whilst capacity constrains do impose a barrier to entry and so protect incumbents, the lack of terminal space and/or runway slots might be a significant strategic constraint” (i.e. London Heathrow, Frankfurt, New York JFK). Hong Kong closed its old airport Kai Tak and opened Check Lap Kok 1998 due to limit of space. Examples exist all over the world, where airports authorities made huge investments in order to be fit for the future (Milan Malpensa MXP, Athens’ Eleftherios Venizelos Airport ATH, Seoul Incheon ICN or Buenos Aires’ Ezeiza EZE).

#### 4.3.1.6. Attractiveness to Passengers

What really matters for the passengers is hard to measure. Whether it is price or any physical factor - lounges, check-in, leisure / business facilities - or even the range as well as timing of connections offered, the reasons for choosing a hub are most different.

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229 see Doganis (2002), p.257
230 see Lijesen / Rietveld / Nijkamp (2000), p.3 f.
4.3.1.7. Hub Efficiency

Minimum connecting time MCT measures the efficiency of a hub. It is also an important sales criterion: If you call up any flight – neutral search - on a Computer Reservation System CRS screen, the system shows the flight with the shortest elapsed time on the first lines, then tight connections, finally double connections. Very fast non-stop flights lead them all. Therefore, airlines have to limit total travel time. As aircraft speed is a fixed criterion, only ground handling can be reduced, especially the minimum connecting time MCT.

<table>
<thead>
<tr>
<th>Airport</th>
<th>Minimum Connecting Time in minutes\textsuperscript{233}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copenhagen CPH</td>
<td>30 – 45</td>
</tr>
<tr>
<td>Frankfurt FRA</td>
<td>45</td>
</tr>
<tr>
<td>London LHR</td>
<td>45 – 130</td>
</tr>
<tr>
<td>Paris CDG</td>
<td>45 – 200</td>
</tr>
<tr>
<td>Milan MXP</td>
<td>40 – 100</td>
</tr>
<tr>
<td>Munich MUC</td>
<td>30 – 45</td>
</tr>
<tr>
<td>Madrid MAD</td>
<td>45 – 100</td>
</tr>
<tr>
<td>Rome FCO</td>
<td>45 – 100</td>
</tr>
<tr>
<td>Vienna VIE</td>
<td>30</td>
</tr>
<tr>
<td>Zurich ZRH</td>
<td>40</td>
</tr>
<tr>
<td>New York JFK</td>
<td>100 – 200</td>
</tr>
<tr>
<td>Washington IAD</td>
<td>45 – 130</td>
</tr>
<tr>
<td>Chicago ORD</td>
<td>50 – 130</td>
</tr>
<tr>
<td>Bangkok BKK</td>
<td>30 – 200</td>
</tr>
<tr>
<td>Singapore SIN</td>
<td>100</td>
</tr>
<tr>
<td>Tokyo Narita NRT</td>
<td>30 – 210</td>
</tr>
<tr>
<td>Dubai DXB</td>
<td>20 – 100</td>
</tr>
<tr>
<td>Osaka KIX</td>
<td>30 – 130</td>
</tr>
<tr>
<td>Hong Kong HKG</td>
<td>100 – 200</td>
</tr>
</tbody>
</table>

Table 15: Minimum Connecting Times MCT\textsuperscript{234}

\textsuperscript{232} see Canaday (2001b), p.61
\textsuperscript{233} as some airports have several terminals a range of the lowest and highest value is displayed only; lowest values of two mostly display domestic connections. Minimum connecting times therefore depend on the type of travel (domestic - international) and the need for terminal change.
\textsuperscript{234} Compiled by the author according CRS Amadeus Reservation System data
This means that customers - who use CRS Computer Reservation Systems like Amadeus - see connections via a hub with a short minimum connecting time first and are therefore eager to choose this flight rather than competitive ones.

However, a short minimum connecting time creates problems too. Sometimes baggage does not make the connection, as the airport distributes it through an automatic centre under or besides the terminal. Passengers sometimes receive their bags with the next arriving flight or even later. Passport control might slow down the connecting process and result in misconnections. In case of insufficient infrastructure passengers also might not be able to reach their connecting flight on time. At some airports aeroplanes are not able to dock on gates or skybridges and are dependent on buses to bring passengers to the gates (this process is time-consuming). Airlines can limit such irregularities, when they move under one roof. They proximate their gates and check-in areas close to each other, in order to avoid long transfers for baggage and passengers. This, unfortunately, is not always the case or possible. Considering selected airports of the Star Alliance allows an interesting insight:

\[\text{\textsuperscript{235} compiled by the author according CRS Amadeus Reservation System data}\]
\[\text{\textsuperscript{236} see Star Alliance (2002), p.92 ff.}\]
<table>
<thead>
<tr>
<th>Location</th>
<th>Airlines and Terminals</th>
</tr>
</thead>
</table>
| Los Angeles LAX: | NH, LH, MX, SQ, TG, RG: Tom Bradley Terminal  
AC, NZ: Terminal 2  
UA: Terminal 6, 7, 8 |
| London LHR: | AC, NZ, NH, SK, SQ, TG, UA, RG: Terminal 3  
LH, OS: Terminal 2  
BD: Terminal 1 |
| Newark EWR: | AC, UA: Terminal A  
LH, MX, SK, SQ: Terminal B |
| New York JFK: | AC, UA: Terminal 7  
OS, LH, SQ: Terminal 1  
NH: Terminal 3  
RG: Terminal 4 |
| Paris CDG: | AC, OS: Terminal 2  
BD, LH, NZ, NH, SK, SQ, TG, UA, RG: Terminal 1 |
| Tokyo NRT: | AC, NZ, NH, OS, LH, SK, TG: Terminal 2  
SQ, UA, RG: Terminal 1 |

Figure 15: Star Alliance Terminal Distribution

Star Alliance transfer busses help passengers to move between terminals are available at: Tokyo Narita NRT and Los Angeles LAX. Additionally airport authorities offer transfer ground services as well.

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237 Compiled by the author according Star Alliance (2002)
238 see Star Alliance (2002), p.93, p.116
“Long MCs at a hub can feed through into less efficient resource utilisation.” 239 “On-line schedule co-ordination can be measured using a connectivity ratio, which shows the degree to which linkages are more than purely random. It allows for varying volumes of flights operated and different minimum connect times at each of the hubs.” 240 Austrian, Swissair and KLM convince with highly integrated schedules. The graph also shows that British Airways, Alitalia and Air France are “way behind with connections that were little more than random. A ratio of 1.0 suggests connections are no better than would be expected with random pattern of schedules. A ration of 2.0 suggests twice as many connections would be achieved on this random basis.” 241

<table>
<thead>
<tr>
<th>Airport</th>
<th>Hub airline</th>
<th>Connectivity ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1989</td>
</tr>
<tr>
<td>Vienna</td>
<td>Austrian</td>
<td>2.2</td>
</tr>
<tr>
<td>Amsterdam</td>
<td>KLM</td>
<td>1.9</td>
</tr>
<tr>
<td>Zurich</td>
<td>Swissair</td>
<td>1.9</td>
</tr>
<tr>
<td>Frankfurt</td>
<td>Lufthansa</td>
<td>1.6</td>
</tr>
<tr>
<td>Brussels</td>
<td>Sabena</td>
<td>1.6</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>SAS</td>
<td>1.4</td>
</tr>
<tr>
<td>Rome</td>
<td>Alitalia</td>
<td>1.2</td>
</tr>
<tr>
<td>London Heathrow</td>
<td>British Airways</td>
<td>1.1</td>
</tr>
<tr>
<td>London Gatwick</td>
<td>British Airways</td>
<td></td>
</tr>
<tr>
<td>Madrid</td>
<td>Iberia</td>
<td>1.0</td>
</tr>
<tr>
<td>Paris CDG</td>
<td>Air France</td>
<td>0.9</td>
</tr>
<tr>
<td>Athens</td>
<td>Olympic</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Table 16: European Hub Performance, 1989-95 242

239 Holloway (2003), p. 386
240 Doganis (2002), p.258
241 Doganis (2002), p.258
242 Doganis (2002), p.259
In terms of minimum connecting time airlines’ and airports’ expectations seem to clash with each other. As discussed above, little MCT allows the airport to be competitive. However, to maximize retail revenues, “operators will have to persuade carriers to strike an intelligent balance between their demands for shorter transfer times and the airports’ need to keep passengers shopping for as long as possible. This will ultimately be in both parties’ interests: higher revenues will give operators more leeway to lower carrier charges.”

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244 The Boston Consulting Group (2004), p.29
5. Hypothesis and Analysis

5.1. General Overview and Concept of the Analysis

The main purpose of this paper is to analyse the influence of Dubai International Airport on the European-Asian traffic. It compares transit travel via Dubai to Europe’s prime hubs: Frankfurt, London-Heathrow and Paris CDG with the help of selected parameters (or product features). It is not only a question of the airport itself, but also of the home airline, as passengers choose a combination of both: airlines’ and airports’ features. Consequently this makes it a homogeneous product and it is not possible to examine the airport individually without the home-based airline. According to Doganis’ evaluation, the following parameters help to measure passenger’s travel decision together with the choice of route (implying airport and airline) \(^{245}\): Price (Economy- and Business Class), taxes (which affect the choice of route, as airlines add taxes and other surcharges to the ticket fare), safety, schedule - convenience (including total travel time), connectivity - ratio, comfort-quality-image as well as the airlines’ frequent flyer programme. Additionally this chapter discusses the various customer segments including their individual demands.

As passengers normally choose one airline or one alliance for travel (i.e. Rome – Frankfurt – Bangkok with Lufthansa respectively Star Alliance), there is no need to analyse traffic possibilities and itinerary conjunctions of competitive airlines (i.e. Rome – Frankfurt with Alitalia and Frankfurt – Bangkok with Lufthansa)\(^{246}\). Alliance members harmonize their schedules and fares within the partnership. Travellers normally do not mix competitive alliance products. It does not make sense for them to switch between non-partner carriers. Therefore the study focuses exclusively on the home-alliance. In this analysis, flights via Frankfurt include Star Alliance members only (with Lufthansa or Lufthansa code share flight number), flights via London-Heathrow include One World Alliance (with British Airways or British Airways code share flight number) and flights via Paris CDG Sky Team (with Air France or Air France code share flight number). Evaluation via Dubai embraces Emirates flights or code share flights only, as the airline does not belong to any alliance yet.

\(^{245}\) see Doganis (2002), p. 236 ff.
\(^{246}\) see Doganis (2002), p.255
The paper also uses several internationally recognized travel surveys as a basis of discussion. For example, the 10 million web poll Skytrax is an influential and honoured quality guide for the international aviation industry. 247 Experts and international travellers can cast their votes. International surveys finally approve the ratings.

As a result, the analytical treatments provide a choice of travellers’ considerations and set of determinants.

5.2. Presentation of the European-Asian Air Traffic

5.2.1. The European-Asian Air Traffic in General

“The world air transport is very concentrated. Half of the world’s largest fleet is operated by just 17 largest airlines (of some 650 worldwide) and half of all available seat-kilometre flown by scheduled airlines are focused on the top 6% of routes linking no more than 33 airports. In terms of scheduled passengers-kilometre (PK) carried, we can distinguish: 248

<table>
<thead>
<tr>
<th>Route Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra North American</td>
<td>33,3 %</td>
</tr>
<tr>
<td>North Atlantic traffic</td>
<td>11,6 %</td>
</tr>
<tr>
<td>Intra-Asia</td>
<td>10,6 %</td>
</tr>
<tr>
<td>Intra-Europe</td>
<td>8,5 %</td>
</tr>
<tr>
<td>Europe – Asia travels</td>
<td>7,4 %</td>
</tr>
<tr>
<td>Transpacific flights</td>
<td>6,6 %</td>
</tr>
</tbody>
</table>

European Global Players Air France generated 10% of its traffic from the Middle East, 24% from Europe and 17% from the Asian market (RPK 2002), British Airways: 10% (from the Middle East); 22,1% (from Europe) and 15,3% (from the Asian market), KLM: 8,2%; 13,2% and 24,8%, Lufthansa: 6,5%; 26,3% and 25,8%. 249

In terms of aircraft expansion, the strongest growth area is Asia/Pacific, with a fleet’s cumulative annual growth rate of 8,9% during the 1991-2000 period against 4,1% in Europe and 3,6% in the US. 250

249 see Merrill Lynch (2003b), p.13
250 see Airlinesgate (2004a), in: http://airlinesgate.free.fr/articles/industry3.htm
Merrill Lynch analysed European vs. Asian Load Factor and Year on Year Growth for the year 2002. European carriers reached higher load factors than their Asian competitors. In terms of Year on Year Growth, however, Asian airlines were superior to European airlines by – maximum – 300%.  

![Europe vs. Asia Traffic YoY Growth (%)](image)

Figure 17: Europe vs. Asia Traffic YoY Growth (%)  

The same research revealed interesting figures about Passenger Volume Year on Year Growth and Aircraft Movement Year on Year Growth. In both categories Asian airports were far ahead of the Europeans.  

![Europe vs. Asia Traffic YoY Growth (%)](image)

Figure 18: European vs. Asian Aircraft Movement YoY Growth (%)  

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251 see Merrill Lynch (2003b), p.25  
252 Merrill Lynch (2003b), p.25  
253 see Merrill Lynch (2003b), p.34  
254 Merrill Lynch (2003b), p.34
European vs. Asian Passenger Volume YoY Growth (%)

Figure 19: European vs. Asian Passenger Volume YoY Growth (%)

5.2.2. The European-Asian Air Traffic via Dubai Airport

Dubai International Airport is a rising hub for flights to/from Europe and to/from Asia/Pacific. According OAG analysts the number of frequencies climbed by 12% for Western European flights and 45% for the Asian/Pacific region. In terms of capacity the number of available seats to/from Western Europe increased by 28% and to/from Asia/Pacific by 47% (2004 vs. 2001).²⁵⁶ London is the top destination with the highest number of available seats to/from Dubai Airport (44.000 seats: Febr. 2004). Frankfurt also reached the “Top 10” list with 15.000 seats. From the Asia/Pacific region only Mumbai (20.000) and Singapore (15.000) qualified to be a top destination. All other cities of this list are Arabian destinations.²⁵⁷ Analysis by flight duration revealed that the majority of flights out of Dubai are short haul. This “has enabled the airport to establish itself as one of the most significant hubs in the Gulf.”²⁵⁸

²⁵⁵ Merrill Lynch (2003b), p.34
²⁵⁶ see OAG (2004b), in: http://www.oagdata.com/upload/oagDubaireport.pdf, p.4
Figure 20: Dubai Airport Trend of Available Seats and Frequency- Flights to/from Western Europe

Figure 21: Dubai Airport Trend of Available Seats and Frequency - Flights to/from Asia/Pacific


<table>
<thead>
<tr>
<th>FLIGHT DURATION</th>
<th>FREQUENCIES</th>
<th>AVAILABLE SEATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 hours</td>
<td>38%</td>
<td>30%</td>
</tr>
<tr>
<td>Between 2-5 hours</td>
<td>34%</td>
<td>34%</td>
</tr>
<tr>
<td>More than 5 hours</td>
<td>28%</td>
<td>36%</td>
</tr>
</tbody>
</table>

Table 17: Flights’ Analysis out of Dubai

5.3. Determinants of Measurement: Measurement Elements and Attributes

Generally speaking, “airlines compete on the basis of service quality (frequency), fare and capacity.”

“Customers ... buy airline tickets. And tickets give them a bundle of service features, including check-in service, cabin service, food, in-flight movies, seating, and timely arrival. Some of these features influence a customer’s choice of airline much more than others.” Airlines sell their customers service: the flight itself, defined by:

- The journey, which is the mean of transportation from departure airport to final destination airport within a certain time range and the maximum level of security.
- Number and frequency of departures and arrivals
- Level of comfort in terms of seat comfort, pitch, equipment
- In-flight-service (meals, movies, entertainment,...)
- Ground service (Web or telephone check-in, lounge, e-ticket,...)
- Travel support (Destination information, telephone sales,...)
- General impression of the airline
- Price

All those attributes are the basis of competition in the airline industry, “they are bundles of features, some of which influence customers more than others” implying that consumers have different tastes for each product characteristic. The hierarchy of decision depends on several factors including a passenger’s travel purpose and a passenger’s sensitivity to variables like time or costs.

262 Pels / Nijkamp / Rietveld (1997), p.2
264 see Bresson / Köhne / Westbrook (2003), p.3 f.
Additionally “demographic information such as age and income are likely to be correlated with taste and thus may explain consumers’ choice of differentiated products ... higher income passengers are more likely to choose itineraries covering shorter distances ... that are expected to be more expensive ... compared to lower income passengers. Higher income passengers have a higher opportunity cost of time and thus more willing to pay a higher price for an itinerary that has a more convenient travel schedule.” 266

In order to measure key product features or preferences, a conceptual framework based upon an individual traveller approach has to be designed. Air traveller seeks information from travel agents, airline websites or call centres. Additional information increases the utility of traveller’s choice. “The probability that an individual selects an option is defined as the probability that its utility is larger than the utility of all other alternatives. Travellers seek to maximize air travel utility by choosing the air travel option with the highest utility.” 267 The graph “Travel Choice Framework” should help to show a possible process of choice. Choices as carrier, departure time, fare class are only examples. The latter figure by R. Doganis illustrates an extended list of product features.

An airport’s and airline’s “potential customer will be influenced by five key product features in making travel decisions and, more important, in choosing between airlines. The ultimate aim of product planning is to attract and hold customers from the market segments that an airline is targeting and to do so profitably. Product planning is deciding what product features to offer in each market segment in which an airline is hoping to sell its services or products.” 268

A survey by Scandinavian SAS revealed that departure/arrival times and non-stop/direct service are important, whereas aircraft type is totally insignificant. The International Foundation of Airline Passenger Association found out, that punctuality, convenient schedules and frequency are the most important features. There is, however, a difference of valuation in terms of short/medium or longer sectors: On long-range flights comfort based attributes are preferred to schedule based features. On short/medium flights it is the other way round.269

---

267 Proussaloglou / Koppelman (1999), p.195
There is no doubt that “consumers prefer flights with less stops to flights with more stops when price is the same.” According to an IATA survey carried out in North America, Europe and Asia in 1997, passengers favoured punctuality (65%) and scheduling (52%) over price (37%). This, however, does not say that price is of secondary concern, as cost structures and competitive pricing are always of major importance. Lufthansa asked companies around Frankfurt airport about the significance of direct flights. 78% consider direct flights out of Frankfurt as very crucial.

---

270 Proussaloglou / Koppelman (1999), p.194
271 Bilotkach (2002), p.1
272 see Gilbert / Wong (2002), p. 519
| 1 | Price          | Fare levels and conditions |
| 2 | Schedule-based | Points served and routeings |
|   |                | Frequency                  |
|   |                | Timings                    |
|   |                | Connections                |
|   |                | Punctuality                |
| 3 | Comfort-based  | Type of aircraft           |
|   |                | Interior configuration     |
|   |                | Individual space           |
|   |                | On-board service           |
|   |                | Ground/terminal service    |
|   |                | Airline lounges            |
|   |                | In-flight entertainment    |
| 4 | Convenience    | Distribution/reservations system |
|   |                | Capacity management policy |
|   |                | Seat availability          |
| 5 | Image          | Reputation for safety      |
|   |                | Branding                   |
|   |                | Frequent Flyer programmes/loyalty schemes |
|   |                | Promotion and advertising |
|   |                | Market positioning         |

Table 18: Key Product Features

The fact that the airport in question is an airline’s hub, flight schedule offered by this specific airline is more convenient as well as customer’s higher tendency towards hub airline’s frequent flyer programme are all samples of possible reasons, why passengers are more likely to choose a specific hub airline.\(^{275}\)

Airline comparisons assist to evaluate price, punctuality, safety or frequent flyer programmes. Several magazines or global marketing information service companies (i.e.: J.D.Power) award official reputation regularly to the airlines and airports. The same applies to "soft" attributes like efficient check-in \(^{276}\) or friendliness \(^{277}\).

\[^{274}\text{Doganis (2002), p. 237}\]
\[^{276}\text{Efficient check-in measurement with the help of time stamps for premium and economy customers. In-house Quality Managers publish corporate standards within an airline/alliance}\]
\[^{277}\text{Passenger surveys made on board and on the ground allow to rate the level of comfort}\]
In 1999 business travellers from around the world gave an idea about their preferences when it came to choosing an airline:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price:</strong></td>
<td></td>
</tr>
<tr>
<td>Cheapest fare</td>
<td>8</td>
</tr>
<tr>
<td><strong>Schedule – based:</strong></td>
<td></td>
</tr>
<tr>
<td>Convenience of schedule</td>
<td>1</td>
</tr>
<tr>
<td>Punctually</td>
<td>7</td>
</tr>
<tr>
<td><strong>Comfort-based:</strong></td>
<td></td>
</tr>
<tr>
<td>Extra comfort and leg room</td>
<td>4</td>
</tr>
<tr>
<td>Efficient check-in</td>
<td>5</td>
</tr>
<tr>
<td>Friendly/helpful cabin staff</td>
<td>9</td>
</tr>
<tr>
<td>Executive lounges</td>
<td>10</td>
</tr>
<tr>
<td>Food and drink</td>
<td>11</td>
</tr>
<tr>
<td><strong>Convenience:</strong></td>
<td></td>
</tr>
<tr>
<td>Membership of Frequent Flyer P.</td>
<td>3</td>
</tr>
<tr>
<td>Advanced seat selection</td>
<td>6</td>
</tr>
<tr>
<td><strong>Image:</strong></td>
<td></td>
</tr>
<tr>
<td>Reputation for safety</td>
<td>2</td>
</tr>
<tr>
<td>Award winning airline</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 19: Importance of Product Features in Choice of Airlines

There are several ways, however, to measure the convenience of flight schedules either by total layover (with the help of data on departure and arrival times), by the number of intermediate stops or by the actual distance flown. In addition a survey by the Kansas State University determines, that – on average – price is not the major factor in explaining passengers’ choice. Non-price attributes, such as flight schedules, frequent flyer programmes, quality of in-flight service are even more important.

Finally an interesting study asked international travellers, why they would change their favourite airline. However, most customers do not have a single reason for leaving. Better service and punctuality clearly lead the group:

---

279 see Gayle (2004), p.17
280 see Gayle (2004)
Airlines have to understand their customers’ needs and purchase behaviour with the final target: fulfillment of expectations -keeping them profitably satisfied- results in a repurchase. Interestingly, companies that offer superior service are able to charge a premium of 8%. Besides, it is crucial to know, that “the differences in expectations of service are derived from different passenger cultures. So if passengers are of different ethnic groups/nationalities then there will be significant difference in their expectations of desired airline service quality.”

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281 Sostar (2004), in: https://www2.one-intra.net
282 see Gilbert / Wong (2003), p.519
283 Gilbert / Wong (2003), p.520
5.4. Customer Segments, Demands and Expectations

“Airline management is about matching supply of air services, which management can largely control, with the demand for such services, over which management has much less influence ... To achieve a profitable matching of supply and demand airlines need to get the balance between unit costs, unit revenues and load factor right ... Thus airline planning is a dynamic and iterative process.” 284 Passenger expectations, however, are often dual-leveled and dynamic. A so-called zone of tolerance diverges desired service from adequate service. A successful airline has to meet all of them. 285

The motivation to travel is diverse and manifold. It can either be because of business or leisure reasons. A small proportion, however, called miscellaneous category include students travelling to or from their place of study, migrants or passengers travelling for medical reasons and do no fit into the business or leisure classifications. 287

In order to adapt to market’s demand, suppliers need precise information about the segmentation of their markets. Business Travellers very much differ from Private Travellers. The following figure helps to distinguish the two groups. It compares Business Travellers’ to Private Travellers’ characteristics.

285 see Gilbert / Wong (2003), p.520
287 see Doganis (2002), p.183
“The demand for passenger services arises from the complex interaction of a large number of factors which affect the different market segments differentially. Those factors fall broadly into two groups.”

<table>
<thead>
<tr>
<th>Factors affecting all markets</th>
<th>Factors affecting particular routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of personal disposable income</td>
<td>Level of tourist attraction:</td>
</tr>
<tr>
<td>Supply conditions:</td>
<td>Scenic/climatic/historical/religious</td>
</tr>
<tr>
<td>Fare levels</td>
<td>Attributes</td>
</tr>
<tr>
<td>Speed of air travel</td>
<td>Adequacy of tourist infrastructure</td>
</tr>
<tr>
<td>Convenience of air travel</td>
<td>Comparative prices</td>
</tr>
<tr>
<td>Level of economic activity/trade</td>
<td>Exchange rate fluctuations</td>
</tr>
<tr>
<td>Population size and growth rate</td>
<td>Travel restrictions</td>
</tr>
<tr>
<td>Social environment:</td>
<td>Historical/cultural links</td>
</tr>
<tr>
<td>Length of paid holidays</td>
<td>Earlier population movements</td>
</tr>
<tr>
<td>Attitudes to travel</td>
<td>Current labour flows</td>
</tr>
<tr>
<td></td>
<td>Nature of economic activity</td>
</tr>
</tbody>
</table>

Table 20: Factors Affecting the Level and Growth of Passenger Demand

---

288 Maurer (2001), p.276
289 Doganis (2002), p.196
290 Doganis (2002), p. 196
It is obvious that due to the growth of personal income and world’s economies (GDP) air travel has become more affordable. The real price of air transport’s decline has played a substantial role in addition.\textsuperscript{291}

“Three fundamental factors affecting passenger demand are incomes, fares and service level. Broad estimates of aggregate elasticises imply that demand is highly elastic with respects to income, rather less elastic with respect to fares and relatively inelastic with respect to service levels.” \textsuperscript{293}

\textsuperscript{291} see Doganis (2002), p.196  
\textsuperscript{292} Hanlon (1999), p.16  
\textsuperscript{293} Hanlon (1999), p.14
A Kansas State University study attempted to explicit model passengers’ heterogeneity within a discrete choice econometric model of demand for air travel:

\[ U_{ijt} = d_j + x_{jt} \beta_i - \alpha_i p_{jt} + \Delta \xi_{it} + \varepsilon_{ijt} \]

Consumer \( i \) chooses among \( J \) different products offered in market \( t \) by competing airlines. Products are defined as a unique combination of airline and flight itinerary (i.e. flight Paris – Bangkok on Air France, Paris – Bangkok on Thai Airways or Paris – Dubai – Bangkok on Emirates; all products are in the same market!). The indirect utility \( U_{ijt} \) that consumer \( i \) gets from consuming a product in market \( t \) is given by this formula, where \( d_j \) are product fixed effects (i.e. in-flight service, frequent flyer programme) capturing characteristics of the products that are the same across markets, \( x_{jt} \) is a vector of observed product characteristics, \( \beta_i \) is a vector of consumer taste parameters for different product characteristics, \( p_{jt} \) is the price for the product \( J \), \( \alpha_i \) represents the marginal utility of price, \( \Delta \xi_{it} \) are differences in unobserved product characteristics and \( \varepsilon_{ijt} \) represents the random component of utility that is assumed independent and identically distributed across consumers, products and markets. \( \beta_i \) and \( \alpha_i \) are individual-specific, implying that consumers have different tastes for each product characteristic. The variables in \( x_{jt} \) are “Hub”, “Hub x Distance” and “Distance x Market \( t \)”.

If the level of demand exceeds a critical value, the airline decides for a fully connected network.

295 see Pels / Nijkamp / Rietveld (1997), p.8
Descriptive and influential elements of demand are:

- aircraft selection
- route development
- scheduling
- product planning
- pricing, level of air fares
- quality of ground handling

Yet supply-features do not only affect demand but demand does it also vice versa. Yield Management defines the value of a traveller – regardless of the journey’s purpose – with the help of the following parameters:

---

296 Compiled by the author using Doganis (2002), p.181, p. 198 data
297 Maurer (2001), p.318
In addition Yield Management needs to know when customers prefer to make their reservations.

![Figure 29: Booking Behaviour](image)

Consequently two groups of travellers use air traffic services: business or leisure travellers. Their very own reasons of travel allow to distinguish them.

![Figure 30: Product Demand of the Different Customer Groups](image)

---

298 Sterzenbach / Conrady (2003), p. 346
300 Doganis (2002), p. 189
A Passenger Survey made by the Austrian Airlines Group end of 2003 testified that approximately 60% of the airline’s passengers are on a business journey and 40% on a leisure trip. However, this does not imply that 60% of the tickets sold are business class fares. Even businesspersons search for low fare tickets – leisure customer sometimes use miles to get upgrades or indulge themselves with a business class ticket.

Ostrowski and O’Brien determine that “survey evidence indicates, for example, that schedule convenience (especially frequency) is by far the most important factor for business travellers’ choice of airline and is the second most important feature for leisure travellers.” “By offering ... scheduling convenient to business needs at a premium price, carriers can attract the users, but this does cost the airlines money. Business Travellers are generally much less price-sensitive but exhibit more demands on quality of service (e.g., in terms of time and frequency of flights, availability of lounge facilities and frequent flyer bonuses).” They also “value a large service network more than do leisure travellers and again are willing to pay for this additional service factor. It reduces their generalized costs of travel.”

“The cost of the average business trip is not assessed purely in terms of air fares but rather in terms of generalized costs. Generalized costs embrace, among other things, air travel time, time spent in terminals, time spent getting to and from airports, air fares, money costs of getting to and from the airports, costs of overnight stays and costs of time wasted due to infrequent flights.”

Additionally Stephen Shaw distinguishes between “customer” and “consumers”. “‘Customers’ are those people who actually travel. ... They make their existence clear by reporting for flights and their requirements and preferences can be analysed using questionnaires. ... They may not be decision-makers about things that matter. In marketing, such decision-makers are defined as ‘Customer’.” Based upon a survey, 64% of the passengers had the ability to make their own airline selection decision.

301 see Feldkircher (2004), p.1
303 Button / Stough (2000), p. 236
304 Button / Stough (2000), p. 239
305 Button / Stough (2000), p.238
To have a better understanding about the industrial buying behaviour, we divide a Decision-Making Unit or DMU into five categories: Deciders: These are people who make the final purchasing decision. Gatekeepers: People who control the flow of information into the Decision-Making Unit. Users: People who will actually use the product or service once it has been purchased. Because of this, they are very concerned about the quality and utility of the product, and less worried about the cost of obtaining it. Buyers: People who negotiate the final deal with the different suppliers. Influencers: People who do not use a product, or become involved in detailed negotiations with suppliers, but who do influence the final outcome of the buying process. They can come from both outside and inside a firm.  

To understand the factors affecting demand and supply in the airline business, we can consider the following elements:

**Demand in the Airline Business**
- Growth in population
- Income
- Increase of leisure time
- Social Development
- International trade
- Generosity in holiday traffic
- Competitive forms of communication

**Supply in the Airline Business**
- Technological development
- Costs
- Air-fares
- Availability of production factors

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5.4.1. Business Travel and Business Travellers

Business travellers include not only members of the traditional group such as middle-, senior management, executives, established lawyers, architects, consultants and other professionals, but also junior (managerial or professional) staff, supervisory clerical and skilled (manual) workers nowadays. 310

Business demand is characterized by its variability on time and space and by the extremely important factor of its high ‘willingness to pay’. Exceptionally, it demonstrates some resistance to costs, although only for those companies where the cost of travel makes up a sizeable part of their budgets." 311 This customer group shows a propensity for luxury travel. 312 Compared to leisure travellers, business travellers are “less price sensitive but exhibit more demands on quality of service (e.g. time and frequency of flights, lounge facilities and frequent flyer bonuses). By offering flexible tickets, comfortable on- and off-plane amenities and scheduling convenient to business needs at a premium price, carriers can exploit this willingness to pay.” 313

In terms of flight schedule and revenue, business travel is the most important field of interest or category for commercial airline industry. Business traveller has to change his schedule at short notice, he needs to reach his destination as quickly as possible, on time and directly; in addition he expects flexibility from his airline-ticket. In other terms the airline has to focus on factors like flexibility, route network and frequency, when price should play a minor part. 314

A business customer travels for his company’s benefit. The corporation makes the travel decision, with the ambition to maximise corporate benefit. He represents 33% of international travel and generally the demand of this group is not very price elastic. 315 Although this group is less price elastic, they are often not free to choose, as companies tend to limit business travel expenses. “Airlines use incentives such as frequent flyer programs and business lounges” 316, more flexible tariff rules or special discounts.

310 see Doganis (2002), p.187
311 Ponti (1996), p. 559
312 see Ponti (1996), p. 559
313 Button / Haynes / Stough (1998), p. 23
314 see Sterzenbach (1996), p.140
315 see Bresson / Köhne / Westbrock (2003), p.4
Demand for business travel is related to level of trade, commercial interaction between two city pairs or the nature of industrial, commercial and other activities in an airport’s hinterland (i.e. London as a banking and financial centre).  

With reference to W. Pompl, there are many different categories of Business Travellers:

**Business Traveller**

- **Hard Money Traveller**  
  Independent businessperson travelling at his own expense
- **Soft Money Traveller**  
  Corporate businessman travelling on an expense account
- **Medium Money Traveller**  
  Conference or incentive business traveller within a group
- **Interim Traveller**  
  Combining personal travel with business trip
- **Frequent Short Traveller**  
  Business traveller who constantly flies a short-haul route
- **Periodic Traveller**  
  Sales person who makes a round of stops on a steady itinerary

Table 21: Market Segmentation Business Travel

Several factors influence the Business Travellers’ decisions for a specific airline and its hub:

- Total time of travel
- Frequency
- Price of the ticket
- Minimum connecting time
- Short connections and ways at the airport
- Time of departure
- Attractiveness of the connecting airport
- Frequent flyer programme
- Quality of connections

---

Therefore, Business Travellers' demands are:

a) Schedule (frequency and timings) and Total Travel Time

As their business schedules might change, business travellers expect high frequency and convenient departure/arrival times. It is essential for them to have extensive opportunities. Total travel time is another sales criterion. Due to their expensive value of time, business travellers do not want to travel 20 hours, if they can choose a flight with 14 hours of total travel time instead.

<table>
<thead>
<tr>
<th>Flight Nbr.</th>
<th>Routing</th>
<th>Dep./Arr./Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 186</td>
<td>EWR B LHR 4</td>
<td>0810 1955 6:45</td>
</tr>
<tr>
<td>VS 018</td>
<td>EWR B LHR 3</td>
<td>0820 2000 6:40</td>
</tr>
<tr>
<td>AA 142</td>
<td>JFK 8 LHR 3</td>
<td>0830 2015 6:45</td>
</tr>
<tr>
<td>BA 178</td>
<td>JFK 7 LHR 4</td>
<td>0900 2040 6:40</td>
</tr>
<tr>
<td>BA 112</td>
<td>JFK 7 LHR 4</td>
<td>1830 0625+1 6:55</td>
</tr>
<tr>
<td>AA 100</td>
<td>JFK 8 LHR 3</td>
<td>1830 0625+1 6:55</td>
</tr>
<tr>
<td>CO 018</td>
<td>EWR C LGW S</td>
<td>1840 0640+1 7:00</td>
</tr>
<tr>
<td>BA 184</td>
<td>EWR B LHR 4</td>
<td>1850 0635+1 6:45</td>
</tr>
<tr>
<td>UA 956</td>
<td>JFK 7 LHR 3</td>
<td>1900 0655+1 6:55</td>
</tr>
<tr>
<td>BA 174</td>
<td>JFK 7 LHR 4</td>
<td>1901 0655+1 6:54</td>
</tr>
<tr>
<td>AA 122</td>
<td>JFK 8 LHR 3</td>
<td>1905 0655+1 6:50</td>
</tr>
<tr>
<td>UA 956</td>
<td>JFK 7 LHR 3</td>
<td>1905 0700+1 6:55</td>
</tr>
<tr>
<td>AI 112</td>
<td>JFK 4 LHR 3</td>
<td>1915 0650+1 6:35</td>
</tr>
<tr>
<td>VS 004</td>
<td>JFK 4 LHR 3</td>
<td>1930 0710+1 6:40</td>
</tr>
<tr>
<td>BA 176</td>
<td>JFK 7 LHR 4</td>
<td>1950 0755+1 7:05</td>
</tr>
<tr>
<td>AA 104</td>
<td>JFK 8 LHR 3</td>
<td>1955 0740+1 6:45</td>
</tr>
<tr>
<td>CO 028</td>
<td>EWR C LGW S</td>
<td>2030 0830+1 7:00</td>
</tr>
<tr>
<td>BA 188</td>
<td>EWR B LHR 4</td>
<td>2040 0820+1 6:40</td>
</tr>
<tr>
<td>BA 114</td>
<td>JFK 7 LHR 4</td>
<td>2050 0850+1 7:00</td>
</tr>
<tr>
<td>VS 046</td>
<td>JFK 4 LHR 3</td>
<td>2110 0850+1 6:40</td>
</tr>
<tr>
<td>AA 132</td>
<td>JFK 8 LHR 3</td>
<td>2115 0900+1 6:45</td>
</tr>
<tr>
<td>KU 102</td>
<td>JFK 4 LHR 3</td>
<td>2115 0900+1 6:45</td>
</tr>
<tr>
<td>VS 002</td>
<td>EWR B LHR 3</td>
<td>2125 0905+1 6:40</td>
</tr>
<tr>
<td>UA 904</td>
<td>JFK 7 LHR 3</td>
<td>2130 0925+1 6:55</td>
</tr>
<tr>
<td>BA 116</td>
<td>JFK 7 LHR 4</td>
<td>2150 0950+1 7:00</td>
</tr>
<tr>
<td>VS 010</td>
<td>JFK 4 LHR 3</td>
<td>2250 1040+1 6:50</td>
</tr>
<tr>
<td>BA 182</td>
<td>JFK 7 LHR 4</td>
<td>2300 1100+1 7:00</td>
</tr>
<tr>
<td>AA 116</td>
<td>JFK 8 LHR 3</td>
<td>2355 1140+1 6:45</td>
</tr>
</tbody>
</table>

LHR 4/LGW S – indicate Terminal; +1: arrival the following day
Local times only

Table 22: Non-Stop Flights New York – London

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321 compiled by the author according CRS Amadeus Reservation System data
On many long haul routes, an adequate frequency is one daily flight. On denser routes, double daily flights may be appropriate (European-Asian routes). In few cases, though, there will be the need for six up to eight flights a day (Europe-USA) which help to provide adequate customer choice and discourage entry by competitors on short routes. A big number of flights characterize the prestigious route from London to New York. The traveller is free to choose the departure time of choice. A flexible ticket allows the passenger to rebook his flight to any alternative airline. Compared to two daily flights between Frankfurt and Hong Kong or five daily flights between London and Hong Kong (examples), high yield passengers are more flexible on the trans-atlantic route than they are on eastbound flights to Asia. Additionally airlines try to extend numbers of flights between alliance hubs in order to provide quicker and more convenient connections.

Today on long haul routes, a significant consideration alongside frequency is that there should be direct, non-stop flights available to the customer. As manufacturers innovate aircraft with even longer ranges (Boeing B 767ER, B 777, B7E7 or Airbus' A 330, A 340 and future A 380), it has become possible to operate a much greater number of destinations without any stop.

b) Punctuality

Flight delays mean inconvenience, missed appointments and, perhaps, loss of customers. As Business Travellers use evening periods for their return, missed connections of the very last flight always results in an involuntary overnight stay at the airline’s hub. Even worse is a “miss-connection” to destinations, which are not daily served. 322 New business destinations like Baku, Yerevan are hardly operated. 323 Therefore, it might happen that they end up at an airport waiting one or more days for the next connection.

c) Airport Location and Access

Especially on short-haul routes, passengers prefer service from a local, easily accessible airport, rather than from a more distant (international or national) hub. In the USA, US major airlines use smaller airports for shorter domestic flights. As New York’s La Guardia Airport LGA is closer to Manhattan than John F. Kennedy JFK or Newark

322 please see also Connecting Passenger Chapter
323 see CRS Amadeus Reservation System
Airport EWR, it accumulates major domestic and business travel. Hubs, however, offer domestic services as well, often with larger aircraft (i.e.: United Airlines and American Airlines use Boeing B 767s on their New York JFK – Los Angeles LAX routes, but Boeing B 757s or Airbus A 320s out of La Guardia LGA only), as they have to feed more passengers from connecting long haul flights into their domestic networks. A common finding in several historic studies is that access time to the airport is the dominant factor affecting airport choice.

The Japanese market is another good example. Travel density is tight. Big aircraft operate on short routes. The distance between Tokyo and Osaka is 65 minutes or 278 miles by plane. ANA All Nippon Airways and JAL Japan Airlines offer 48 flights a day together (38 flights with a “widebody-aircraft“ such as Boeing B 747 or Boeing 777).

![Mode of Surface Transport Used by Passengers at London Heathrow in 2001](image)

A survey about the different modes of surface transport used by passengers at London Heathrow Airport revealed that 39% use their cars in terms of regional access to airport. Unfortunately not all airports provide good public transportation to the city or local area (i.e.: underground, speed trains,...). High prices for parking at or a taxi ride to the airport are the reason why third parties drive travellers to the airports or

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324 see Basar / Bhat (2003), p. 5 ff.
325 see CRS Amadeus Reservation System
326 see Graham (2003), p.233
327 see Sterzenbach (1996), p.120

**d) Seat Accessibility and Ticket Flexibility**

It is a crucial product need for the business traveller being able to book a seat on a flight shortly before it is due to depart. Although sometimes he has already booked a flight early in advance, a last minute change of plans causes a cancellation of the booking and results is a new reservation on an earlier respectively later flight. This requirement results in the need for ticket flexibility as well as booking-class availability, which also allows the passenger to rebook a flight without any penalty charge even when the intention occurs close to the moment of departure or after being no-show. The attached graph shows different tickets including their rights for a journey from Frankfurt to Dubai on Lufthansa for Mai 2005:

![Graph showing different tickets with their rights](image)

---

328 see Sterzenbach (1996), p.115
329 see Graham (2003), p.232
Total flexibility is available to full fare passengers, who spend between EUR 3,389,- and 5,601,- (excluding taxes and surcharges) for their flight from Frankfurt to Dubai. They can even buy their tickets without an advance purchase penalty and airlines sell these (high yield) seats even, if they are heavily overbooked (booking class is nearly always available).
In addition to that premium frequent travellers get a booking guarantee. Gold customers do always get a seat in the full fare Economy Class if they make their booking at least 24 hours before departure with the major alliances.  

As schedules of premium passengers are tight, some airlines grant them more flexible minimum check-in times:

<table>
<thead>
<tr>
<th>Check-in closure for int. long distance flights</th>
<th>British Airways London Heathrow</th>
<th>Lufthansa Frankfurt</th>
<th>Emirates Dubai*</th>
<th>Air France Paris</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Class &amp; Gold Card</strong></td>
<td>45 min</td>
<td>30 min</td>
<td>60 min</td>
<td>60 min</td>
</tr>
<tr>
<td><strong>Business Class</strong></td>
<td>45 min</td>
<td>30 min</td>
<td>60 min</td>
<td>60 min</td>
</tr>
<tr>
<td><strong>Economy Class</strong></td>
<td>120 min</td>
<td>40 min</td>
<td>180 min</td>
<td>60 min</td>
</tr>
</tbody>
</table>

* and all other Emirates stations

Table 23: Check-in Closure for International Long Distance Flights

A long-haul trip often requires at least three days out of someone’s diary. Finding such a gap normally takes a great deal of more pre-planning in comparison with a short-haul flight. Businesspersons accomplish such short-haul flights on a day-return basis. Therefore, the last-minute availability of a seat is of less importance on a long haul flight.

e) Frequent Flyer Benefits

According to S. Shaw these benefits can be important building market loyalty. He admonishes, however, not to exaggerate their impact on short haul routes. As mileage points on a short journey are quite small, passengers choose flights because of appropriate departure timing and the availability of a seat. Therefore frequent flyer miles simply act as a welcome bonus.

On a long haul route, substantial numbers of points are at stake. Travelling Business or First Class might entitle them to travel free within Europe on some programmes. There is a greater likelihood of a passenger on a long haul flight choosing the airline whose frequent flyer programme he is supporting, even if this means travelling earlier or later than he would ideally likes.

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332 Compiled by the author according CRS Amadeus Reservation System data
f) Airport Service and Connecting Times

Especially on short flights, time spent at the airport may exceed the flight time. Business Travellers demand several opportunities as late check-in, separated check-in areas and ticket counters, fast lanes at passport and security checks, arrival plus departure lounges, premium baggage service or service centres.

Long-haul passengers tend to check in earlier than those on short trips, presumably because, with lower frequencies, the penalty of missing a flight will be greater. The offer of a very late check-in time may therefore be less important. In contrast, though, lounge facilities will be of greater significance.

Connecting passengers do not want to waste too much time on ground. Therefore connecting times must be as short as possible on one hand, but long enough to guarantee transit. The airport itself has to be attractive due to its facilities, general standard or at least with the help of perfect marketing campaigns.

g) In-Flight Service

In-flight experience may be a crucial one for choice-of-an-airline decisions, even on routes where flight times are only three-quarters-of-an-hour or so. Nowadays also European airlines want their passengers to pay for food and beverages on board in Economy Class on certain flights. Therefore segregation between Business/First and Economy Class is crucial. Airlines must pander to the pride and ego of those who pay Business Class fares and convince them to do so with perfect in-flight service as seat comfort or meals.

Seating comfort on board, a separate cabin that allows to sleep and work, meal quality and in-flight entertainment, all figure prominently in the business traveller’s long haul expectations. The following trends in the aviation industry are remarkable: In the 90s some major airlines replaced traditional First and Business Class on long haul routes with new Business/First Classes. As they were not able to sell First Class seats any more, they introduced a mixed form of a premium class. Legroom between 120 and 140 cm became the standard in the industry and meal service - equal to traditional First Class - should convince high yield passengers to travel with airlines like:

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333 On US domestic flights you can only find Economy and First Class cabins on narrow body aircraft, as in Europe Business and Economy Class is offered only. First Class seats in the US are more comfortable as they do not use convertible seat systems like European carriers do. They can be compared to the traditional Business Class Seats on long haul routes during the 80s and 90s.
Trans World Airlines TWA\textsuperscript{334}, Continental, USAir\textsuperscript{335}, Air Canada, Austrian Airlines\textsuperscript{336}, Delta Airlines, Alitalia, SAS – Scandinavian Airlines System, or TAP – Air Portugal. New brands should convey a touch of luxury, whether it is TWA’s Trans World One Class, Continental’s BusinessFirst, Austrian Airlines’ Grand Class or TAP’s Navigator Class.

One decade later British Airways was the first airline that introduced flat beds or so called suites in the traditional First Class. Now major airlines like: Qantas, Singapore Airlines, Swiss Airlines, United Airlines or American Airlines offer such outstanding suites too. Full reclining beds that are quite similar to the suites can be found on board of Lufthansa, Air France, Iberia, ANA – All Nippon Airlines or JAL – Japan Airlines.

Market leader was Emirates, who introduced separated and lockable cubes, in order to guarantee real private atmosphere on board of the airline’s latest aircraft. So the airline is the only one, which offers “room service in the sky”.\textsuperscript{337}

In the same decade some airlines upgraded their traditional Business Class, using attractive marketing campaigns. British Airways again perfectly knew how to create a new trend, after airlines like Air New Zealand or Eva Air had been successful with this idea before. More legroom or even -nearly- full reclining seats aimed to attract high yield passengers. Lufthansa or ANA – All Nippon Airlines soon followed. Not all passengers, however, are able to pay Business Class Fares on long haul routes. However, they demand some extra legroom, space to work and service for a small or extra additional charge. British Airways calls this Premium Economy Class “World Traveller Plus” on its long haul network, which includes more legroom, hand-baggage and mileage. Air France offers its Economy Full Fare Passengers on routes to Europe, North Africa and Israel a separate cabin called Tempo Challenge.\textsuperscript{338} United Airlines introduced Economy Plus on its North American flights (incl. Canada, Puerto Rico, Mexico and Central America) providing extended legroom. Seats are available to all “Mileage Plus”\textsuperscript{339} members with Premier status or higher and full fare Economy ticket holders on a first come, first served basis.\textsuperscript{340}

\begin{itemize}
  \item \textsuperscript{334} filed bankruptcy and was bought by American Airlines
  \item \textsuperscript{335} now US Airways
  \item \textsuperscript{336} now Austrian
  \item \textsuperscript{337} see APA (2004b), in: http://www.apa-defacto.at;
  \item \textsuperscript{338} Vorne Sitzen (2004b): First Class, in: http://www.vorne-sitzen.de/cgi-bin/dbn/playout.pl?Out=sfs_vs_fc.html
  \item \textsuperscript{339} see Air France (2002), p.24
  \item \textsuperscript{340} Mileage Plus is United Airlines’ frequent flyer programme
  \item \textsuperscript{340} see United Airlines (2001), p. 13
\end{itemize}
<table>
<thead>
<tr>
<th>British Airways</th>
<th>Ticketprice in GBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class Full Fare (unrestricted)</td>
<td>7.522,-</td>
</tr>
<tr>
<td>First Class Discounted</td>
<td>3.946,- up to 6.514,-</td>
</tr>
<tr>
<td>Business Class Full Fare</td>
<td>4.550,-</td>
</tr>
<tr>
<td>Business Class Discounted (restricted)</td>
<td>1.966,- up to 3.956,-</td>
</tr>
<tr>
<td><strong>World Traveller Plus unrestricted</strong></td>
<td><strong>World Traveller Plus restricted</strong></td>
</tr>
<tr>
<td>World Traveller Plus Full Fare</td>
<td>878,- up to 1.167,-</td>
</tr>
<tr>
<td>Economy Class Discounted</td>
<td>1.776,-</td>
</tr>
<tr>
<td>price quoted in GBP</td>
<td>478,- up to 878,-</td>
</tr>
<tr>
<td>excluding tax and other charges</td>
<td></td>
</tr>
<tr>
<td>price range due to different applicable seasons</td>
<td></td>
</tr>
</tbody>
</table>

Table 24: British Airways Ticket Price for London – New York – London

The sample determines, that this premium class fills the gap between Business and Economy fares. Further the airline easily increases revenues as it attracts more Economy Class passengers, who are prepared to pay for extra service and comfort, but would never buy Business Class tickets.

SAS offers “Economy Extra Class” on its new aircraft characterized by a separate cabin, more comfort and legroom and better flexibility in terms of rebooking or ticket-changes. The airline was not only the first carrier, that presented a very reasonable form of “Tourist class” in 1952, but acts as a pioneer this year again: With reference to press releases, SAS is going to introduce a “third class” in the rear of the cabin on its European network this year, only for passengers with low fare tickets. Other airlines that sell a so-called “Premium Economy Class” are ANA, Condor, Eva Air, Garuda Indonesia, LTU, Martinair and Vietnam Airlines.

5.4.1.1. Corporate Business Travellers

“Corporate Travellers are those who travel for a company, and who are able to put the price of their ticket and other business travel costs onto an expense account. They often adopt a rather cavalier approach to the costs of the services they buy, placing importance instead of high product standards ... for the corporate traveller, frequent flyer benefits are usually no more than an attractive perk of the job, providing opportunities for enjoyable free leisure flights.”

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341 compiled by the author according CRS Amadeus Reservation System data
342 see Strobl (2004b), p.19
343 see Vorne Sitzen (2004c), in: http://www.vorne-sitzen.de
344 Major Companies, however, pool the miles of their employees on one corporate mileage account. Others compel their employees to use miles for future air tickets and prohibit private use of air mileage.
345 Shaw (2004), p. 24 , p. 31
5.4.1.2. Independent Business Travellers

“Independent business travellers, on the other hand, are those who are self-employed or who work for small companies. These people feel to a much greater degree that the price of an air ticket is coming out of their own pocket ...” 346 “With independent business travellers, the fundamental needs remain exactly the same in terms of frequency, timings, safety, punctuality, seat accessibility and ticket flexibility. Price, though, assumes a greater significance than in the corporate market. The independent traveller will trade off cheaper ticket prices against product frills such as standards of seating comfort, free drinks and in-flight meals ... for the independent traveller free flights are much more commonly used for business travel purposes and provide a welcome opportunity to reduce expenditure on air tickets.” 347

5.4.2. Leisure Travel and Leisure Travellers

Leisure travellers are most strictly related to earnings. Their demand grows in relation to optional income (e.g. income that exceeds essential consumption) and the availability of free time. 348 “The most significant socio-economic variable affecting the demand for leisure travel is personal or household income, since leisure trips are paid by the passenger, who may also be paying for a spouse and one or more children.” 349 Lowest price enjoy highest priority over short-term availability, flexibility and frequency. Nevertheless safety is the most important criterion for this passenger group at all. 350

Leisure travellers have different kinds of motivation: 351

- Volatility driven orientation: the traveller tries to escape.
- Adventure driven orientation: the traveller wants to be away (from home or in motion)
- Destination driven orientation: the traveller aims to arrive at a certain destination

Their travel ambitions are personal and maximise their own utility. Leisure travellers represent 66% of international travel. Their demand is very price elastic. 352

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346 Shaw (2004), p. 24, p. 31
347 Shaw (2004) p. 31
348 see Ponti (1996), p. 559
351 see Opaschowski (2000), p. 36 f.
352 see Bresson / Köhne / Westbrook (2003), p. 4
Several factors characterize leisure travellers:  

- Origin, fortune, level of education,
- fields of interests, need for beach&sun, need for cultural sights, etc. and are the explanation for the rising demand for “inclusive tours”.

Leisure mobility is based upon time, money, motorization plus thirst for adventure; and lead to three different forms of leisure traffic:

- Day trip traffic (return flight on the same day, without the need for a hotel)
- Short trip traffic (short trips up to a length of 4 days)
- Vacation traffic (holiday trip with 5 days minimum)

Lufthansa affirmed that 45% of its schedule flights’ (charter flights excluded) customers are leisure travellers:

![Kind of Travellers on Board of Lufthansa Schedule Flights](image)

Figure 34: Kind of Travellers on Board of Lufthansa Schedule Flights

In contrast to business travel, “leisure travel is also related to taste. Tourist destinations can inexplicably fall into or out of favour.”

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353 see Hoggart (2000), p. 4
354 Inclusive Tour (IT) is a holiday package where a single charge includes travel, hotel accommodation and possible local ground transports, etc. Selling agent is an intermediary such as a tour operator, travel agent or student union.
355 see Opaschowski (2000), p. 24
356 see Lenz (2000), p. 91
357 see Lenz (2000), p. 91
358 Doganis (2002), p. 199
The Institute for Marketing University Münster created a market segmentation for private travel with the help of an empirical survey within the German market:

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1: Price Oriented (75% of all Private Travellers)</td>
<td>Ticket price is the most important dimension (70%)</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>Flexibility is a mandatory side-condition (20%)</td>
<td></td>
</tr>
<tr>
<td>Cluster 2: Service Oriented (15% of all Private Travellers)</td>
<td>Demand comfortable seats on board (20%)</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Consider price as a measure criterion (18%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expect meals and magazines/newspapers (15%)</td>
<td></td>
</tr>
<tr>
<td>Cluster 3: Flexibility Oriented (10% of all Private Travellers)</td>
<td>Require appropriate modification- and cancellation possibilities (60%)</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Consider price as important (25%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 25: Market Segmentation Private Travel

5.4.3. Connecting Passengers

Connecting passengers – in other words: Transit Passengers or Upline Passengers pass through when changing aircraft. These passengers, which generally form the largest group of travellers at hubs, originate from other airports and are destined for other airports. ... these passengers normally have a choice of whether to take a direct flight or to transit through one of several hubs. The fact that a hub is dominated by a single carrier does not constitute a monopoly position because people can opt for alternative routings. The hubs effectively compete with each other for this type of traffic.”

Airlines cannot survive, when they rely on local traffic only. They have to generate transit or connecting travel via their hubs. As competition between rival airlines and even within the alliances is severe, transfer process plays a key role in every airline’s strategic plan.

360  Maurer (2003), p.341
"The requirements of the connecting passenger are, ..., a mixture of those which prevail in the short-haul and long-haul point-to-point markets. The connecting passenger requires a high frequency of flights in exactly the same ways as the point-to-point market does. It requires a spread of flights throughout the day, because long-haul flights depart from a hub at different times, while point-to-point traveller requires peaks early and late in the business day." 362 Following, several examples show the varying strategies of transfer traffic systems to illustrate its importance.

"The classic example in the United States is at Hartsfield Airport in Atlanta ... with 600 daily departures. More than 20 000 Delta Airlines passengers change planes in Atlanta each day ... Each of Delta’s arriving and departing waves consists of over 50 aircraft, requiring all four runways to be used simultaneously ... Each pair of arriving and departing waves is known as a ‘complex’. The scheduled duration of each complex – from the time the first aircraft lands to the time the last aircraft takes off – is no more than 90 minutes ... Each complex in Atlanta generates a total of 2 500 possible city pair linkages." 363

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362 Shaw (2004), p.33
363 Hanlon (1999), p.95
364 Hanlon (1999), p.96
Changi Airport in Singapore shows a flight concentration in the evenings. “Services from Europe arrive in the early evening, in the time to enable passengers to transfer to flights to Australia and New Zealand taking off two or three hours later.”

In terms of transfer, Dubai is obviously one of the most convenient airport. Maximum distance between the gates is 500 m and the minimum connecting time is 20 up to 100 minutes. Busiest time at Dubai airport is the night (time range 11 p.m. until 9 a.m.). In this interval most of the flights arrive and depart. In contrast to Dubai, Frankfurt has little traffic during nighttime. Peaks are in the morning, late mid-day including evening (arrival) and late morning, mid-day, afternoon as well as late evening (departure).

The number of waves is the basis for schedule and transfer convenience. Passengers can choose between a large number of flights and enjoy little transit at the hub, in case the airline has sufficient frequencies (or waves).

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365 Hanlon (1999), p.95
366 compiled by the author see Austrian Airlines Group (2004b) ; Air France (2002), p. 73 ff. ; The Department of Civil Aviation (2000) ; CRS Amadeus Reservation System
Figure 37: Arrival and Departure Waves of all Emirates operated flights at Dubai

Figure 38: Arrival and Departure Waves of all Lufthansa operated flights at Frankfurt

367 compiled by the author according Emirates (2004b) data
368 compiled by the author according Lufthansa (2004c) data
In 2002 Austrian Airlines introduced a new traffic system. A fourth and fifth frequency helped the airline to generate more traffic from West Europe to its Vienna hub.

Figure 39: Hubstructure Vienna Trafficsystem 2000

Figure 40: Hubstructure Vienna Trafficsystem 2002

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369 Austrian Airlines Group (2002)
“Punctuality assumes even greater importance for the connecting passenger. A delay of an hour to a connecting passenger’s flight into a hub may result in the long-haul flight being missed. This may cause an actual delay of a day or more, on routes which are only served at a comparatively low frequency.”  

The following graph shows all departure times of OS 94’s connecting passengers. Austrian Airlines’ flight OS 94 from Washington D.C. to Vienna on 15. December arrived in Vienna at 9.00 a.m. local time with 167 transit passengers\footnote{CRS Amadeus Reservation System shows only connecting flights that are booked in the same PNR-Passenger Name Record} on board. The first downline passenger\footnote{Maurer (2003), p.341} left Vienna at 10.00 a.m with flight OS 137 to Nuremberg, the last one at 10.15 p.m. on board of OS 641 to Yerevan.

![Transit passengers' booked connecting flights leave Vienna at...](image)

On board of flight OS 94 was a total load of 246 passengers, with 68 % transit bookings. For only 79 passengers Vienna was the final destination respectively onward flights were booked in a separate PNR. Most popular connecting destinations were New Delhi and Pristina that day.

Figure 41: Transit Passengers on Flight OS 94 Washington – Vienna 15th Dec. 2004 part 1

\footnote{Shaw (2004), p.33}
\footnote{Maurer (2003), p.341}
\footnote{compiled by the author according CRS Amadeus Reservation System data}
Sterzenbach verifies this high level of transit passengers: Hub airlines have increased this level from 10% in the 80s up to 70% today.\textsuperscript{376} Eventually “complexing of flight schedules ensures that the probability of the first outgoing service to any particular destination being by the same airline as the delivering flight is disproportionately high. Interlineable fares, involving transfer from one airline to another, therefore become no longer necessary.” \textsuperscript{377}

### 5.4.4. Local Passengers

Local Passengers are a “group of travellers, those residing at a hub airport city, are open to exploitation. They have no choice in terms of using the hub as an origin and return destination for their trips; they are in a sense captive. The concern is whether direct fares to and from hub airports are excessively high due to the lack of competition with other hub based airline networks.” \textsuperscript{378}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure.png}
\caption{Transit Passengers on Flight OS 94 Washington – Vienna 15\textsuperscript{th} Dec. 2004 part 2 \textsuperscript{375}}
\end{figure}

\textsuperscript{375} compiled by the author according CRS Amadeus Reservation System data
\textsuperscript{376} see Darrow / Leimkuhler / Smith (1992), p.15 in Sterzenbach (1996), p. 312
\textsuperscript{377} Doganis (2002), p.255
\textsuperscript{378} Button / Stough (2000), p. 239
However, “the value of frequent flyer mileage is greatest for residents of a city that serves as the hub for a large hug-and-spoke network because it translates into convenient free travel to a multitude of destinations.” 379 Additionally “residents living in the region around a hub airport enjoy advantage of having a range of destinations open to them that exceeds those in comparable regions without a hub. In economic terms, residents enjoy external benefits from having transit passengers passing through their local airport that allow them access to a major scheduled air transport network.” 380 Passengers have to accept a “hub premium” for a better “service” and higher number of destination, which is used to reduce feeder flight fares. In practice, the price charged on a leg can even exceed the price charged on a path including the leg, as interhub competition and lack of competition on spoke markets exist. An airline compensates passengers with higher frequencies or via the price for indirect travels. According to the FAA, “for people who live close to the hub airport, hubbing is beneficial because many non-stop flights are available to many cities that would not otherwise be able to support such service.” 381

5.5. Empirical Findings

Measurement’s focus is on transit travel via Frankfurt (LH), Paris CDG (AF), London Heathrow (BA) and Dubai (EK). All or at least the majority of the selected airlines have to serve the arrival and departure destinations in this benchmark. In a few cases competitive airlines were not able to offer any connection via their home hubs or do not even serve a destination (i.e. there is no possible connection between Moscow and Delhi on British Airways or British Airways-One World code share flight). In this case the box is left blank and does not show any value. If an airline cannot offer any connection, there is no price published on this route, except the IATA standard tarif, which is applicable to all carriers on the same route. This is the reason, why selected price boxes are without a value. Origin cities are: Rome (FCO), Athens (ATH), Zurich (ZRH), Dusseldorf (DUS), Munich (MUC), Istanbul (IST), Manchester (MAN), Moscow (SVO or DME 382), Nice (NCE), Glasgow (GLA), Vienna (VIE) and Milan (MXP). Destination cities are: Bangkok (BKK), Shanghai (PVG), Osaka (KIX), Hong Kong (HKG), Singapore (SIN), Delhi (DEL) and Mumbai (BOM).

379 Button / Stough (2000), p. 239
380 Button / Stough (2000), p. 239
382 BA and EK serve DME; AF and LH serve SVO
5.5.1. Price and Yield

“The price that a consumer is willing to pay can be influenced by the availability of complementary products. Airlines have increasingly engaged in dynamic price discrimination (yield management) as computerization, and in particular the development of computer reservation systems, has given more information on the way seats are selling and the ability to adjust fares rapidly. This means that there is effectively no such thing as a fare for a flight and often an aircraft will carry passengers paying a wide range of fares. Airlines, for commercial reasons, are reluctant to release detailed breakdowns of fares paid and consequently demand analysis tends to be based on yield (i.e.: the total revenue from flight divided by the number of passengers).”  

The price for an airline ticket depends on the following factors: Corporate target, demand, competition, cost level, market potential, anti-trust authority’s targets and other airlines’ interest. During Regulation airlines were not allowed to publish own fares. The Civil Aeronautics Board (CAB) calculated a Standard Industry Fare Level for the entire airline industry and rarely permitted special fares, except to senior citizens, soldiers or students.

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383 Button / Stough (2000), p. 17  
384 see Pompl (2002), p.239 f.  
385 see Hüschelrath (1998), p.366  
386 Pompl (1998) p. 174
Until 1978 all members of the International Air Transport Association (IATA) agreed to fixed fares that were binding to all members and consequently prevented any kind of fare-competition or price dumping between members.  

IATA Interlining is the mutual acceptance of tickets including clearing of reciprocal liabilities with the help of IATA Clearing House in Geneva. From this very moment an airline is not limited to the sale of its own tickets. Airlines now accept passengers with tickets from other competitors too. IATA introduced three tariff-areas:

- North-, Middle- and South America
- Europe, Africa and Middle East
- Asia, Australia and Oceania

Fares were valid for two years on a basis of a special cost allocation base:

- Length of the route
- Volume of traffic
- Fuel price
- Airport taxes
- Competitive pressure of alternative carriers (i.e. rail, road, water,...)

1978’s Deregulation Act, however, brought many changes, including the ones on fares. “The effect of these new liberal agreements on fares, number of carriers and traffic growth was dramatic. Where new airlines entered routes previously operated by only two carriers, normally one from each country, fares dropped significantly. The lower fares and the new entrants in turn stimulated traffic growth. In 1983 ... the cheapest London – Amsterdam fare was an advance purchase fare of GBP 82,- return and only three other reduced fares were available. Within two years of the new bilateral, fifteen different discount fares were available and the lowest was GBP 55,- return.”

389 American Airlines’ documents are characterized by an 001 prefix
391 see Jopplien (2003), p. 257
392 see Doganis (2001), p. 27
Another phenomenon is that fares/km for short flights are more expansive than long distance flights. Airlines often offer cheaper flights to New York than to Hamburg. Only on the European-Asian/Pacific route, prices/km increase with the distance.

<table>
<thead>
<tr>
<th>Route group</th>
<th>US cents per passenger-kilometre at varying distances (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>250</td>
</tr>
<tr>
<td>North-Central America</td>
<td>64.0</td>
</tr>
<tr>
<td>Central America</td>
<td>45.3</td>
</tr>
<tr>
<td>North America</td>
<td>59.5</td>
</tr>
<tr>
<td>North-South America</td>
<td>25.4</td>
</tr>
<tr>
<td>South America</td>
<td>27.8</td>
</tr>
<tr>
<td>Europe</td>
<td>76.3</td>
</tr>
<tr>
<td>Middle East</td>
<td>44.5</td>
</tr>
<tr>
<td>Africa</td>
<td>31.7</td>
</tr>
<tr>
<td>Europe-Middle East</td>
<td>38.1</td>
</tr>
<tr>
<td>Europe-Africa</td>
<td>32.1</td>
</tr>
<tr>
<td>North Atlantic</td>
<td></td>
</tr>
<tr>
<td>South Atlantic</td>
<td></td>
</tr>
<tr>
<td>Asia/Pacific</td>
<td>26.4</td>
</tr>
<tr>
<td>Europe-Asia/Pacific</td>
<td>15.9</td>
</tr>
<tr>
<td>North-Mid Pacific</td>
<td></td>
</tr>
<tr>
<td>South Pacific</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>52.6</td>
</tr>
</tbody>
</table>

Table 26: Average Economy Class Normal Fares (Schedule Services) 1993

Doganis' theory confirms: The consequences of the homogeneous nature of the airline product are: Airlines try to differentiate their services with the help of new aircraft types, advertising, in-flight- and ground-handling quality with the ultimate aim to convince the customer, that their service is superior to their competitors' service. As the airlines hardly reach this goal, they mainly compete on price, which is tangible and fare differences are demonstrable. Surveys over a longer period (1985-1992) revealed that "price cuts by one airline were always matched by the competitors."  

Fare demand elasticity for air travel depends on the nature of the final demand of passengers (e.g. leisure or business activities) and whether one is looking at the long term or short term elasticities (i.e. using a cross-section or time series approach).  

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393 Hanlon (1999), p.184  
395 Bilotkach (2002), p.3  
396 see Button / Stough (2000), p.17
There is some evidence that the estimated elasticities vary by fare class (first class, standard economy and discount) and by distance. This corresponds to the intuitive notion that price-sensitive leisure travellers form the majority of long distance passengers while less price sensitive business travellers make short journeys.  

<table>
<thead>
<tr>
<th></th>
<th>Time series</th>
<th>Cross-section</th>
<th>Others*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leisure travel</td>
<td>0.40 – 1.98, 192</td>
<td>1.52</td>
<td>1.40 – 3.30, 2.20-4.6</td>
</tr>
<tr>
<td>Business travel</td>
<td>0.65</td>
<td>1.15</td>
<td>0.90</td>
</tr>
<tr>
<td>Mixed or unknown</td>
<td>0.82, 0.91, 0.36 - 1.81, 1.12 - 1.28, 1.48</td>
<td>0.76 – 0.84, 1.39, 1.63, 1.85, 2.83 - 4.51</td>
<td>0.53 – 1.00, 1.80 – 1.90</td>
</tr>
</tbody>
</table>

Ranges of estimates from −0.4 to 4.51 are used with reference to the Marshallian demand elasticities.

Table 27: Demand Elasticities of Air Passenger Travel  

“The data in the table confirms that the demand for business travel is less sensitive to fare changes than is the demand for leisure travel. It is not only fare that can be important in determining demand, ..., factors such as ‘bonuses’ associated with frequent flyer programs may also be important.” Simply looking at fares charged by traffic originating from a hub airport compared with other non-hubs can be misleading. Full allowance must be made for a variety of factors, including the following:

- On average, yield (i.e. fare per mile) falls with distance travelled reflecting the importance of take-off and landing costs in the overall costs of air travel. The differing average flight lengths from airports need controlling for.

- Carriers offer different levels of service, and strict comparisons should therefore compare the fares of a carrier at a concentrated hub with fares of the same carrier elsewhere.

- Flights can involve a number of segments (even if a passenger is originating from a hub) and this should be allowed for.

- When comparing airports, it is important to look at the type of competition a carrier is confronted with; e.g., have any of the airports got services by low cost carriers such as AirTran or Southwest?

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397 see Button / Stough (2000), p.17
399 Button / Stough (2000), p.19
The demand for airline service is highly volatile. ... There is an inevitable catching up effect in fares over business cycle, and short-term calculations can be misleading.” 400

Finally, “the concern is whether direct fares to and from hub airports are excessively high due to the lack of competition with other hub based airline networks.” 401 “The empirical evidence does seem superficially to indicate that some fares at hub airports levied by a dominant carrier can be higher than for other airlines. Empirical work at the Brookings Institution using carefully constructed data, however, indicates that this premium in 1993 was only about 5% and that it represented less than 2% of the estimated annual benefits of deregulation.” 402

In order to attract transit passengers, airlines use a common strategy of indirect flights’ cross-subsidization with the help of direct flights out of their hubs. (Business) Passengers have to accept a “hub premium” for a better “service” and higher number of destinations, which is used to reduce feeder flight fares. In practice, the price charged on a leg can even exceed the price charged on a path including the leg. Interhub competition and lack of competition on spoke markets are the reasons for this phenomenon. An airline compensates passengers with higher frequencies or via the price for indirect travels. Besides according K. Button being no hub has the advantage of cheaper ticket fares, but less numbers of direct flights on the other hand. 403

<table>
<thead>
<tr>
<th>EUR</th>
<th>Monoploy Destinations</th>
<th>Destinations with 2 competitive airlines</th>
<th>Destinations with at least 2 competitive airlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business fares per km</td>
<td>0.45</td>
<td>0.40</td>
<td>0.35</td>
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<tr>
<td>Economy fares per km</td>
<td>0.35</td>
<td>0.30</td>
<td>0.25</td>
</tr>
<tr>
<td>Special fares per km</td>
<td>0.25</td>
<td>0.20</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Figure 44: Ticket Prices Under Certain Market Structures 404

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401 Button / Stough (2000), p. 239
404 Pompl (2002), p.452
Additionally the number of competitive airlines at one airport or hub strongly influences ticket prices. Destinations with at least two competitive airlines, result in up to 24% lower fares as the following table “Ticket prices under certain market structures” shows.

Before prices are set, costs of a particular flight have to be measured. “In allocating costs to routes airlines have to make some arbitrary decisions, particularly with regard to the allocation of certain overhead and fixed costs.” In the airlines business “there are three major cost categories: ... variable direct operating costs ... (fuel-, variable flight and cabin crew costs, landing or en-route charges, inflight catering), ... fixed -or standing direct- costs ... (fixed annual flight and cabin crew costs, insurance, aircraft standing charges) ... and indirect operating costs ... (station and ground costs, passenger service costs on the ground, general and administrative overheads ... costs of any sales offices and promotion) ...” 405

As a descriptive sample, Singapore Airlines uses a Boeing B777-300 with a configuration of 18 seats in First Class, 49 seats in Business Class and 265 Economy Class seats.406 Singapore Airlines has a total passenger yield on schedule service of 56.3 US cents per passenger tonne kilometre in 1999. 407

<table>
<thead>
<tr>
<th>Variable</th>
<th>First (F)</th>
<th>Business (C)</th>
<th>Economy (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Costs per seat if all economy</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>2 Seat pitch (inches)</td>
<td>78</td>
<td>52</td>
<td>32</td>
</tr>
<tr>
<td>3 Seat costs index allowing for seat pitch</td>
<td>244</td>
<td>162</td>
<td>100</td>
</tr>
<tr>
<td>4 Number of seats abreast</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>5 Seat cost index allowing for pitch plus seat abreast</td>
<td>366</td>
<td>208</td>
<td>100</td>
</tr>
<tr>
<td>6 Planning load factor (%)</td>
<td>50</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>7 Cost per passenger adjusted for load factor</td>
<td>732</td>
<td>320</td>
<td>125</td>
</tr>
<tr>
<td>8 Passenger specific costs</td>
<td>40</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>9 Costs per passenger including Passenger specific costs</td>
<td>772</td>
<td>345</td>
<td>135</td>
</tr>
<tr>
<td>10 Cost per passenger if Y=100</td>
<td>571</td>
<td>255</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 28: Unit Costs of Different Classes on Singapore Airlines’ Boeing B777-300 408

405 Dognais (2002), p.288
406 Configuration Singapore Airlines used in 2001
408 see Doganis (2002), p.290
This table shows “a final index of relative costs per passenger between the first, business and economy cabins of 571:255:100 ... if purely cost-based, the business fare should be two and a half times the normal economy fare and the first class fare six times as high ... this proposed relationship should apply to the average yield per passenger or passenger kilometre in each class rather than the fare.” 409

A survey by American Express Corporate Travel for the 1st Quarter of 2004 shows how different air fares for flights from Europe to the Far East are: 410

<table>
<thead>
<tr>
<th>Costs for flights out of Europe</th>
<th>Far East</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per mile in Euros</td>
<td>Economy</td>
<td>Business</td>
<td></td>
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<tr>
<td>Germany</td>
<td>0,36</td>
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<td>U.K.</td>
<td>0,23</td>
<td>0,65</td>
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<td>Italy</td>
<td>0,19</td>
<td>0,41</td>
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<tr>
<td>The Netherlands</td>
<td>0,19</td>
<td>0,45</td>
<td></td>
</tr>
</tbody>
</table>

Table 29: Costs for Flights out of Europe 411

Costs for flights out of Europe to the Far East 412

Figure 45: Costs for Flights out of Europe to the Far East 412

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409 Doganis (2002), p.290
410 see Strobl (2004b), p.19
411 see Strobl (2004b), p.19
412 see Strobl (2004b), p.19
Yields, however, are even more substantial for airlines. IATA economic analysis based on returns from 12 airlines for their services between Europe and North East Asia allow an interesting insight in terms of cabin class distinctions:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cabin class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>1 Passenger yield per RPK (US cents)</td>
<td>26.7</td>
</tr>
<tr>
<td>2 Yield index (Economy = 100)</td>
<td>545</td>
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<tr>
<td>3 Break-even load factor(%)</td>
<td>55</td>
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<tr>
<td>4 Load factor achieved (5)</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 30: Europe to/from North East Asia: Passengers results by class of service, 1999

“The level and structure of passenger fares are less important than the yield an airline actually obtains. Yield is the average revenue per passenger, per passenger kilometre or passenger tonne kilometre performed. They all measure the average revenue per unit of output sold.” Finally, there exists an indirect link between frequency and price. Higher frequency makes an airline more attractive to travellers with high time values, as they are willing to pay higher price for a flight with the home carrier. And this customer attitude is important for airlines, which urgently need both a high load factor together with high yields, as they have to cover the average operating costs.

5.5.1.1. Economy Class

The analysis of Economy Class fares for flights between Europe and Asia reveals, that mostly one airline dominates one single market with the lowest prices. This means that i.e. Emirates offers the cheapest flights out of Moscow to every city of Asia. For flights out of Nice Air France and Lufthansa compete for the best price to Asia. Rome is a perfect example for the effects of an oligopoly market in the airline business. Attempts by any one carrier to gain competitive advantage by dropping prices will invariably be matched by all others. Therefore, they all end up with similar fares. The route from Rome to Bangkok for instance: a journey via Frankfurt costs EUR 804,-, via Paris: EUR 809,-, via London: EUR 780,- and via Dubai only: EUR 728,-.

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413 Doganis (2002), p.292
414 Doganis (2002), p.294
415 see Lijesen / Rietveld / Nijkamp (2000), p.3
416 In 2001 the one way operating costs of a Boeing 747-400 for a flight: Europe – New York are USD 80.000 according Doganis (2002), p. 266
Additionally the case study shows, that there are tremendous differences between the lowest and highest tariff. If a customer chooses to fly from Moscow to Shanghai via Dubai, he pays only EUR 565,--. Flying via Frankfurt however, means that the passenger is charged EUR 2251,-- for the same destination. There are also examples, where Dubai is the most expensive hub to choose: A flight from Nice to Hong Kong costs EUR 2.344,-- via Dubai and only EUR 730,-- via Paris or Frankfurt.

There is definitely no relation between the distance and the price.

Fares are based on a sample journey from 15th March 2005 (outbound) until 23rd March 2005 (homebound) [+/- 1day]. All tariffs are quoted in Euros and include taxes as well as other surcharges. Price request was made late October 2004.
5.5.1.2. Business Class

Business Class fares show a similar trend as it applies to the Economy Class case study. There is mostly one airline that dominates one market. A flight via Dubai is only a reasonable decision when the journey starts at Athens, Zurich, Istanbul, Moscow, Glasgow, Vienna or Milan (with a few exceptions). Rome – Bangkok together with Nice – Osaka are two low fare routes in markets dominated by competitive airlines.

It is interesting that a Business Class ticket from Zurich to Osaka costs as little as EUR 2.678,- when the flight goes via Dubai. In case the customers choose Frankfurt or Paris as the transit airport, he has to pay EUR 6.853,- or EUR 7.445,- instead.

Once again, fares are based on a sample journey from 15th March 2005 (outbound) until 23rd March 2005 (homebound) [+/- 1day]. All tariffs are quoted in Euros and include taxes as well as other surcharges. Price request was made late October 2004.

All fares quoted in EUR incl. taxes and charges
Source: CRS Amadeus

Table 31: Economy Class Benchmark417

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417 compiled by the author according CRS Amadeus Reservation System data
<table>
<thead>
<tr>
<th>from</th>
<th>BKK</th>
<th>PVG</th>
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| LH | AF | BA | EK |
5.5.2. Aeronautical Charges, Taxes and Access Costs

5.5.2.1. Aeronautical Charges

Airports charge airlines, which use their services. Especially since the tragic events of 11th September 2001, the variety of surcharges to the net airfare has increased. As price of fuel increases rapidly, airlines have to cover those costs and introduce a fuel surcharge, which has become inevitable in the industry. Lufthansa charges EUR 2,- for domestic as well as for European flights and EUR 7,- for long distance flights. British Airways charges EUR 18,- for long distance flights and EUR 2,5 for short distance flights. IATA’s forecast for the period between August 2004 and August 2005 is US$ 10 billion additional costs for the whole industry.

“Aeronautical charging traditionally has been relatively simple, with most revenue coming from weight-based landing charge and a passenger fee dependent on passenger numbers ... At other airports charging practices have become more complex and more market based.” Further, “the hub airport responds to price increases of airlines by increasing its own price. The same holds true for its response to price increase of other airports.”

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418 compiled by the author according CRS Amadeus Reservation System data
419 see Graham (2003), p. 98 ff.
420 see APA (2004c), in: www.apa-defacto.at
421 see Strobl (2004a), p.13
422 Graham (2003), p.98
5.5.2.2. **Forms of Aeronautical Charges\footnote{424}{see Graham (2003), p.99 ff.}**

There are four main forms of aeronautical charges: **Landing charges**, **passenger charges**, **security charges** as well as **other charges**. In addition to that, **government taxes** and **ground handling/fuel charges** also exist. The following **landing charges** may apply:

a) **Weight Related Landing Charges**

The basis for weight related landing charges are the maximum take off weight (MTOW) or the maximum authorized weight (MAW). Airports, that charge a fixed amount unit rate (US $ XX each tonne), use the simplest method and finally favour smaller aircraft.

b) **Movement Related Charges**

As this fee is very unpopular with airlines operating flights by smaller aircraft, only on a few airports levy so called “movement related charges”.

c) **Minimum Landing Charges**

In order to encourage traffic to move away from congested airports, authorities adopted a “minimum landing charge”. Frankfurt charges: 35 tonnes minimum, Dusseldorf: 32 tonnes.

d) **Season / Time of the Day Charges**

London Heathrow and Gatwick have fixed runway charges at peak times. Higher charges in the early morning are charged at: Toronto, Mexico City or Brussels. During summer Menorca and Ibiza increase their landing charges whereas Dublin has a mixed form of them all.

e) **Other Landing Charge Forms:**

Airlines have to cover additional charges for Air Traffic Control (ATC) or charges for terminal navigational facilities. In France, Switzerland or Belgium noise-related surcharges are mandatory. Zurich, Geneva and Stockholm allocate emission charges.
“Elsewhere, more standard ICAO ‘chapter’ classifications are used. The level of noise, which aircraft make and the areas on ground, affected by the aircraft noise, serve as the basis of classification. This is the practice at the German and London airports and those serving the cities of Stockholm, and Oslo.” 425 France, Italy and Korea charge a separate noise tax.

**Passenger Charges:**

The second group of aeronautical taxes are the “passenger charges”, collected per departing passenger, with different rates for domestic, regional/EU or international travel. Some airports charge smaller amounts for transfer passengers: Amsterdam, Dublin, Frankfurt, Helsinki, Vienna and Copenhagen. On top of that Stockholm, Tokyo and Taipeih waive this fee completely, in order to encourage transit traffic.

**Security Charges:**

The reason why airport authorities charge security fees is the mandatory demand for higher security level after the events of 11th September 2001. Its duty is to finance airport security. “The provision of security services may be performed by airport’s own employees, or by private company under contract to the airport, the airlines, or a government agency.” 426

**Other Charges:**

In comparison to the previously mentioned duties, the shares for parking charges or lighting charges are very small. Aircraft's weight or the wingspan serve as a basis for parking charges in Singapore, Malaysia, Oman, Malta and some U.S. airports, such as Boston, Houston or Miami. Parking for a period of 1 up to 4 hours is free at most airports, except BAA plc’s London airports, Frankfurt, Hong Kong, Amsterdam, Dusseldorf, Manchester, Vienna or Canadian airports. There is a lighting charge in France and Italy. Other services for charges are fire fighting, storage facilities or hangar use.

425 Graham (2003), p.100
426 Graham (2003), p.101
Government Taxes:

Government taxes are charged for departing passengers. They do not directly go to the airport operator.

Ground Handling and Fuel Charges:

a) Ground Handling Fees:

In case the airline chooses service provided by the airport rather than leaving it to handling agents or other airlines, it has to pay so-called ground handling fees. These fees cover ramp handling, passenger handling, apron buses, aircraft cleaning, ground power or push back.

b) Fuel Charges:

Fuel companies collect fuel charges, with the Middle East as an exception. There the airports offer all services to the airline in one overall package. Transport from seaport to the airport, handling costs at the airport, import duties on fuel by the government and fix price measures by the government influence the charge. It is interesting that fuel is also expensive at Middle East airports, as close refineries do not meet local demand. There is no doubt that at any airline’s home base price for fuel is the lowest. Other discount factors are number of daily departures, size of aircraft and the sector distances over which they will be flying. Various additional factors also influence the price, such as the size of the airline, scale of its operation at the airport in question and airline’s use of service by the same handling agent and fuel company at other airports.

<table>
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<th>Eastern Europe</th>
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<td>74.3</td>
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<td>72.3</td>
<td>67.1</td>
<td>66.0</td>
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</table>

Cents per US gallon

Table 33: Average Fuel Prices Paid by International Scheduled Airlines, Sept. 1999

427 see Doganis (2002), p.107
428 Doganis (2002), p.107
“The level of fuel prices paid by airlines varies markedly between airports – even between airports in the same region.” 429 African and Middle East airports charge the highest rates, as US airports have cheap prices. Europe and Asia show a great diversity. Many airlines hedge by taking so-called call options in order to control increases in fuel costs.430

<table>
<thead>
<tr>
<th>City</th>
<th>Fuel Price (cents per US gallon)</th>
</tr>
</thead>
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<tr>
<td>Jeddah</td>
<td>101.2</td>
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Table 34: Average Fuel Prices Paid by International Airlines at Selected Airports, Oct. 2001 431

5.5.2.3. The Level of Aeronautical Charges, the Impact and the Criticism

“There is a wide spread of charges (excluding taxes) ranging from less than 300 Euros at Dubai airport over 5000 Euros at New York Newark, Moscow, Kansai, and Athens. Dubai has not increased its charges for many years and reduced them after 11th September 2001.”432 IATA Director General Giovanni Bisignani wanted to freeze or at least lower them in the difficult period after the year 2001, as in 2000-01 the operating margins reached 27.6% for airports and 23.4% for air navigation service providers.433 As the total costs for the airlines of added security in 2002 was about US$ 3 billion, he attached that “Governments should implement and pay for aviation security not the airlines, not the airports and not their customers who are already taxpayers.” 434

As monopolies, airports have been able to pass on the costs of excess capacity to the carriers in the form of higher charges – costs that few of today’s financially unstable airlines can afford. In 2000 the top 10 airport companies (ranked by revenues 2000) reached a cash margin of 42% and a profit margin of 12%. The top 10 airlines, however, accounted for 12% cash margin together with 3% profit margin, which undoubtedly manifest the current discrepancy in the aviation industry. 435

430 see Doganis (2002), p.109
434 see The Boston Consulting Group (2004), p.11
Airlines are paying over US$ 15 billion to airports and air traffic service providers annually for their international services alone. In 2002 it accounted for nearly 10 % of airline operating costs. Another survey - covering 2000 and 2001 - revealed that airports recorded operating margins of 27,6% (London Heathrow: 41%, Frankfurt: 32%) compared to 4,8% for the top 150 airlines.  However, some airports actively reacted and lowered their charges in order to encourage airlines: Amsterdam reduced landing fees by 4,5%, Singapore by 10%, Athens by 15-23%, Dubai by 50%, Copenhagen by 10% for international flights only and Cyprus airports temporarily waived landing fees for all flights.  Vienna airport reduced landing fees by 16% and waived parking fees for the time between 10 p.m. and 6 a.m. Incentives are offered for flights to Eastern Europe, with a refund up to 40% of the landing fees. Long distance flights do also benefit from this incentive programme.  Hong Kong airport maintained the 15% reduction in landing and parking charges which it had introduced in 2000 to strength its position as a major hub airport in the Asian region. Munich airport – Lufthansa’s second hub - increased landing charges by 2%. Passengers pay EUR 9,86 for domestic, EUR 10,6 for European and EUR 12,08 for long distance flights.  

436 Graham (2003), p. 105  
437 see IATA (2002a), in: http://www1.iata.org/pressroom/pr/2002-10-08-34.htm  
438 see Graham (2003), p.106  
439 see APA (2004e), in: http://www.apa-defacto.at  
440 see Graham (2003), p.106  
441 see APA (2004d), in: http://www.apa-defacto.at
Airport charges typically account for one quarter of the price of the average airline ticket. This figure summarizes the latest findings of the Boston Consulting Group:

![Airport and Non-Airport Related Costs](image)

Values in brackets show % of Total Cost

**Figure 47: Airport and Non-Airport Related Costs**

<table>
<thead>
<tr>
<th>USD per turn-round</th>
<th>Airport charge related to:</th>
<th>Airport charges</th>
<th>Government Taxes</th>
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<tr>
<td></td>
<td>Aircraft</td>
<td>Passenger</td>
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<tr>
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<td>5,614</td>
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<tr>
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<td>9,779</td>
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<td>Rome FCO</td>
<td>2,250</td>
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Table 35: Representative Airport Charges for a Boeing 747, Oct. 2000

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443 Doganis (2002), p.111
The previous graph shows the proportion of landing and fly-over charges to airline's variable costs. Although Austrian Airlines is able to control its variable costs and keep them constant somehow, aeronautical charges increased dramatically (+132%: 1995 vs. 1985).

Finally a revenue breakdown of selected European airports illustrates the importance of aeronautical charges in terms of airport income. The majority of the quoted airports have similar proportions of passenger-related revenue at around 80%. Unique Zurich Airport (UZA) has the lowest exposure at 72%.
However “the huge financial pressures on the major carriers will leave them with little choice but to consolidate their traffic into mega hubs, sidelining many of today’s primary and secondary hubs” 446, as not all carriers can choose the more efficient polar routes and avoid overflight charges. 447 Without doubt Dubai is definitely the cheapest transit airport in this case study. There is no route where passengers pay a lower airport taxes. The most expensive route in terms of aeronautical charges is Glasgow – Frankfurt – Osaka with EUR 186,.-. In comparison taxes for a flight from Glasgow to Osaka via Dubai are as little as EUR 78,.-.

Undeniably customers do not make their final decision based on airport charges. But as these taxes are added to the fare, it certainly has an effect. The following aeronautical charges and taxes apply for flights departing on 15th March 2005 (outbound) and returning 23rd March 2005 (homebound) [+/- 1day]. All taxes are quoted in Euros. Price request was made late October 2004.

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447 see Canaday (2001a), p.73
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All taxes quoted in EUR
Source: CRS Amadeus
Applicable for flights
outbound: 15th March 2005; homebound: 23rd March 2005

Table 36: Aeronautical Charges and Taxes Benchmark

In terms of aeronautical charges, Dubai is the most competitive airport with EUR 200,- aircraft related taxes for an international Boeing B737-800 turnaround. Unfortunately there is no comparable data for Frankfurt available. Therefore the benchmark is limited to Paris, London and Dubai only. A similar survey by Cranfield University, however, helps to integrate Frankfurt into this benchmark. Frankfurt’s aircraft related charges for a Boeing 747 in October 2000 were quite comparable to those of Paris CDG. Government taxes were equal to Paris CDG and passenger charges twice as much as Paris CDG imposed. Consequently we can assume that the same ratio applies for a Boeing B737-800.

448 compiled by the author according CRS Amadeus Reservation System data
449 see Doganis (2002), p.111
5.5.2.4. Access Costs

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<td>5,84</td>
<td></td>
<td>1,95</td>
<td></td>
</tr>
<tr>
<td>Shanghai</td>
<td>4,13</td>
<td>1,84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osaka</td>
<td>117</td>
<td>18</td>
<td>9,5</td>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
<td>39</td>
<td>9,74</td>
<td>3,9</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>10,64</td>
<td></td>
<td>2,31</td>
<td>0,9</td>
</tr>
<tr>
<td>Delhi</td>
<td>7</td>
<td></td>
<td>0,87</td>
<td></td>
</tr>
<tr>
<td>Bombay</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>London</td>
<td>35,67</td>
<td>21,4</td>
<td>10</td>
<td>5,71</td>
</tr>
<tr>
<td>Paris</td>
<td>38</td>
<td>7,75</td>
<td>10,00</td>
<td></td>
</tr>
<tr>
<td>Frankfurt</td>
<td>4,5</td>
<td>2,9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dubai</td>
<td>2</td>
<td></td>
<td>0,41</td>
<td></td>
</tr>
</tbody>
</table>

Table 37: Surface Transport Costs \(^{451}\) (Fares in EUR)

---

\(^{450}\) see Graham (2003) p. 105

\(^{451}\) compiled by the author according CRS Amadeus Reservation System data
Access-mode to the airport adds a certain spread on the total travel costs as well as on the total travel time. Consequently, it directly influences the travel indicator access time. As the journey always starts from the same city in this benchmark (measurement of flights i.e.: FCO-LHR-BKK vs. FCO-DXB-BKK vs. FCO-CDG-BKK vs. FCO-FRA-BKK), this chapter has informative character only. We can consider that the passenger opts for a certain mode of transport (public – private) regardless of the route or airline he chooses. Nevertheless, it is important to know the spread on the ticket price.

5.5.3. Safety

The second most-important feature in terms of customers’ preferences is safety and reputation for safety. Air transport is the safest mode of transport compared to others.

Authorities and governments control the level of safety with laws and regulations on aircraft and maintenance. Unfortunately accidents in the aviation industry attract great attention, as the numbers of casualty per event exceed at least 100 people. 452

Maintenance costs encounter for approximately 11% of an airline’s total expenses. 453 In addition to that it is also a time intensive factor:

<table>
<thead>
<tr>
<th>Event</th>
<th>Interval</th>
<th>Ground time per event</th>
<th>Ground time per event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Flight-Check</td>
<td>Prior each flight</td>
<td>30 - 60 min</td>
<td>1</td>
</tr>
<tr>
<td>Ramp-Check</td>
<td>Daily</td>
<td>2 - 5 hours</td>
<td>6 – 35</td>
</tr>
<tr>
<td>Service-Check</td>
<td>Weekly</td>
<td>2.5 - 5 hours</td>
<td>10 – 55</td>
</tr>
<tr>
<td>A-Check</td>
<td>350-650 flying hours</td>
<td>5 – 10 hours</td>
<td>45 – 260</td>
</tr>
<tr>
<td>C-Check</td>
<td>15 - 18 months</td>
<td>36 – 48 hours</td>
<td>650 – 1800</td>
</tr>
<tr>
<td>IL-Check</td>
<td>5 - 6 years</td>
<td>2 weeks</td>
<td>up to 25000</td>
</tr>
<tr>
<td>D-Check</td>
<td>5 - 10 years</td>
<td>4 weeks</td>
<td>up to 60000</td>
</tr>
</tbody>
</table>

Table 38: Maintenance Costs 454

Every year International Civil Aviation Organization (IACO) Statistical Yearbooks / Traffic Results publish a ranking of all major airlines and their numbers of accidents. The JACDEC safety rate in this figure is based upon the casualties multiplied by 1000 and divided by airline’s Revenue Passenger Kilometres. The table only mentions air carriers with a high influence on the European-Asian traffic.

454 see Lufthansa (2001), p. 59
<table>
<thead>
<tr>
<th>Airline</th>
<th>Foundation</th>
<th>Number of lost aircraft</th>
<th>Number of casualties</th>
<th>JACDEC Safety-rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emirates</td>
<td>1985</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>British Airways</td>
<td>1935</td>
<td>5</td>
<td>67</td>
<td>0.04</td>
</tr>
<tr>
<td>Lufthansa</td>
<td>1926</td>
<td>3</td>
<td>61</td>
<td>0.05</td>
</tr>
<tr>
<td>Air France</td>
<td>1933</td>
<td>8</td>
<td>220</td>
<td>0.22</td>
</tr>
<tr>
<td>Cathay Pacific</td>
<td>1946</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>All Nippon Airw.</td>
<td>1958</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>United Airlines</td>
<td>1931</td>
<td>8</td>
<td>261</td>
<td>0.08</td>
</tr>
<tr>
<td>Singapore Airlines</td>
<td>1972</td>
<td>1</td>
<td>83</td>
<td>0.09</td>
</tr>
<tr>
<td>Northwest Airlines</td>
<td>1926</td>
<td>3</td>
<td>165</td>
<td>0.09</td>
</tr>
<tr>
<td>SAS</td>
<td>1946</td>
<td>5</td>
<td>110</td>
<td>0.26</td>
</tr>
<tr>
<td>KLM</td>
<td>1919</td>
<td>3</td>
<td>251</td>
<td>0.30</td>
</tr>
<tr>
<td>Japan Airlines</td>
<td>1951</td>
<td>6</td>
<td>584</td>
<td>0.42</td>
</tr>
<tr>
<td>Asiana</td>
<td>1988</td>
<td>1</td>
<td>68</td>
<td>0.54</td>
</tr>
<tr>
<td>Thai Airways Int.</td>
<td>1959</td>
<td>10</td>
<td>429</td>
<td>0.88</td>
</tr>
<tr>
<td>Garuda Indones.</td>
<td>1949</td>
<td>14</td>
<td>411</td>
<td>1.39</td>
</tr>
</tbody>
</table>

Table 39: Safety Statistic

IACO also measures, which countries meet the IACO safety standard. Only “exotic” countries like Haiti, Honduras, Swaziland, etc. do not meet category 1. The same applies for Bulgaria, Serbia and Montenegro (Formerly Republic of Yugoslavia), Argentina or Uruguay. Here is an extract of the 2004 report:

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>CATEGORY</th>
<th>COUNTRY</th>
<th>CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1</td>
<td>Italy</td>
<td>1</td>
</tr>
<tr>
<td>Austria</td>
<td>1</td>
<td>Japan</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>1</td>
<td>Saudi Arabia</td>
<td>1</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
<td>Singapore</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
<td>Thailand</td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>1</td>
<td>United Arab Emirates</td>
<td>1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1</td>
<td>United Kingdom</td>
<td>1</td>
</tr>
<tr>
<td>Argentina</td>
<td>2</td>
<td>Uruguay</td>
<td>2*</td>
</tr>
</tbody>
</table>

Table 40: International Aviation Safety Assessment (IASA) Program

Note - For those countries not serving the U.S. at the time of the assessment, an asterisk "*" will be added to their Category 2 determination.

---

5.5.4. Schedule, Schedule Convenience and Total Travel Time

Connecting flights to prime hubs leave Europe between 3 p.m. and 9 p.m. (except flights to India on Lufthansa, British Airways and Air France, which depart in the morning). As there is normally only one flight (possibility each airline) eastbound, passengers have no (or limited) chance to choose between different departure possibilities compared to the huge amount on the trans-atlantic route. Passengers can choose to leave Zurich with Emirates at 2.45 p.m. with an arrival time in Bangkok at 12.10 a.m. the following day (EK 88 / EK 384) or prefer Lufthansa flight at 7.20 p.m. and arrive in Bangkok at 2.10 p.m. the following day (LH 3729 / LH 744). The personal - value of an earlier or later departure time is not measurable and its importance varies from event to event. Total travel time – which is the only comparable constant factor here – serves as the basis for schedule convenience measurement. In terms of total travel time, Frankfurt convinces as the ideal transit station. Although Dubai has the smallest maximum distance from one gate to the other including the smallest Minimum Connecting Time, it seldom makes sense to travel via the Middle East, except for flights out of Istanbul together with selected flights out of Moscow, Rome as well as Athens. It has to be mentioned, however, that the travel time differences are not more than 3 hours (average). In some cases, travel via Dubai is a lot closer to the quickest route than these 3 hours. But other flights take up to 7 hours longer than via alternative airports.

All values of the total travel time are based on a sample journey from 15th March 2005 (outbound) until 23rd March 2005 (homebound) [+/- 1day]. All values are quoted in hours and decimal system. Request was made late October 2004.

<table>
<thead>
<tr>
<th>From</th>
<th>to</th>
<th>BKK</th>
<th>PVG</th>
<th>KIX</th>
<th>HKG</th>
<th>SIN</th>
<th>DEL</th>
<th>BOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCO</td>
<td></td>
<td>12,9</td>
<td>13,3</td>
<td>14,2</td>
<td>13,8</td>
<td>14,6</td>
<td>10,3</td>
<td>10,7</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>14</td>
<td>14,9</td>
<td>16</td>
<td>16,1</td>
<td>11,2</td>
<td>11,7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,3</td>
<td>15,5</td>
<td>15,6</td>
<td>16,8</td>
<td>13,1</td>
<td>14,1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13,3</td>
<td>20,9</td>
<td>14,6</td>
<td>13,8</td>
<td>11,8</td>
<td>10,8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATH</td>
<td></td>
<td>14,1</td>
<td>15,3</td>
<td>19,3</td>
<td>14,8</td>
<td>16,9</td>
<td>15,5</td>
<td>15,8</td>
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<tr>
<td></td>
<td>16,4</td>
<td>16,3</td>
<td>19,4</td>
<td>17</td>
<td>17,5</td>
<td>12,7</td>
<td>13,2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19,8</td>
<td>17,9</td>
<td>17,8</td>
<td>20,9</td>
<td>13,8</td>
<td>17,8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,7</td>
<td>23,1</td>
<td>17,9</td>
<td>16,8</td>
<td>14,3</td>
<td>13,3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZRH</td>
<td></td>
<td>12,8</td>
<td>13,4</td>
<td>13,7</td>
<td>13,8</td>
<td>14,6</td>
<td>9,83</td>
<td>10,2</td>
</tr>
<tr>
<td></td>
<td>14,9</td>
<td>14,8</td>
<td>15,5</td>
<td>15,5</td>
<td>16</td>
<td>13,5</td>
<td>11,3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14,9</td>
<td>15</td>
<td>15,6</td>
<td>16,1</td>
<td>10,9</td>
<td>12,8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,4</td>
<td>23,1</td>
<td>17,7</td>
<td>16,8</td>
<td>14</td>
<td>13,2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

129
<table>
<thead>
<tr>
<th></th>
<th>DUS</th>
<th>MUC</th>
<th>IST</th>
<th>MAN</th>
<th>SVO</th>
<th>DME</th>
<th>NCE</th>
<th>GLA</th>
<th>VIE</th>
<th>MXP</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH</td>
<td>12.1</td>
<td>12</td>
<td>14</td>
<td>15</td>
<td>15</td>
<td>12.6</td>
<td>13.1</td>
<td>16.1</td>
<td>12.8</td>
<td>13.7</td>
</tr>
<tr>
<td>AF</td>
<td>13.5</td>
<td>13</td>
<td>15</td>
<td>13</td>
<td>17.1</td>
<td>13.8</td>
<td>13.8</td>
<td>15.9</td>
<td>14.6</td>
<td>14.3</td>
</tr>
<tr>
<td>BA</td>
<td>13.2</td>
<td>15.3</td>
<td>15.8</td>
<td>15.1</td>
<td>17.8</td>
<td>15.2</td>
<td>13.4</td>
<td>16.8</td>
<td>17.3</td>
<td>17.2</td>
</tr>
<tr>
<td>EK</td>
<td>9.33</td>
<td>9.25</td>
<td>16.2</td>
<td>10.3</td>
<td>14.3</td>
<td>9.75</td>
<td>10.8</td>
<td>12.8</td>
<td>13.6</td>
<td>14.9</td>
</tr>
<tr>
<td></td>
<td>9.67</td>
<td>9.5</td>
<td>16.3</td>
<td>10.7</td>
<td>14.3</td>
<td>9.58</td>
<td>11.5</td>
<td>12.1</td>
<td>12.6</td>
<td>10.3</td>
</tr>
</tbody>
</table>

- LH: Lufthansa
- AF: Air France
- BA: British Airways
- EK: Austrian Airlines

**n.c. ... no connection possible according schedule**

**time quoted in hours (decimal system)**


Source: CRS Amadeus

Table 41: Total Travel Time Benchmark

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457 compiled by the author according CRS Amadeus Reservation System data
5.5.5. Minimum Connecting Time and Connectivity Ratio

It is not always a question of flight speed. Time on ground has to be limited as good as possible. Although all airlines and alliances offer outstanding ground service (Lounges, Arrival Service, Health Clubs, Shower-facilities, etc.), passengers normally want to leave an airport as quick as possible. Therefore it is crucial that minimum connecting time and the maximum distance from one (arrival) gate to another (departure) gate are shortest. Competitive connecting procedure reduces transfer times and increases customer service (travel comfort). Dubai does not only offer the shortest “maximum distance from gate to gate” with 500m but also the quickest minimum connecting time: 20 minutes up to 100 minutes according to the type of connection. Transfer via London Heathrow means to expect a maximum walking (or running – in case the flight is delayed) distance of 3 kms and a minimum connecting time of 45 up to 130 minutes.

<table>
<thead>
<tr>
<th>Transfer Times</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max. distance from gate to gate</strong></td>
</tr>
<tr>
<td>Dubai</td>
</tr>
<tr>
<td>Paris CDG</td>
</tr>
<tr>
<td>Frankfurt</td>
</tr>
<tr>
<td>London Heathrow</td>
</tr>
</tbody>
</table>

Figure 51: Transfer Times

“On-line schedule co-ordination can be measured using a connectivity ratio, which shows the degree to which linkages are more than purely random. It allows for varying volumes of flights operated and different minimum connect times at each of the hubs.”

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458 compiled by the author see Austrian Airlines Group (2004b) ; Air France (2002), p. 73 ff ; The Department of Civil Aviation (2000) ; CRS Amadeus Reservation System
459 Doganis (2002), p.258
Dubai, Frankfurt, Paris and London Heathrow convince with highly integrated schedules (close or above 2.0). “A ratio of 1.0 suggests connections are no better than would be expected with random pattern of schedules. A ration of 2.0 suggests twice as many connections would be achieved on this random basis.”

The chart compares the level of activity at the station and a connectivity index, based on a selected week. The connectivity index is based on an aggregation of flights within specified travel time interval. Dubai airport definitely shows the highest connectivity index superior to its competitors. European prime hubs, however, have a higher station activity.

Finally, Skytrax awarded Dubai International Airport second best transit airport in terms of convenience and infrastructure. The outstanding possibilities passengers have together with the terminal product facilities are the basis for this international recognition. Only Singapore Changi Airport got a better quality ranking in 2004.

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461 Doganis (2002), p.258
5.5.6. Comfort, Quality, Image and Service on Ground

5.5.6.1. Comfort and Quality

Most of the time airports offer one overall product: appeal to a very heterogeneous collection of passengers. Pressure was coming from the travelling customer, as he became more experienced and demanding. Privatization supported competition between airports. It is hard, however, to measure quality of service because of the characteristic uneven spread of demand. Airport service is a result of combined activities of several organizations (i.e.: airlines, handling agents, customs control, immigration officers, concessionaires), with partial control by the airport authorities themselves.

Travellers arrive at airports with different kind of expectations, which lead to a level of segmentation’s increase: separate check-in areas, airline and contract lounges, fast track systems, valet parking or concept lounges (i.e. pay-as-you-go lounge at London Heathrow for a GBP 25,- entrance and no membership need or KLM’s “Holideck” at London Heathrow to cater for families with children).463

Airport measurements allow verifying the service standard many airports adopt with the help of objective and subjective measures. “Objective indicators measure the service delivered and can cover areas such as flight delays, availability of lifts, escalators and trolleys, and operational research surveys such as queue length, space provision, waiting time, and baggage reclaim time.” 464 As objective indicators cannot measure if customers feel safe or are satisfied with the equipment, there is a need to look at passengers’ satisfaction ratings. 465 Mystery shoppers, comment/complaint cards, customer services are popular tools. ACI and IATA publish the results of their worldwide surveys and have an essential marketing effect. 466 “In 2002, Dubai achieved the overall highest ranking in the survey followed by Singapore Changai and Copenhagen ... In 2001, Dubai was not included in the study ... for European airports, for example, in 2001, Helsinki was ranked first by business travellers whilst Copenhagen had the highest ratings from leisure passengers ... The regularity with which the IATA survey is undertaken has meant that is has been generally accepted within the industry.” 467

463 see Graham (2003), p.75
464 Graham (2003), p.76
465 see Graham (2003), p. 78
466 see Graham (2003), p. 78 ff.
467 Graham (2003), p. 81
Overall passenger satisfaction levels:
best performing airport from IATA’s 2001 global airport monitor by size of airport

<table>
<thead>
<tr>
<th>Airports &gt; 25 million annual passengers</th>
<th>Airports 15-25 million annual passengers</th>
<th>Airports &lt; 15 million Annual passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Hong Kong</td>
<td>2. Copenhagen</td>
<td>2. Vienna</td>
</tr>
<tr>
<td>5. Atlanta/Seattle</td>
<td>5. Zurich</td>
<td>5. Geneva</td>
</tr>
</tbody>
</table>

Table 43: Overall Passenger Satisfaction Levels

Rating categories in IATA’s Global Airport Monitor are:
- Overall passenger satisfaction
- Restaurant/eating facilities
- Way finding/signposting
- Ground transport to/from the airport
- Flight information
- Courtesy of airport staff
- Connection making with other flights
- Waiting/gate areas
- Shopping facilities
- Parking facilities

Overall Passenger Satisfaction in 2002

![Graph showing overall passenger satisfaction ratings for different cities in 2002](image)

Figure 53: Overall Passenger Satisfaction in 2002

In order to guarantee an exact quality of service, airlines tend to arrange service level agreements (SLAs) or strategic partnership agreements (SPAs).

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469 see IATA (2003d), in: http://www.iata.org/productsandservices/gam.htm ; Sterzenbach / Conrady (2003), p. 130
471 see Graham (2003), p.82
ACI also publishes its investigated quality of service measurement at airports. All areas are represented except South America. Overall, 120 airports responded (i.e. Frankfurt, Paris, Chicago, Johannesburg, Tokyo or Sydney). Forty-three percent of the respondents said that they used objective criteria, while 62% used subjective criteria. The survey included measures like: availability of trolleys, elevators, escalators, moving walkways, conveyors, taxi services, waiting time, queue length at check-in, security and immigration cleanliness, baggage delivery, complaints and comments.  

| Criteria most frequently used to measure quality of service at ACI airports |
|---|---|---|
| Airport process | Objective criteria | Subjective criteria |
| General | Response to/analysis of complaints/mail comments | Overall customer satisfaction on terms of attractiveness/ convenience/quality |
| | Availability of lifts/escalators/ moving walkways etc | |
| | Availability of trolleys | |
| | Cleanliness | |
| Flight information displays, information desk/telephone | Quality of public announcements | |
| Check-in | Waiting time/queue | |
| Security check | Waiting time/queue | |
| Immigration | Waiting time/queue | |
| Catering | | Overall satisfaction |
| Shops, commercial services (banks, post offices, etc.) | | Overall satisfaction |
| Baggage delivery | | Overall satisfaction |
| Ground access | | Overall satisfaction: ground access/public transportation |

Table 44: Criteria Most Frequently Used to Measure Quality of Service at ACI Airports  

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472 see Graham (2003), p.78 f.  
5.5.6.2. Service on Ground

We have to distinguish between service offered by the airport authorities and by the airlines themselves. Especially in the USA airlines finance new terminals, which they finally own. Therefore they directly influence the infrastructure according to their passengers’ needs and expectations (i.e. United’s and American’s terminals at Chicago O’Hare or JFK’s Terminal One Group: Lufthansa, Air France, Japan Airlines and Korean). 474

“Airline decisions about the level of airport service they offer to their customers will be a reflection of their overall business strategy.” 475 “Major efforts have been made in recent years to establish airport service as a significant area of product differentiation.” 476 Emirates and ANA offer limousine services to premium passengers, Eva Air a free coach service within city limits. Other tools are curbside check-in or separate check-in counters for premium passengers in order to avoid long lines. Airlines also provide fast tracks at customs, security or passport control at their home hubs or at other important destinations. “Hub airports are often provided with executive lounges, separate ticket/check-in facilities and other attributes that benefit local travellers but that are not costless.” 477

Lounge service is an important factor to attract high yield passengers, whether it is a departure or arrival lounge. Some airlines have contract with luxurious airport hotels. United Airlines calls its programme “United Arrivals Suite”. The airline offers its First Class and full fare Business Class customers, who arrive after an international night flight in the morning rooms with showers, business centres and breakfast.478 Some lounges or airports enjoy special recognition: business traveller magazines always recommend Virgin Atlantic’s Clubhouses. Singapore Airport even makes free cinema, sauna or jacuzzi available to its customers. Copenhagen airport offers a wide range of service facilities: Shopping Centres or Sauna.

Star Alliance introduced the first worldwide Star Alliance lounge in Zurich. This is the first lounge build and equipped by a joint Star Alliance budget. In contrast to other Star Alliance destinations, you can find only one lounge in Zurich now. Members have to pay staff or equipment only once.

474 see Maurer (2003), p.244
475 Shaw (2004), p.164
476 Shaw (2004), p.165
477 Button / Stough (2000), p. 236
478 see United Airlines (2003), p.3
This optimizes costs, as at other stations like London Heathrow, Bangkok or Hong Kong you can find up to 5 alliance partner’s lounges in one terminal.  

5.5.6.3. Airport Measurement

Passengers also rated the hubs of the major carriers. In this benchmark, Skytrax evaluates airport services at Paris CDG, London LHR, Dubai DXB and Frankfurt FRA. Ratings depend on the service provided by the airports, handling agents and airlines.

<table>
<thead>
<tr>
<th>Airport Services</th>
<th>CDG (Air France)</th>
<th>LHR (British Airways)</th>
<th>DXB (Emirates)</th>
<th>FRA (Lufthansa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check-in premium</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td>Check-in economy</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Transfer Service – premium</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Transfer Service – economy</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Arrival Service</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>First Class Lounge – product facilities</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td>First Class Lounge – staff service</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Business Class Lounge – product facilities</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Business Class Lounge – staff service</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
</tbody>
</table>

Source: Skytrax

Table 45: Comfort Benchmark on Ground

<table>
<thead>
<tr>
<th>Airports</th>
<th>Satisfaction Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changi Singapore</td>
<td>87,95%</td>
</tr>
<tr>
<td>Heathrow Terminal 4</td>
<td>87,20%</td>
</tr>
<tr>
<td>Dubai International</td>
<td>87,10%</td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>87,03%</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>86,80%</td>
</tr>
<tr>
<td>Kuala Lumpur</td>
<td>85,28%</td>
</tr>
<tr>
<td>Barcelona</td>
<td>85,28%</td>
</tr>
<tr>
<td>Schipol, Amsterdam</td>
<td>85,23%</td>
</tr>
</tbody>
</table>

Table 46: Airport Satisfaction Rate

---

479 see Star Alliance (2002), p. 81 ff.
Additionally ACI and IATA made passenger satisfaction surveys. Dubai was the best airport worldwide in 2003. The major traveller magazine Conde Nast published its annual airport satisfaction rate in 2004. London had a satisfaction level of 87.2% and close behind followed Dubai with 87.1%. This third internationally recognized survey determines, that Dubai offers an outstanding quality standard in terms of airport services.

5.5.6.4. Dubai International Airport’s Profile, Quality and Innovations

The 10 million web poll Skytrax is an influential and honoured quality guide for the international aviation industry. Experts and international travellers can cast their votes. International surveys finally approve the ratings. Unfortunately Skytrax has not concluded its latest survey yet. Dubai International Airport’s and London Heathrow’s data is available, Frankfurt’s and Paris CDG’s not. No other – comparable to Skytrax – rating or measurement report has been found, which offers such an outstanding amount of information.

Dubai International Airport got four stars (out of five) in Skytrax’s airport ranking. London Heathrow got “only” three stars. In the main categories terminal product facilities and airport staff service, Dubai won four stars (London: three stars).

<table>
<thead>
<tr>
<th>Airport</th>
<th>Security “Comfort”</th>
<th>Terminal(s) Security</th>
<th>Perimeter/Externals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dubai DXB</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>Frankfurt FRA</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★★</td>
</tr>
</tbody>
</table>

★★★ 3 stars rated fair, maximum 5 stars (excellent) – minimum 1 star (very poor)

Table 48: Airport Security Ranking 484
The standard of airport web side was honoured with three stars (London four stars). \(^{485}\) Airport Security is another main subject. In Skytrax’s Security report was only data for Dubai and Frankfurt available.

“Many of the Gulf airports are in fierce competition for transit and transfer traffic – albeit to a lesser extent nowadays because of more non-stop long-haul flights.” \(^{486}\) They have probably done more than any other airports in the world to attract passengers by promoting the duty free facilities on offer.” \(^{487}\) “In December 1993 the airport introduced the first Dubai Duty Free (DDF) shop. Since 1984, the turnover associated with these sales has increased by over 1000 per cent, totalling around US$ 306 million in 2002. It is the fifth largest duty free outlet at an airport in terms of turnover.” \(^{488}\)

In order to attract even more transit passengers, “the DDF launched its ‘Dubai Duty Free Finest Surprise’ to mark the expansion of its shopping complex.” \(^{489}\) Customers are able to win a Rolls Royce Bentley Mulsanne car. Tickets for this competition are sold only within the Duty Free area, the cheapest one for USD $100,-. “After 1991 two cars were offered simultaneously and, by early 2003, 1078 luxury cars had been won by travellers from over 65 different countries.” \(^{490}\)

The airport has started more investments in order to attract as many international passengers as possible. On the one hand there is the Dubai Shopping Festival every year, Dubai Summer Surprises, FIFA World Youth Championship, Dubai Rugby Sevens, Dubai World Cub and other events. \(^{491}\) On the other hand the city of Dubai attempts to attract business and leisure travellers with new – out of state architecture.

“In 2000 a new duty-free complex was opened and covers an area of 9000 square metres and is four times larger than the previous shop. All routes to the 27 departure gates go through the retail area. To commemorate the opening of these new facilities, the airport launched another promotion called the ‘Dubai Duty Free Finest Cyber Surprise’. The promotion offered US$ 1 million to winners,... for nearly $ 300 a ticket.” \(^{492}\)

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\(^{485}\) See Skytrax (2004h), in: http://www.airlinequality.com/AirportRanking/dxb.htm;


\(^{486}\) Graham (2003), p.172

\(^{487}\) Graham (2003), p.173

\(^{488}\) Graham (2003), p.173

\(^{489}\) Graham (2003), p.173

\(^{490}\) Graham (2003), p.173

\(^{491}\) See Clark (2003), p.11, in: http://www.ekgroup.com

\(^{492}\) Graham (2003), p.173
“In support of Commercial’s strategic objective to grow passenger traffic to Dubai, a number of tactical products were developed in partnership with Dubai’s leading hotels, generating sales in excess of 120,000 hotel nights. Meetings, trade fairs, conventions and conferences were supported by special fares and promotions and for passengers wanting a short break in Dubai; the successful Dubai Stopover programme was further enhanced.” 493

Here is a selection of Dubai International Airport’s Star Ranking: This survey approves, that Dubai is – in terms of measurable quality – an ideal hub or connecting airport for international travellers. It convinces with outstanding service facilities and can easily compete with European prime hubs. IATA and ACI’s Customer Satisfactory Survey also affirms that impression.

<table>
<thead>
<tr>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Transport facilities</td>
</tr>
<tr>
<td>Cost/Location of Public Transportation</td>
</tr>
<tr>
<td>Easy access by car</td>
</tr>
<tr>
<td>Cost/Location/Availability of taxis</td>
</tr>
<tr>
<td>Cost/Location of Hotel Shuttle buses</td>
</tr>
<tr>
<td>Location/Access to Car Rental facilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arrivals / Departures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting times at Check-in</td>
</tr>
<tr>
<td>Baggage trolley/carts throughout the airport</td>
</tr>
<tr>
<td>Connecting between Terminal(s)</td>
</tr>
<tr>
<td>Time/distance to Boarding gates</td>
</tr>
<tr>
<td>Clear Directional signing around airport</td>
</tr>
<tr>
<td>Walking distance – Arrivals, Transit, etc.</td>
</tr>
<tr>
<td>Waiting times for baggage delivery</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security / Immigration / Customs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting times at Security screening points</td>
</tr>
<tr>
<td>Efficiency of Security screening points</td>
</tr>
<tr>
<td>Waiting times at Immigration</td>
</tr>
<tr>
<td>Attitude/Friendliness of Immigration staff</td>
</tr>
<tr>
<td>Customs Clearance procedures</td>
</tr>
<tr>
<td>Attitude of Customs staff</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food &amp; Beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of restaurants/food outlets</td>
</tr>
<tr>
<td>Prices of food and beverages</td>
</tr>
<tr>
<td>Staff Service in restaurant/food outlets</td>
</tr>
<tr>
<td>Language abilities of staff</td>
</tr>
</tbody>
</table>

### Shopping Facilities

| Information about Shopping facilities | ++++
| Exciting/stimulating shopping environment | +++
| Selection of shop outlets | ++++
| Prices of international brand items in shops | ++++
| Quality of Staff Service on shops | +++
| Language abilities of staff | +++

### Terminal Comfort

| Seating Areas – Comfort & Capacity | +++
| Passenger crowding around terminal | +
| Terminal Ambience & Decor | ++++
| Cleanliness of Terminal areas | +++
| Standard of air-conditioning | ++++
| Natural daylight in Terminal | ++++
| Views of the aircraft/runways | +++
| Smoking policy/smoking rooms | +
| Children's play facilities | +
| Washrooms – numbers/location | +++
| Washrooms – cleanliness/presentation | ++
| Showers – numbers/locations | +
| Showers – cleanliness/presentation | +
| Disabled/Baby room facilities | +++
| Transit Hotel/Dayroom facilities | ++++
| Other leisure facilities | +
| Visibility of Customer service counters | +++
| Quality of service at counters | ++

### Business Facilities

| Cash machines/Bureau de Change | ++++
| Supply of Public Telephones | ++++
| Supply of Internet facilities | +
| Business Centre/Workstation areas | +++
| Location/Accessibility of lounges | +++

### SUMMARY RANKING

| Terminal Product Facilities | +++
| Airport Staff Service | +
| Standard of Airport Web Site | ++

**Source:** Skytrax: ++++ best + worst

---

5.5.7.  Comfort, Quality, Image and Service in the Air

Airlines from Asia and the Middle East traditionally offer a high level of quality. A summary of the major business and travel magazine surveys in terms of price-performance ratio, service, reliability, on time performance, safety, seat comfort, food&beverage as well as frequent flyer programme, help to give an exact plus measurable overview.

<table>
<thead>
<tr>
<th>Comfort Benchmark Onboard</th>
<th>Air France</th>
<th>British Airways</th>
<th>Emirates</th>
<th>Lufthansa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onboard Features</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflight Entertainment ^1</td>
<td>+++</td>
<td>++++</td>
<td>++++</td>
<td>+++</td>
</tr>
<tr>
<td>Passenger Comfort Amenities</td>
<td>+++</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td>Onboard Reading Materials</td>
<td>+++</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
</tr>
</tbody>
</table>

| **Cabin Seat Comfort**     |             |                 |          |           |
| First Class - long haul ^2 | ++++        | ++++            | ++++     | ++++      |
| First Class - short haul   |             |                 |          | ++++      |
| Business Class - long haul ^3 | ++++      | ++++            | ++++     | ++++      |
| Business Class - short haul| ++++       | ++++            | ++++     | ++++      |
| Premium Economy Class - long haul | +++ | ++++ | ++++ | +++ |
| Economy Class - long haul  | +++        | ++++            | ++++     | ++++      |
| Economy Class - short haul | +++        | ++++            | ++++     | ++++      |

| **Onboard Catering**       |             |                 |          |           |
| First Class - long haul    | ++++        | ++++            | ++++     | ++++      |
| First Class - short haul   |             |                 |          | ++++      |
| Business Class - long haul | ++++       | ++++            | ++++     | ++++      |
| Business Class - short haul| ++++       | ++++            | ++++     | ++++      |
| Premium Economy Class - long haul | +++ | ++++ | ++++ | +++ |
| Economy Class - long haul  | +++        | ++++            | ++++     | ++++      |
| Economy Class - short haul | +++        | ++++            | ++++     | ++++      |

| **Cabin Staff Service**    |             |                 |          |           |
| First Class – efficiency   | ++++        | ++++            | ++++     | ++++      |
| First Class - attitude / friendliness | ++++ | ++++ | ++++ | ++++ |
| Business Class - efficiency| ++++       | ++++            | ++++     | ++++      |
| Business Class - attitude / friendliness | ++++ | ++++ | ++++ | ++++ |
| Economy Class - efficiency | ++++       | ++++            | ++++     | ++++      |
| Economy Class - attitude / friendliness | ++++ | ++++ | ++++ | ++++ |
| Responding to PAX requests | ++         | ++++            | ++++     | ++++      |
| Assisting Parents with children | ++++ | ++++ | ++++ | ++++ |
| Staff Language Skills      | ++         | ++++            | ++++     | ++++      |

1 Lufthansa does not offer in-seat video system
2,3 Global Passenger Survey was made before Emirates introduced its new First Class Suites and Business Class

Source: Skytrax

+++++ best + worst
### Comfort Benchmark

#### Economy Class
<table>
<thead>
<tr>
<th>Airline</th>
<th>Seat Pitch</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air France</td>
<td>81 cm</td>
<td>30°</td>
</tr>
<tr>
<td>British Airways</td>
<td>81 cm</td>
<td>15 cm</td>
</tr>
<tr>
<td>Emirates</td>
<td>84 cm</td>
<td>17 cm</td>
</tr>
<tr>
<td>Lufthansa</td>
<td>81 cm</td>
<td>31°</td>
</tr>
</tbody>
</table>

#### Business Class
<table>
<thead>
<tr>
<th>Airline</th>
<th>Seat Pitch</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air France</td>
<td>155 cm</td>
<td>180°</td>
</tr>
<tr>
<td>British Airways</td>
<td>185 cm</td>
<td>180°</td>
</tr>
<tr>
<td>Emirates</td>
<td>152 cm</td>
<td>180°</td>
</tr>
<tr>
<td>Lufthansa</td>
<td>150 cm</td>
<td>180°</td>
</tr>
</tbody>
</table>

Seat Pitch is the distance between a row of seats - the measurement from the same position on two seats, one behind the other (and not the legroom).

**Table 50: Comfort Benchmark on Board**

### Business Travel

<table>
<thead>
<tr>
<th>Airline</th>
<th>Satisfaction Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore Airlines</td>
<td>88,50%</td>
</tr>
<tr>
<td>British Airways</td>
<td>88,40%</td>
</tr>
<tr>
<td>Emirates</td>
<td>87,75%</td>
</tr>
<tr>
<td>Cathay Pacific</td>
<td>86,65%</td>
</tr>
<tr>
<td>Air New Zealand</td>
<td>86,47%</td>
</tr>
</tbody>
</table>

### Intercontinental Flights

<table>
<thead>
<tr>
<th>Airline</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore Airlines</td>
<td>1,7</td>
</tr>
<tr>
<td>Malaysia Airline</td>
<td>1,85</td>
</tr>
<tr>
<td>Emirates</td>
<td>1,97</td>
</tr>
<tr>
<td>Thai Airways</td>
<td>2,01</td>
</tr>
<tr>
<td>Quantas</td>
<td>2,12</td>
</tr>
<tr>
<td>Swiss</td>
<td>2,16</td>
</tr>
<tr>
<td>KLM</td>
<td>2,2</td>
</tr>
<tr>
<td>Lufthansa</td>
<td>2,24</td>
</tr>
<tr>
<td>British Airways</td>
<td>2,25</td>
</tr>
<tr>
<td>Air France</td>
<td>2,42</td>
</tr>
</tbody>
</table>

### Leisure Travel - Short Haul

<table>
<thead>
<tr>
<th>Airline</th>
<th>Satisfaction Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Airways</td>
<td>87,34%</td>
</tr>
<tr>
<td>BMI</td>
<td>87,30%</td>
</tr>
<tr>
<td>KLM</td>
<td>87,23%</td>
</tr>
<tr>
<td>SAS</td>
<td>86,67%</td>
</tr>
<tr>
<td>Swiss</td>
<td>86,07%</td>
</tr>
<tr>
<td>Emirates</td>
<td>85,76%</td>
</tr>
<tr>
<td>Air France</td>
<td>84,85%</td>
</tr>
<tr>
<td>Lufthansa</td>
<td>84,71%</td>
</tr>
<tr>
<td>Silk Air</td>
<td>84,24%</td>
</tr>
<tr>
<td>Monarch Airlines</td>
<td>83,49%</td>
</tr>
</tbody>
</table>

### Leisure Travel - Long Haul

<table>
<thead>
<tr>
<th>Airline</th>
<th>Satisfaction Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air New Zealand</td>
<td>90,08%</td>
</tr>
<tr>
<td>Singapore Airlines</td>
<td>89,91%</td>
</tr>
<tr>
<td>British Airways</td>
<td>87,90%</td>
</tr>
<tr>
<td>Virgin Atlantic</td>
<td>87,46%</td>
</tr>
<tr>
<td>Emirates</td>
<td>87,40%</td>
</tr>
<tr>
<td>Qantas</td>
<td>86,90%</td>
</tr>
<tr>
<td>Cathay Pacific</td>
<td>85,46%</td>
</tr>
<tr>
<td>Malaysia Airlines</td>
<td>84,91%</td>
</tr>
<tr>
<td>Thai Airways</td>
<td>84,76%</td>
</tr>
<tr>
<td>United Airlines</td>
<td>83,88%</td>
</tr>
</tbody>
</table>

**Table 51: Airline Benchmark**

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5.5.8. Frequent Flyer Programme and Alliance

From the moment American Airlines introduced the first frequent flyer programme (FFP) American Advantage in 1981, “it was an immediate success.” 497 The rest of the world soon copied this idea, as airlines recognised the power and attraction of such loyalty programmes. Finally “almost all significant airlines have their own FFP, or are partners in a joint-venture programme.” 498 “Frequent flyer programmes are popular and most regular business travellers are members of at least one programme. Residing near a hub airport where a single carrier serves a wide range of destinations allows a more rapid accumulation of miles and a larger choice of how these ultimately may be used. If many carriers serve a hub, then accumulation can become piecemeal and utilization of the miles much less convenient.” 499

In order to attract and retain members, programmes have to fulfil customers’ as well as airline’s requirements. As unredeemed mileage credits are liability on the airline’s balance, therefore cost control is necessary. Consequently certain airlines introduced a time limit for spending. Available award travel seats have to be limited in accordance to high and low season in order to optimize revenues. Passengers, however, demand cooperation with other airlines, alliances, car-rental companies or hotel chains in order to accrue and redeem miles for awards. They also expect class bonus when travelling Business or First Class, lounge excess, separated check-in counters plus free baggage allowance.

“The importance of frequent flyer programmes for retaining airline customer loyalty is well documented and this loyalty is enhanced when convenient travel to a host of destinations is possible on a particular carrier. The value of frequent flyer mileage is greatest for residents of a city that serves a hub for a large hug-and-spoke network because it translates into convenient free travel to a multitude of destinations.” 500

“Tiers of membership are now an essential component of a state-of-the-art frequent flyer programme.” 501 Some tiers can be earned (i.e. Lufthansa’s Frequent Traveller FTL status), some can only be awarded (former Qualiflyer “Circle” or the latest “HON-Circle” by Lufthansa and Austrian Airlines Group ) and a few ones are exclusively for

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499 Button / Stough (2000), p. 236
500 Button / Stough (2000), p.239
501 Shaw (2004), p.239
special branches of the industry (Air France’s Petroleum Club\textsuperscript{502}). Within the alliance all silver and gold members enjoy recognition of points as well as outstanding service according to their status. (i.e. Star Alliance Gold and Silver Card).

While membership is free for the majority of loyalty programmes, some of them “require payment of membership fee (e.g., Qantas’s Australian’s Flight Deck), but all offer members private lounges, refreshments and, often, business facilities. They represent sunk costs to airline travellers and hence, at the margin, are an incentive to stay with an airline once a club is joined.”\textsuperscript{503}

Major carriers or members of a big alliance have significant advantages. “Large incumbents with their extensive route networks give travellers a greater opportunity to earn miles and also have a more diverse set of destinations to offer when the traveller accumulates enough miles to earn an award.”\textsuperscript{504} A US General Accounting Office (1990) study revealed that 81% of business travellers choose flights to build up their frequent flyer mileage more than half the time.\textsuperscript{505}

<table>
<thead>
<tr>
<th>How often US business travellers choose flights to build up frequent flyer miles</th>
<th>Percentage of travel agents reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always or almost always</td>
<td>57</td>
</tr>
<tr>
<td>More than half the time</td>
<td>24</td>
</tr>
<tr>
<td>About half the time</td>
<td>9</td>
</tr>
<tr>
<td>Less than half the time</td>
<td>4</td>
</tr>
<tr>
<td>Rarely, if ever</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 52: The Influence of Frequent Flyer Programmes\textsuperscript{506}

“A frequent flyer programme is an example of loyalty-inducing marketing device that is intended to reduce consumer’s sensitivity to price. Empirical studies by Nako (1992), Proussaloglou and Koppelman (1995) and Suzuki (2003) have shown that frequent flyer programmes significantly affect travellers’ choice of airlines.”\textsuperscript{507}

\textsuperscript{502} Air France’s Petroleum Club is for customers, who work in the oil and gas industry. At Paris CDG separate check-in counters, lounge and hotel service are offered. Club benefits service will be introduced at other destinations soon. (see Air France (1999), p. 5 ; Air France (2002), p. 29 ; Air France (2004), in: http://www.airfrance.com )

\textsuperscript{503} Button / Stough (2000), p.17

\textsuperscript{504} Button / Stough (2000), p.19

\textsuperscript{505} see Button / Stough (2000), p.19

\textsuperscript{506} Hanlon (1999), p.54

\textsuperscript{507} Gayle (2004), p.2
Premium membership levels (Gold – Silver or Elite Plus – Elite or Emerald – Sapphire) entitle for enhanced benefits, which are somehow equal within all loyalty programmes: Priority reservation waiting list, priority and dedicated check-in desks/areas, priority baggage handling, priority airport standby, special ground service, booking guarantees or excess baggage privileges.  

For the sake of completeness Gayle avowes, that “on average, prices may not be as important as we think in explaining passengers’ choice behaviour among alternative products. Non-price product characteristics such as whether or not the product is offered by a hub airline, convenience of flight schedules, and differences in other services offered by airlines which may include quality of in flight service and frequent flyer programs, are likely to do a better job of explaining passengers’ choice behaviour.”

Two examples give insight into the booking list and reveal passenger status: Austrian Airlines had 240 passengers on board of flight OS 87 from Vienna to New York JFK dated 16th Dec. 2004. Only 32 passengers had a frequent traveller identification in theirPNRs.

---

509 Gayle (2004), p.21
510 compiled by the author according CRS Amadeus Reservation System data
It is common, however, that some travellers do not quote their frequent flyer number at the moment of booking or check-in. They send their boarding passes to the local airline office after the journey is completed in order to accrual miles. In contrast to the previous sample, flight OS 451 from Vienna to London Heathrow had 90 passengers on board. A lot more frequent travellers were on the booking list: 31 people that day.

Alliances help airlines to capture revenue synergies of an expanded network. They gain as much as 70% - 80% of outright merger benefits, as they are very effective at redirecting traffic to the benefit of the alliance members along with cost savings aspects (share of terminal facilities, consolidating ticket offices, joint purchase).

At the moment Star Alliance is the ultimate leader in the aviation business. It has grown so big, that its members created some kind of “subsidiary”: Regional Star Alliance, including for instance: Adria, Blue1 or Croatia Airlines. SAA South African Airways and TAP Air Portugal will join Star Alliance soon.

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511 compiled by the author according CRS Amadeus Reservation System data
512 see Airlinesgate (2004a), in: http://airlinesgate.free.fr/industry.htm
Star Alliance: United Airlines, Lufthansa, Air Canada, Air New Zealand, ANA, Austrian Airlines Group, British Midland, SAS, Singapore, Thai Airways, Varig, US Airways, Spanair, LOT, Asiana and Mexicana (until 2004)\textsuperscript{513}

One World: American Airlines, British Airways, Cathay Pacific, Iberia, Qantas, Lan Chile, Aer Lingus, Finnair

Skyteam: Air France, Delta Airlines, KLM, Northwest, Continental, Alitalia, Korean Airlines, Aeromexico, CSA Czech Airlines, Aeroflot

Emirates: no alliance, but only a joint Frequent Flyer Bonus Programme with SriLankan

<table>
<thead>
<tr>
<th></th>
<th>Star Alliance</th>
<th>One World</th>
<th>Skyteam</th>
<th>NW/KL/CO</th>
<th>Emirates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passengers 2002 (m)</td>
<td>337,9</td>
<td>205,9</td>
<td>188,8</td>
<td>112,7</td>
<td>8,5</td>
</tr>
<tr>
<td>RPK 2002 (bil)</td>
<td>698,5</td>
<td>485,7</td>
<td>338,8</td>
<td>265,8</td>
<td>31,6</td>
</tr>
</tbody>
</table>

Northwest, KLM and Continental Airlines shown separately, they will join Skyteam in 2004

Table 53: Global Passenger Share 2002 \textsuperscript{514}

<table>
<thead>
<tr>
<th></th>
<th>Star Alliance</th>
<th>One World</th>
<th>Skyteam</th>
<th>Northwest, KLM and Continental Airlines shown separately, they will join Skyteam in 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destinations</td>
<td>827</td>
<td>571</td>
<td>658</td>
<td></td>
</tr>
<tr>
<td>Countries</td>
<td>150</td>
<td>134</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>Departures</td>
<td>14916</td>
<td>8100</td>
<td>14000</td>
<td></td>
</tr>
<tr>
<td>Aircraft</td>
<td>2400</td>
<td>1940</td>
<td>1500*</td>
<td></td>
</tr>
</tbody>
</table>

* excluding Continental, KLM and Northwest

Table 54: Alliance Key Statistics \textsuperscript{515}

\textsuperscript{513} Mexicana will terminate Star Alliance membership in 2004. Figures still include Mexicana’s data.


Figure 56: Revenue Passenger Kilometres 2002

Figure 57: Global Passenger Share 2002


Presently Emirates is not a member of any alliance, but prefers to cooperate with members of the Star Alliance, Sky Team or One World according to the route. The airline has code share agreements with Air India, Air Mauritius, British Airways, Continental Airlines, Japan Airlines, Philippine Airlines, Royal Air Maroc, South African Airlines, SriLankan and Thai Airways. Partner contracts within the frequent flyer programme Skywards exist with British Airways, Continental Airlines, Delta Airlines, Japan Airline, Singapore Airlines, South African Airways and United Airlines.

Due to the Air France and KLM merger, only partial information about the updated frequent flyer bonus programme is available. According to the Skyteam website, members of Air France’s Frequence Plus programme, have access to 390 lounges worldwide (including Skyteam alliance lounges). It is the top loyalty scheme for frequent flyers, when lounges are the crucial criteria. Lufthansa’s Miles&More programme provides the most airline partners and other partners such as hotel chains, car rental companies, etc. Consequently it is travellers’ first choice in these categories.

![Frequent Flyer Programmes](image.png)

* No final and updated data available. Total number of lounges: 390 after the merger

Figure 58: Frequent Flyer Programmes

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As Emirates has not joined or introduced an alliance, the airline is limited to its own or SriLankan’s facilities. They, however, offer its customers miles on seven Skywards partners. To be more attractive to business travellers, Emirates definitely has to take measures and improve the seize of its loyalty scheme. In addition to that, the airline urgently has to reconsider company’s strategy to keep away from any alliance.

5.5.9. Value of (Travel) Time

As “time is money” – which is more applicable to business people rather than to leisure travellers – the (total) value of travel time plays a significant role in accessibility analysis. Airline’s customers have to judge, if cheaper flights - with longer total travel times - should be favoured rather than non-stop flights, which mostly embrace less total travel times but higher fares.

Studies by E. Pels, E.T. Verhoef and P. Rietveld are the basis for this chapter and should show the approach to the valuation of travel time. Not solely monetary costs influence travel behaviour, but also time-related costs; and both result in generalised costs. Personal features like income or travel motive, transport modes and environmental/situational features (weather, strike) highly affect the valuation of travel time. Additionally the issue of reliability has a major impact on travel behaviour and on cost benefit analysis, as speed as well as reliability does not always go hand in hand.519

Utility (or generalised costs) depends on: monetary costs, travel time ( waiting time, in-vehicle time, access time,...) or other comfort aspects and are donated as \(x_1, ..., x_j\). Each trip component ( car ride to the airport, check-in process, boarding,...) needs time: \(t_1, ..., t_j\). The total monetary expenditure made for this trip is \(p\). In terms of reliability, we have to consider uncertainty, which means that the traveller does not know the exact value of the choice characteristics 520. It relates to both traveller’s lack of knowledge of the traveller and the structural unreliability of transport networks. In other words, uncertainty may affect the comfort of a trip: unreliability of service may lead to overcrowded areas, various types of stress due to uncertainty: Decision makers experience cognitive and social stress in decisions, otherwise aspects of regret, stress or frustration, that they chose the wrong alternative.

519 see Rietveld (2003), p.2
520 examples: examine uncertainty on the monetary costs of a trip, on travel times, in the transport system, in the quality of destination, safety or fear,...
Furthermore each feature $x_j$ has a density of possible results $g_j(x_j)$ with a mean $\mu_j$ and a variance $\sigma_j^2$. Density $g_j(x_i)$ depends on the traveller $i$ him/herself. With the influence on situational circumstances $z$ (time of day, type of day, weather, strike, accident,...), density can be generalised to: $g_{ji}(x_{ji}|z)$. Aspects of uncertainty might be: punctuality (flights within 15 minutes of schedule are not regarded as delayed, but as on time in airline business\(^{521}\)), safe arrival or comfort aspects $f_j(x_j|z)$ (i.e. to get a seat on board – avoid overbooking situation, rebookings,...).\(^{522}\)

Utility ($U$) as a linear function of travel time and price without uncertainty:

$$U = a_1 \times t_1 + \ldots + a_8 \times t_8 + b \times p$$

The marginal value\(^{523}\) of each travel time component $j$ is defined as the marginal rate of substitution between travel time $t_j$ plus price and can be computed as $a_j / b$. In case $t_{tot}$ is the total trip time, the average value of time (VOT) for the whole trip is:

$$\text{Average VOT} = \Sigma_j \left( \frac{t_j}{t_{tot}} \right) \frac{a_j}{b}$$

Marginal values are defined as the change in price necessary to compensate traveller for a loss of one unit travel time so that he remains at the same level of utility.\(^{524}\)

Assuming uncertainty is valued via expected utility ($W$), marginal values of travel time are constant, it is equal to:

$$W = \Sigma_j a_j \mathbb{E} \left( t_j \right) + b \times p$$

$\mathbb{E} \left( t_j \right)$ represents the expected value of $t_j$ - and is called the expected value operator. Again the value of each travel component $j$ can just be computed as $a_j / b$.

This represents the chance in price necessary to compensate a traveller for loss of expected travel time of one unit so that he remains at the same level of expected utility. Therefore uncertainty effects only the average duration of the various trip components.\(^{525}\)

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\(^{522}\) see Rietveld (2003), p.2 ff., p. 9, p. 15  
\(^{523}\) assumption that marginal value of travel time is constant  
\(^{524}\) see Rietveld (2003), p.5 f.  
\(^{525}\) see Rietveld (2003), p.6 f.
In case the valuation of time depends on the length of travel time, \( a_j x t_j \) must be replaced by \( f_j (t_j) \), where \( f_j (t_j) \) is a non-linear function of \( t_j \):

\[
U = f_j (t_j) + \ldots + f_j (t_j) + b x p
\]

As we face no uncertainty, the marginal value of travel time component \( j \) is

\[
VOT = \frac{d [ f_j (t_j) ]}{d [ t_j ]} / b
\]

Depending on the level of \( t_j \).\(^{526}\)

---

![Figure 59: Valuation of Travel Time as a Function of Trip Duration](image)

Figure 59: Valuation of Travel Time as a Function of Trip Duration\(^{527}\)

If uncertainty is valued via the expected utility and the marginal value of travel time is not constant, the value of time estimate for a trip time \( j \) is:

\[
VOT_j = \frac{dF (\alpha_1, \ldots, \alpha_N; \mu_1, \ldots, \mu_8; \sigma_{11}, \ldots, \sigma_{jj})}{d\mu_j} / b
\]

\(^{526}\) see Rietveld (2003), p.7 f.

\(^{527}\) Rietveld (2003), p.19
The value of time estimate of trip time $j$ depends on all parameters, including the means and variances and covariances of the travel time components. Whereas now $f_1(t_1) + ... + f_8(t_8)$ depend on parameters $\alpha_1, ... \alpha_N$ and now the joint density $g(t_1, ..., t_8)$ has parameters for expected values of travel times $\mu_1, ... \mu_8$ and their variances and covariances $\sigma_{ij}$.  

When activities are either scheduled or not scheduled, uncertainty on travel time is always problematic. Supposing uncertainty is valued via expected utility with a penalty for standard deviation and the marginal value of travel time is constant, the corresponding value of travel time would be:

$$VOT = d \left[ a_j + c a_j \sigma_j h_j \right] / b$$

![Figure 60: Valuation of Travel Time as a Function of Trip Duration Under Certainty (Variance = 0) and Uncertainty (Variance > 0)](image)

$C$ is the weight given to the standard deviation relative to the average. The above-mentioned formula is only valid, if the marginal value of expected travel time and the variance would increase. With the normal distribution, the standard deviation and mean are not interrelated.  

---

528 see Rietveld (2003), p.8  
529 Rietveld (2003), p.20  
530 this means $h_j = 0$
In skewed distributions (i.e. exponential or gamma distribution), mean and standard deviation are proportional to each other. When proportionality between mean and standard deviation exist, uncertainty is implicitly incorporated in the estimate of the value of travel time. 531

Finally scheduling costs are relevant when a targeted time of arrival is given and losses are faced at late arrival (i.e. meeting,...). They also imply a strong non-linearity in the valuation of travel time. The utility of a trip is:

\[ U = a_1 \times t_1 + \ldots + a_8 \times t_8 + b \times SDE + c \times SDL + d \times D_L + b \times p \]

\( T^* \) is the desired arrival time, \( t \) the total travel time, \( SDE \) the early schedule delay, \( SDL \) the late schedule delay, \( D_L \) a dummy that assumes the value 1 when \( SDL > 0 \). \( P_L \) is the probability of late arrival, which is needed in the formula of expected utility, in case unreliability occurs:

\[
E(U) = \sum_j a_j E(t_j) + \text{const.} \sum_l (t_l) + d \times P_L + b \times p
\]

The term with the expected values of travel time takes into account the weights:

\[ \sum_j a_j E(t_j) \]

The standard deviation reads in terms of total unweighted travel time \( (t_1, \ldots, t_8) \). 534

“Ignoring the standard deviation and the probability of a late arrival, leads to high estimates for the value of time in the case of schedule activities. This must be one of the main reasons why a general result from the literature is that value of time for commuting and business trip is so high.” 535 Eric Pels and Erik T. Verhoef 536 reflect about passengers' and airlines' value of time in their study about Airport Congestion Pricing with the help of the generalized user cost function. The average time loss per passenger per flight due to congestion at node \( h \), \( \Phi_h \) is assumed to increase linearly in the total frequency at that node:

531 see Rietveld (2003), p.9 ff.
532 number of minutes arrived before \( t^* \)
533 number of minutes arrived after \( t^* \)
534 see Rietveld (2003), p. 11 ff.
For explanation, \( \eta \) is the slope of the congestion function, \( \Phi \) gives the sum of time losses during departure and arrival on the airport. \( \lambda_i \) is the given product of the load factor and seat capacity, and thus gives the number of passengers per flight \((q_i\text{, transported by airline } i)\). \( f_i \) is the airlines frequency \(\left(\frac{1}{\lambda_i}\right) q_i\). The inverse aggregate demand \((D)\) is linear in the form: \( \alpha - \beta \sum q_i \), whereas \( \alpha \) represents the maximum reservation price along with \( \beta \) as the demand sensitivity parameter. So finally the passenger’s value of time is defined:

\[
VOT_p = \frac{g_i - p_i}{\Phi_i}
\]

With \( \Phi_i \) as the sum of time loss, \( g_i \) as the generalized user cost function together with \( p \) as the fare.\(^{537}\)

5.6. Validity of the Empirical Findings and Critical Approach

The model represents a common application to measure the relative importance of several driving forces (frequent flyer programme, price, schedule-convenience, etc.). However, the study is not without its limitations. It does not (due to capacity constraints) show decision-elasticities as interviews were disregarded. The selection of routes is limited to a group of destinations, all carriers serve via one of the four competitive hubs\(^{538}\). A study with alternative departure and arrival cities possibly offers different results. The analytical treatment definitely provides suggestions for future research and policy implications. It examines the determinants of air travel demand along with elements of consideration. The study adopts a market research approach, conducts an econometric analysis and identifies the relative importance of factors that influence travellers’ options.

The estimated choice parameters allow quantifying passengers’ tradeoffs among these driving forces, emerging in a conceptional framework, which provides a means to quantify and test hypothesis about Dubai as a first choice hub for international travellers.

\(^{536}\) See Pels / Verhoef (2003), p. 2 ff.
\(^{537}\) See Pels / Verhoef (2003), p. 2 ff.
\(^{538}\) Dubai, Frankfurt, London, Paris
Nevertheless competition between each parameter is vivid. The outcome is measurable, but the proportion of the influence only anticipatory. Several studies reveal passengers’ preferences. They provide an easy to understand ranking, telling the reader which product feature is superior to the other. But no statistic answers the question, how the customer finally decides, in case a situation like the following might occur: A flight via Dubai is considered as the cheapest possibility, London-Heathrow rated the most luxury airport, the connection via Frankfurt resulting in the quickest total travel time and Air France’s frequent flyer programme being the best loyalty scheme for this passenger. Probably conjoint measurement analysis may provide a partial help, but does not bring total clarification. Consequently a lot of research is still to do, if we do not want to work solely with approximate values or assumptions.

5.7. Summary

The paper develops an extensive evaluation of measurement methods, strategies and results. In the model, a set of parameters is created on a literature basis. It deals with the issue of key product feature and with arbitrage-affecting travel decisions from the - divergent- passengers’ point of views.

Dubai airport fails to succeed in terms of frequent flyer programme, total travel time or price. Some routes are cheaper via Dubai and even the travel time is less than via other hubs. Still, the “classic” European mega-hubs attract the majority of the passengers with a perfect -and wide spread- schedule together with a profound frequent flyer programme. The valuation of travel time emphasizes the importance of minimized total travel time and schedule convenience. In respect to service features, quality standards and safety, Dubai is the perfect choice for travel. In addition, the outstanding comfort-level convinces passengers to choose Dubai as their transfer point. However, it is also the exciting stop-over programme, which serves as an attractive bonus to the passenger, who can experience the Arabian culture no matter if it is a business or leisure trip.

Undoubtedly, each parameter must not be considered on a case-by-case basis. The customer finally decides upon the logical sum of the current framework excluding equilibrium of these driving forces, after he has generated a personal arrangement of perspectives. The beneficial effects of competition and development imply an even large set of choices for the traveller (i.e. with regard to price, quality, service, etc.).
6. Forecast and Prospects

6.1. Prognosis to Airports’ Future Prospects with Reference to Empirical Findings

“Airports will have to rethink their strategies and business models to survive and thrive in tomorrow’s environment.” 539

Airports’ roles in the future landscape depend on two key factors. They will consequently determine their relative growth and capacity requirements: in order to attract local and transit travel the geographic location, including size plus affluence of catchment area plays an important part. Only airports with central locations and large, affluent catchment areas will be eligible to be mega hubs. The other key factor is the carrier’s strategic as well as financial strength. A careful analysis is mandatory. Since Belgium’s Sabena went bankrupt, Brussels airport’s passenger volumes have plummeted by 30%. 540

The different types of airports need different strategies. Here is an example of possible key issues and the appropriate focus:

```
<table>
<thead>
<tr>
<th>Example</th>
<th>Airline focus</th>
<th>Key issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>Leading airlines within alliance Regional feeders</td>
<td>Quality leadership Privateization imperative Capacity management</td>
</tr>
<tr>
<td>Mega - hubs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Int. O &amp; Ds</td>
<td>Intercontinental airlines All other airlines</td>
<td>Sweat assets over the limit Modernization of return</td>
</tr>
<tr>
<td>International</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>Member of airline alliance All other airlines</td>
<td>Support of alliance airline Investment stop Streamline business model</td>
</tr>
<tr>
<td>Secondary hubs and O&amp;Ds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>LCC - Low Cost Carriers Regional feeder</td>
<td>Focus on LCC segment Tight cost management Acquire public funding</td>
</tr>
<tr>
<td>Airports</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Figure 61: Different Strategies for Different Types of Airports 541

539 The Boston Consulting Group (2004), p.25
540 see The Boston Consulting Group (2004), p.25
Attractive O&D locations along with some regional airports will benefit from an increase in financially attractive point-to-point travel in the short to medium range travel-field. Among the large airports, significant long-term growth is left to mega hubs and O&D locations that feature prominently in the alliances’ schedules. Mega hubs will not only profit from the consolidation of long haul traffic. The huge financial pressures on the major carriers will leave them with little choice but to consolidate their traffic into mega hubs, sidelining many of today’s primary and secondary hubs. Secondary hubs will lose this kind of traffic along with point-to-point travel. Therefore they will experience much less growth. The rise of point-to-point travel will strengthen selected O&D locations plus regional airports.  

Frankfurt, London Heathrow and Paris CDG are the most probable candidates to become a European mega hub. Munich’s or Madrid’s future will be the role of a secondary hub. Focus on point-to-point travel is international O&D’s fate, which includes airports like Zurich or Milan. But where will Dubai go? There is no special analysis about the future of this airport. A scenario drawn for international airports by Joop Krul is used a basis for an expectation:

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543 The Boston Consulting Group (2004), p.20  
544 see The Boston Consulting Group (2004), p.20
Dubai’s airport future goes hand in hand with Emirates expansion plans. In case Dubai became a secondary hub, the airport could serve a feeder function for prime hubs. It additionally could offer a broad short- and middle range network, including a small intercontinental network. If Dubai turned into an Origin and Destination airport, it could end up in a point-to-point traffic airport only. Dubai airport and its market will serve as a gate for short- and middle range as well as intercontinental network. From this very moment, Dubai will not play a specific hub function any more.  

This paper cannot answer the question where Dubai will go in the near future, as the airline industry is still in a state of radical antagonism. The aviation sector is in constant motion. The introduction of advanced aircraft redistribute airports-airlines and alliances roles. The decision of a new partner directly inclines the role of the partners’ home airports. In case Swiss either joins One World or Star Alliance (respectively mergers with or is taken over by another airline), Zurich definitely will be downgraded to an O&D airport. Emirates’ strategy influences Dubai’s future, the same way as the airport’s operations affect Emirates vice versa.

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6.2. Future Development of the Aviation Industry with Reference to the European-Asian Air Traffic

Growth rates for the European-Asian traffic look good. They depend on economic development in addition to future crisis, war or strikes. Another obstacle, however, is the problem of Air Traffic Control both on the ground and in the air. Most airports have already reached their limits (in terms of capacity, slots, etc.). The same applies to flight routes. 547 Airbus expects that travel volume for the European-Asian traffic will rise by 6.5% until 2009. Likely Dubai will accrue a major portion, as the airport has no constraints and can grow. In addition the home-based airline Emirates provides an extensive network together with the latest aircraft. Large and modern types of aircraft help to keep operating costs low. Consequently travel via Dubai convinces with competitive price.

![Average Growth Rate per Year 1999-2009](image)

**Figure 64: Average Growth Rate per Year 1999-2009** 548

6.2.1. Market and Commercial Driven Changes

World’s “regions are at different stages in the life cycle of the industry. A possible hypothesis is that growth follows an S-sharped pattern over time: slow to begin with, then rapid and finally slow again when the industry reaches maturity.

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On this interpretation Africa would appear to be in the beginning stage* 549; in the rapid growth stage Asia, Middle East and Latin America appear. North America and Europe are very close to enter the mature stage.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Beginning stage</th>
<th>Transition</th>
<th>Rapid growth stage</th>
<th>Transition</th>
<th>Mature stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td>US and Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latin America</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Middle East</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>... become this mature industry?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 65: Market Life Cycle 550

“A lot of companies (no matter of their seize) reduce budget for commercial travel. Managers face new situations and have to fly Economy Class instead of Business Class. Airlines have to adapt to these changes in the industry with Fare and Service – adjustments." 551 The decline in business travel forces airlines to introduce new ideas in order to attract high yield customers. Lufthansa launched business-class-only-flights on selected transatlantic routes. Private Air’s Boeing 737 and Airbus A319 operate flights between Dusseldorf, Munich and Newark with 48 business class only seats on behalf of the German airline. The airline industry has clearly become more open to novel solutions. In the United States, the use of teleconferencing and videoconferencing rose by more than 50 percent in 2001. Many companies expect their employees to travel economy class. Fractional jet ownership schemes are another current trend, in which companies buy shares in corporate jets. So top priority is luring back business travellers. In addition, Qatar Airways introduced a converted Airbus A319 to attract high yield travellers. 552

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549 Hanlon (1999), p.14
550 Sterzenbach / Conrady (2003), p. 391
551 n.a. (2004b)
552 see Gazvinian (2002), p.54 ; Lufthansa (2004c), p. 163
6.2.2. Technical and Infrastructure Driven Changes

6.2.2.1. Technical Driven Changes

Only the largest hubs with significant feeder capacity will be equipped to handle mega planes such as the Airbus A380. The introduction of this new generation of mega planes, which will require large airports with substantial feeder capacity, will accelerate the shift to mega hubs.\footnote{see The Boston Consulting Group (2004), p. 5, p.16} Airbus expects that traffic between international mega hubs like Frankfurt, Singapore, New York or Tokyo will constantly grow. There is an urgent need for an aircraft with a high load factor and extended range. The Airbus A380 will have a capacity of 555 passengers and a range of 15,000 km.\footnote{see Deckstein / Hawranek / Klawitter (2004), p.85 ; Sterzenbach / Conrady (2003), p. 262} Currently 12 different customers (such as Emirates, Lufthansa, Singapore Airlines, Virgin Atlantic, Air France or Qantas) have already made 133 firm orders.\footnote{see Lyberth (2004), p.9; Deckstein / Hawranek / Klawitter (2004), p.95; Airbus (2004), in: http://www.airbus.com} Airports and Ground handling companies have to adopt their infrastructure to the new giant aircraft. Upgraded terminals as well as gates are mandatory. Some airports like Dubai and Frankfurt introduced improvement plans. The government already approved Frankfurt’s maintenance-hall.\footnote{see APA (2004g), in: http://www.apa-defacto.at} Dubai will offer 23 gates for the Airbus A380 and guarantees to board the aircraft within 60 minutes, with the help of a multiple-gate area.\footnote{see Newton (2003), p. 5} Paris CDG is fit for aircraft since 2001.\footnote{see Aéroports de Paris (2004), in : http://www.adp.fr}

For example, the Airbus A340-500 is already in service for ultra long range. Singapore Airlines uses the aircraft on its Singapore – New York route for an 18 hours non-stop flight, Emirates for Sydney and New York flights (14-15 hours).\footnote{see Stolzke (2004), in: http://www.apa-defacto.at} It would also be possible for the airline to serve Dubai – Los Angeles and San Francisco non-stop within 17 hours or possibly operate Rio de Janeiro as well as Sao Paulo non-stop.\footnote{see Stevens (2001), p.34} Air Canada would be able to connect Toronto with cities in Asia like Singapore or Indonesia, even Australia.\footnote{see Canaday (2001a), p.73} European carriers might not have so many operational areas for such types of long distance aircraft. There would not be enough customers to operate a Frankfurt – Honolulu or Sydney route.\footnote{see Stolzke (2004), in: http://www.apa-defacto.at} The A340-500 enables airlines to serve routes of 15,000 km distance without a technical stop. They, however, have to attract high yield customers to justify such routes.
The growth of the more profitable point-to-point travel draws traffic passengers from hubs, especially secondary hubs. The arrival of the new Boeing 7E7 supports this development. This aircraft is able to bypass hubs by providing direct point-to-point travel.\footnote{see The Boston Consulting Group (2004), p. 17}

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<th>Technical Details</th>
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<td>B747-400</td>
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<td>Range with full passenger load</td>
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<td>Passengers</td>
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It definitely makes sense to introduce these new types of aircraft. “For premium travellers, the elapsed-time rankings are like lowest fare rankings for many leisure travellers: the prime choice variable. This makes sense, of course, because time is money to business travellers ... you can get the biggest bang for the buck if you are 15% faster on the longest trips.”\footnote{Canaday (2001b), p.61}

Therefore such long-range non-stop flights are attractive to travellers, because they increase the timesavings, by either avoiding stops at all or at least the ground handling – connecting processes. These new aircraft and airlines’ firm order prove, that there is a need for quick non-stop travel anywhere in the world. As the Airbus A380 is able to reduce tariffs by 15 up to 20% \footnote{see Airbus (2004), in: http://www.airbus.com}, passengers might not have to choose cheaper connecting flights any more.

Boeing and Airbus have different expectations: Whereas Boeing supposes that there will only be a high demand for point-to-point travel with smaller aircraft, Airbus assumes growth on medium and long-range routes to big hubs.\footnote{see Stolzke (2004b), in: http://www.apa-defacto.at} This situation jeopardizes Dubai’s role as an international hub, because high yield travellers expect quick connections and aircraft of the latest generation. In case major airlines offer flights with giant aircraft (implying low seat costs) even from non mega hub airports, Dubai might easily lose its role as a connecting airport between Europe and Asia.
6.2.2.2. Infrastructure Driven Changes

Some prime hubs have problems to expand and therefore cope with passenger growth. A highway, Air Force base, a residential area and forest, bound Frankfurt. Forty percent of Lufthansa’s intercontinental departures faced a delay with an average of 33 minutes in 2002. Figures for 2004 got better. Lufthansa’s long haul on time departures were about 68.5%. London Heathrow urgently needs a third runway and terminal 5. The airport is running to a capacity of 97%. In 2002, 30% of British Airways’ intercontinental departures were delayed by an average of 31 minutes. 2004, 73% of British Airways’ long haul departures were on time. Paris CDG is fit for the future as the new terminal 2E opened in 2003, but still has delay problems: In 2002, 51% of Air France intercontinental flights were delayed by 47 minutes (average). 2004 the percentage of on time departures improved and reached 57.4%. No problems at all has Dubai airport. There is enough space for expansion plans and no residentents or environmental restrictions. A new terminal dedicated entirely to Emirates and two new concourses will be completed by 2006. They will push the capacity of the airport up to 70 million passengers. It is a question of slots obligations and possibilities. If airlines cannot operate as desired, it will also harm their home airports. Constraints are the limitations for future success, as competitors are waiting for a chance to succeed – no mistake allowed! In this category Dubai airport definitely has the best cards for the future!

6.3. Critical Conclusion

Airports and its allies airlines both face the same set of trends (positive and negative) in the industry. Their responses to those trends will depend on their financial as well as competitive strength; guaranteed success will come only when both are able to attract customers.

One priority is always the aim to secure financial stability and a lower cost base. Both partners have to focus on a long-term survival strategy, whereas vigilance and creativity in raising cash together with cutting costs are crucial.

568 Flights within 15 minutes of schedule are not considered as delay, but as on-time according AEA (2004a)
Additionally they have to stimulate demand. Ultimately, financial retrenchment represents only part of the equation.

Airports and airlines have to wheedle, cajole or otherwise convince customers to return to the skies as often as possible. Pulling the price lever may be the only way to entice travellers to return, but this is a short-term solution that favours the player with the lowest cost structure.

All players should look for short-term opportunities to differentiate and reinforce long-term relationships (i.e. make the stay at the airport or in the sky an unforgettable event). The challenge for all is to stimulate demand without destroying yield.

Another problem is the regulatory issue. Governments will influence the competitive environment with decisions about financial support, competitive rules and foreign ownership. There is no doubt that airport operators prosper as local or regional monopolies leave the airlines little negotiation leverage. Legislators might redistribute some of the industry’s earnings by ensuring the same level of competitiveness between airlines, airports and organizations they do business with. Airlines and airports have to treat themselves as partners, as airports’ future lies in closer cooperation with the major airlines.

All participants have to reinforce their competitive strengths. Major airlines with privileged access to and cooperation with a strong hub (i.e. Air France – Paris CDG, Lufthansa – Frankfurt, British Airways – London Heathrow or Emirates – Dubai) should enforce their efforts to squeeze efficiency from their hub-and spoke networks, with the help of the airports themselves, providing excellent infrastructure and high quality level.

In Europe this cooperation seems to be rigidly. As the technical leap possibly excludes Dubai from the European-Asian traffic flow, the airport has to set new quality standards to attract customers. Since the financial situation is more than healthy and fortunate, it is undoubtedly a small challenge for the airport as well as the airline. The sole uncertainty that still remains, is, how will the passenger react to all those changes?
Unfortunately, the aviation industry suffers from highly unstable psychological impacts mentioned above. Doing nothing or even doing more of the same is simply not an option. Although securing financial stability is a common and urgent requirement, success will ultimately depend on how demand is stimulated and competitive strengths can be reinforced.

The value of sound strategy development and execution has never been higher.

**Acknowledgments**

The author wishes to thank the Institute of Transport Economics and Logistics together with everyone, who supported this paper with faith, force, friendship plus inspiration.
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