

Chapter 2

Characteristics of the Airline Industry

The real difficulty in changing any enterprise lies not in developing new ideas, but in escaping from the old ones.

John Maynard Keynes

2.1 Introduction

In recent years, the European airline industry has exhibited impressively dynamics. The sector has gone through a drastic change on both the supply and the demand side. Unlikely in other industries, the driving forces governing the recent changes do not depend mainly on technological factors, but on developments in the legal, institutional, and cultural domains. Legal and institutional aspects have clearly affected the structure of the market, while cultural forces have influenced spatial mobility and its *characteristics*.

On the supply side, we observe that only a few industries have faced changes as dramatic as those that have occurred in the European airline industry in the past 20 years. Over this time period, the industry has evolved from a system of long-established state-owned carriers operating in a regulated market to a dynamic, free-market industry. Before the deregulation, only one or two flag carriers operated the European routes, with airfares being regulated by state bilateral agreements.

The process of deregulation and the subsequent process of privatization have induced important changes in the structure of the airline market.

This chapter presents a concise analysis of the main *characteristics* and *changes* in the aviation sector, mainly from the supply side, which has followed the deregulation.¹ The aim is to draw a new profile of the airline industry in terms of new airline business models and compare their characteristics in a way which has rarely been presented in the literature to date. Section 2.2 describes the deregulation of

¹ This chapter mainly attempts to describe the European market but draws parallels with other markets. Thus, some elements of the description can easily be generalizable to other markets.

the EU aviation market and part of the relevant literature. The discussion mainly concerns its effects on the airlines' strategies and how they have consequently reorganized their models. In Sect. 2.3 these new models are described, with particular emphasis on network, pricing, and alliances. These three elements are discussed more in-depth in Sects. 2.4, 2.5 and 2.6, respectively. Section 2.7 concludes this analysis and introduces Parts II and III of this study.

2.2 Market Deregulation

At the Chicago Convention in 1944, 52 state members² discussed some forms of agreements in order to regulate: (1) capacity and frequency; (2) airfares; (3) freight levels; and (4) the application of the traffic rights or 'air traffic freedoms'.³

The Convention also established the International Aviation Organization (ICAO), i.e. an inter-governmental agency responsible for the coordination of worldwide technical and operational standards. The four regulatory elements together were able to effectively reduce the entry of new carriers, the pricing freedom, and the production levels, and therefore they limited any form of price or network competition. International carriers such as KLM or Lufthansa defined their international strategy depending on a set of bilateral service agreements (known as 'bilaterals') between the government of their country of aircraft registration and the destination country. The bilateral agreements specified the traffic rights for each operating carrier, the number of airports in which they operate, the number of carriers, and the frequencies of flights between the fixed airports. Those airlines were, in practice, the national flag carriers of each country (state-owned). Since 1947 the International Air Transport Association (IATA) has had the authority to set the ticket prices charged by international airlines at the worldwide international IATA conference.⁴ The national carriers, national governments, and the national airports dominated international air-transport until 1978.

In 1978, the United States domestic market started to become liberalized. In the 1980s and 1990s many international bilateral agreements were changed (see Doganis 2001). Almost 25 years after the US market deregulation, Anderson et al. (2005) identified the major changes produced in the US market. Those changes include the entry of the low-cost carriers, waves of mergers among the major carriers, rapid growth in the number of air travellers, general decline of airfares, increased variability in fares across the market, and the emergence of the HS system. Anderson provides evidence on the nature of the competition in the

² The national government involvement in the development of the airline industry was decided in the Paris Convention in 1919, where the allied countries after the First World War decided that nation states would have sovereignty on their own airspace.

³ See Appendix I for the complete list of 'Freedoms of the Air'.

⁴ The International Air Transport Association was founded in Havana in 1945. Its main purpose was to represent the interests of airlines and counterweight the ICAO. Tariffs come to be regulated by the IATA.

post-deregulation US market. The study presents a historical review of the US market since deregulation, and then develops an econometric model of domestic air fares in order to investigate how the level of competition, the low-cost carrier entry, or the HS systems affect the airfares of a particular route or airport. The paper concludes that airfares decreased in US as a result of higher competition and the low-cost carrier entry. However there was also found to be a 'hub effect', i.e. the carrier applies a price premium on the traffic originating from its main hubs.

Following the lead of the US, the European deregulation began about 10 years later. Three policy 'packages' were agreed in 1988, 1990 and 1993, and full deregulation came into force in 1997. The Third Package⁵ was the most important one as, by then, pricing capacity and access were fully deregulated. Within the EU, airlines could now operate between two other Member States via their home country (the 'Sixth Freedom' defined by the Chicago Convention) and even operate domestic flights within other European Member States (the 'Seventh Freedom' or cabotage right). The carriers can compete freely on routes, frequencies, prices, and service levels. In addition, previous limitations on cross-border mergers within the EU were removed. Thus, the old state-owned carriers, which belong to single countries, can be replaced by a broader private ownership structure, despite the national borders. However, much of the extra-EU network is still regulated by bilateral agreements and this still has a significant impact on the network structure of the carriers.

The deregulation effects on the industry have been broadly analysed by several authors in terms of network development, pricing behaviour, airlines-airports relations, and alliances. Some examples are Borenstein (1989, 1992); Dresner and Windle (1995); Button et al. (2000); Oum et al. (2000); Pels (2000); Schipper (1999) and Barrett (2004).

In the US, the deregulation has resulted in two main effects on network strategy. First, a large number of 'trunkline' carriers have reorganized their network structures from a point-to-point (PP) system into a hub-and-spoke (HS) system. Second, (see Gillen and Morrison, 2003) there has been an increase in the adoption of PP systems by low-cost, no-frills airlines such as Southwest Airlines.

In the EU, the deregulation produced a slow and rather small effect on routes and fares (see Brueckner and Pels, 2003) in the initial stage, but during the late 1990s the changes gradually became bigger. The first change was the rise of the international airlines' alliances. The reasons behind the emergence of alliances are demand-related (i.e. the economic globalization has created demand for intercontinental flights) and supply-related (i.e. long intercontinental flights need one or more stop and require an interline journey provided by different airlines). A brief analysis of the economic factors behind the alliances' development is presented in Sect. 2.6. The second effect was the further development of the HS strategy by the former flag carriers. The HS configuration was already the predominant structure in Europe before the deregulation. However, Brueckner and Pels (2003) questioned whether these networks were functioning in the HS manner. Their answer was that, despite their radial configuration, they mainly functioned as PP networks but without the

⁵ See, e.g., Starkie (2002); Chang and Williams (2002).

relevant volume of connecting traffic. The main reason for this was that, given the geographical size of the European countries and the fact that the flag carriers were connecting all major cities with price and capacity regulated by bilateral agreements, the potential for connecting traffic within Europe was limited.

At an earlier stage of the EU deregulation, Berechman and de Wit (1996) addressed a potential deregulation effect which still seems to be still latent in the market. Their research question was: ‘...in a profit maximizing environment if airlines are free to enter and exit the market, design their networks and set fares and level of services, which West European airports will they favour as their main hub?...’. The study was carried out in 1996 when the EU liberalization was not yet finalized but one of its conclusions was that the airlines would intensify the use of the HS system and would select a specific hub so as to maximize their profits.

Berechman and de Wit concluded that, in the immediate future, national carriers in the EU will continue to operate in their national home base for a substantial part of their products, but they will probably take the opportunity of a liberalized market by developing a secondary Euro-hub complementary to their national hub. Finally a concentration in the internal market will take place thus creating room for enhanced HS operations. While the concentration and development of the HS system is widely documented as the main effect of deregulation, the selection of a specific hub by airlines is not evident. Most of the carriers still have their hubs in their original country. However, this aspect raises the questions whether the EU deregulation has effectively created sufficient market liberalization, as simulated by the Berechman and de Wit model or whether it was able to diminish the role of hubs as entry market barriers.

The third effect was the growth of low-cost carriers such as Ryanair and easyJet. They experienced fast growth after 1999 and often compete with full-service carriers on the same routes and for coincident segments, and they did not suffer as much from the crisis in the air transport industry after September 11, this is because the low fare levels still attract many passengers, and the air travelling public’s fearing of flying to sensitive regions (North America and Asia) diverted passengers to fly intra-Europe.

The deregulation and the increased competition have reduced the air fares. Thus some effects on the charter operations are possible given that the gaps between the charter fares and the scheduled low-cost carrier fares are being reduced.

2.3 The Open-Skies Agreement between the EU and the US

On 30 March 2008, the most ambitious air service deal ever negotiated, took effect. European airlines can now fly without restrictions from any point in the EU to any point in the US. The new EU–US agreement is expected to increase competition and reduce the airfares in the biggest international air transport market.

The Open-Skies agreement contains numerous positive elements but *three key elements* seem decisive in the future of the worldwide air traffic.

1. *Recognition of all European airlines as 'community air carriers'*: All European companies are classified identically without discrimination based on their country of origin (if in the EU).
2. *Flights now possible between any point in the EU to any point in the US*: the airlines will be able to fly from any European airport to any US destination.
3. *Flights now possible beyond the US towards third countries*: European companies will also be allowed to go beyond the US and provide destinations using the US as a stopover. With respect to the operation of cargo flights between the US and third countries: freight will follow the same above-mentioned rules as passenger traffic.

This will allow flights from any European airport to any US airport with any European or US company. This major improvement will equalize the rights of all EU Member States which previously did not have a bilateral agreement with the US and thus enhance the destination possibilities for many Europeans.

Some other key factors of the agreement provide for cooperation in fields such as security, safety and environment.

1. *Security*: The EU and the US will work towards compatible standards and practices for entering territories in order to facilitate air regulation.
2. *Safety*: A consultation procedure will be set up to consider safety concerns on either side, and there will be recognition of the development of safety responsibilities at EU level.
3. *Environment*: The US airlines may be subject to taxation of aviation fuel on routes between Member States.

This agreement represents only a first step in the process of metallization of the European and US sky. Both the EU and US agreed to engage a second phase of negotiations after May 2008 aimed at tackling the following issues: facilitating foreign investments; fostering the development of liberalization. Indeed the deal leaves in place *some key limitations*:

1. *Ownership and the control of the airlines*. Foreign entities remain limited to owning no more than 25 percent of the voting shares in a US carrier—49 percent in an EU carrier—and foreigners can not exercise actual control on US carriers.
2. *The US domestic market remains entirely closed* to foreign airlines, and cabotage in the US remains prohibited under the 'Fly America' policy.

Most important of all, the US carriers will finally enter London Heathrow, the key getaway airport in Europe for the US to full compete with the EU carriers.

2.4 Airline Business Models

The emerging forms of business models in the airline industry are presented in terms of how the carrier generates revenue, its product offering, value-added services, revenue sources, and target customers.

The deregulation and new competitive interactions between firms always result in some adjustment of the player's own business model to that of the competitor.

Three main sets of airline business models that will be described in the next sections are:

1. Full-service carrier or FSC
2. Low-cost carrier or LCC
3. Charter carrier or CC

2.4.1 Full-Service Carriers

A full-service carrier (FSC) is defined in this study as an airline company developed from the former state-owned flag carrier, through the market deregulation process, into an airline company with the following elements describing its business model:

- *Core business*: Passenger, Cargo, Maintenance.
- *Hub-and-spoke network*: This has as its major objective the full coverage of as many demand categories as possible (in terms of city-pairs⁶) through the optimization of connectivity in the hub. This item will be presented in-depth, in Sect. 2.4.
- *Global player*: Domestic, international and intercontinental markets are covered with short-, medium- and long-haul flights from the hubs to almost every continent.
- *Alliances development*: No individual airline has developed a truly global network. Thus the network is virtually enlarged by interlining with partner carriers and become part of multi-HS systems.
- *Vertical product differentiation*: This is affected through in-flight and ground service, electronic services (Internet check-in) and travel rules to cover all possible market segments.
- *Customer relationship management (CRM)*: Every FSC has a loyalty program to retain the most frequent flyers. The frequent flyers programs (FFP) have become part of a broader strategy called CRM. The general purpose of CRM⁷ is to enable carriers to better manage their customers through the introduction of reliable processes and procedures for interacting with those customers. The final aim of the CRM is to enhance the passenger's buying and travelling experience in order

⁶ Airlines' demand can be divided into: *primary need*, or the need for a passenger to travel from A (origin) to B (destination) and back at a certain time on a certain day. The use of the 'city-pair market' or 'O&D market' derives from this reason; and *secondary need* or the preference for a certain airline, compared in terms of product quality, brand, and pre-and post-sales customer services, etc.

⁷ The term CRM is used to describe either the software or the whole business strategy oriented to customer needs. The main misconception of CRM is that it is only software, but actually it is the whole business strategy. Major areas of CRM focus on automated service processes, personal information gathering and processing, and self-service. It attempts to integrate and automate the various customer-serving processes within a company.

to personalize the carriers' services. In this perspective, the CRM is an extra tool to differentiate the airline product.

- *Yield management and pricing*: To support product differentiation, pricing and yield management is sophisticated, with the aim of maximizing the network revenues. This item will be presented in-depth in Sect. 2.6.1.
- *Multi-channel sales*: Sales channels are divided into indirect off-line (intermediate travel agencies) or indirect on-line (web intermediate electronic-agents); direct on-line: the passenger buys the tickets directly via the airline's Internet site⁸; direct off-line: the passenger buys the tickets directly via the airline's call centre, the airlines city office (CTO), or the airline's airport office (ATO). The FSC cover all of these channels.
- *Distribution system*: The complexity of the distribution system described above is technologically supported by external companies called Global Distribution Systems (GDSs). Among the most diffused GDSs are: Galileo, Amadeus, WorldSpan, Sabre.

2.4.2 Low-Cost Carriers

The concept of 'low-cost carriers' or LCC originated in the United States with Southwest Airlines at the beginning of the 1970s. In Europe, the Southwest model was copied in 1991, when the Irish company Ryanair, previously a traditional carrier, transformed itself into an LCC and was followed by other LCCs in the UK (e.g. easyJet in 1995). In the literature, there are several similar definitions of an LCC, also known as a low fare or no-frills airline (see Appendix II for a complete list of LCC existing in Europe). In this study an LCC is defined as an airline company designed to have a competitive advantage in terms of costs over an FSC.⁹ In order to achieve this advantage, an LCC relies on a simplified business model (compared with the FSC), a model which is characterized by some or all of the following key elements:

- *Core business*: This is passenger air-service despite the ancillary offers are increasing and becoming part of the LCC core business.
- *Point-to-point network*: The network is developed from one or a few airports, called 'bases', from which the carrier starts operating routes to the main destinations. Destinations are only continental within the EU or the US. No connections are provided at the airport bases, which function as aircraft logistics and maintenance bases.
- *Secondary airports*: City-pairs are connected mainly from the secondary or even tertiary airports—such as London Luton—that are less expensive in terms of landing tax and handling fee and experience less congestion than the larger ones,

⁸ Some authors have analyzed the e-commerce market in the airline industry (see Roy and Filiatrault, 1998; Nyshadham, 2000; Jarach, 2002).

⁹ Riley (2003) defines the LCC as an airline that '... aims to keep operating costs significantly lower than the traditional flag-carrying airlines...' [p. 16].

such as London Heathrow. Small airports will strive to gain the LCC' operation and the usual way is to reduce airport charges. Similarly, air transport activity generates welfare that is a multiple of the airports' activities, inducing regional economic and social development. Local authorities recognize that the LCC operation is a potential driver for social and economic developments, and are willing to provide financial help (for example: tax exemption, marketing support while LCCs start a new connection). The reduced airport fees can be understood as an incentive, as most of these secondary airports are public. These incentives can be quite relevant and can be deemed to contravene the EU's competition rules.

- *Single aircraft fleet:* In general, the LCC operates with one type of aircraft such as the Boeing 737 series with a configuration of 149 seats. The fleet composition also depends on the fact that they operate on only short- or medium-haul routes.
- *Aircraft utilization:* The aircraft is in the air, on average, more hours a day compared with FSCs that have to respect the connectivity schedule.
- *No frills service:* The product is not differentiated as they do not offer lounge services at airports, choice of seats, and in-flight service, and they do not have a frequent flyer program. Fare restrictions are removed so that the tickets are not refundable and there is no possibility to rebook with other airlines. This item will be presented in-depth in Sect. 2.5.2.
- *Minimized sales/reservation costs:* All tickets are electronic and the distribution system is implemented via the Internet or telephone sales centre (only direct channels). Passengers receive an e-mail containing their travel details and confirmation number, when they purchase. The LCC does not intermediate the sale with travel agents and nor does it outsource the distribution to GDS companies.
- *Ancillary services:* LCC increasingly have revenue sources other than ticket sales. Typical examples are commissions from hotels and car rental companies, credit card fees, (excess) luggage charges, in-flight food and beverages, advertising space. The potential growth of this revenue comes from telephone operations and gambling on board. Mintel (2006) reported that Ryanair's revenue from sources other than ticket sales contributed €259 million to its 2005–06 net profit of €302 million. Those revenues already represent 16 percent of the carrier's total revenue. For easy Jet, that kind of income originally represented only 6.5 percent of the airline's total revenue, but it increased by 41.3 percent from 2004.

Not every low-cost airline implements all of the points mentioned above. For example, in 2005 Air Berlin started the UK domestic services as feeders to its German services out of Stansted, exploring the hub-and-spoke operations.

The differences between the FSC and LCC business models are multifaceted (see, e.g., Alderighi et al., 2004). The significant structural cost gap between the two models results from these fundamental differences. Table 2.1 breaks down the cost gap between the FSC and the LCC business models. Overall, the LCC model can operate at 49 percent of FSC costs. In particular, 37 percent out of a total 51 percent of costs difference can be attributed to explicit network and airport choices (or business place and process complexity); another 9 percent of the LCC cost advantage comes from the distribution system and commercial agreements (costs which are narrowing with the elimination of commissions and GDS). A remarkably

Table 2.1 The LCC has 51% cost advantages in relation to the FSC (Source: Doganis, 2001)

	Cost reduction	Cost per seat
<i>Full-service carrier</i>		100%
<i>Low-cost carrier</i>		
Operating advantages		
Higher seating density	−16	84
Higher aircraft utilization	−2	82
Lower flight and cabin crew costs	−3	79
Use cheaper secondary airports	−4	75
Outsourcing maintenance/single aircraft type	−2	73
Product/service features		
Minimal station costs and outsourced handling	−7	66
No free in-flight catering, fewer passenger services	−5	61
Differences in distribution		
No agents or GDS commissions	−6	55
Reduced sales/reservation costs	−3	52
Other advantages		
Smaller administration and fewer staff/offices	−3	49
<i>Low-cost carrier compared with a full-service carrier</i>		49%

small proportion (13 percent) of the cost differential is product/in-flight service-related. The relative simplicity or complexity of their business models distinguishes the LCCs from the FSCs.

LCCs have successfully designed a focused, simple operating model around non-stop air travel to and from high-density markets. On the other hand, the FSC model is cost-penalized by the synchronized hub operations (e.g. long aircraft turns, slack built into schedules to increase connectivity) that implicitly accept the extra-time needed for passengers and baggage to make connections. In addition, the FSC business model relies upon highly sophisticated information systems and infrastructure to optimize its hubs. Franke (2004) stated that the most relevant success factors of LCCs are their network configuration and their streamlined production processes in relation to FSCs. This issue will be addressed in more depth in Chaps. 6 and 7.

2.4.3 Charter Carriers

A charter carrier (CC) is defined, in this study,¹⁰ as ‘an airline company that operates flights outside normal schedules, by a hiring arrangement with a particular customer’.¹¹ Charter flights have acquired the more specific meaning of a flight whose only function is to transport holidaymakers to tourist destinations. However,

¹⁰ Studying the charter business model does not come within the scope of the study. However for the sake of completeness, we have decided to include a concise description of this model here.

¹¹ The CCs are defined in contrast to scheduled flights even though they also operate to regular schedules (not always published).

tickets are not sold directly by the charter airline, but by tour operator companies who have chartered the flight.

Although charter airlines typically carry passengers who have booked, individually or as small groups to beach resorts, historic towns, or cities where a cruise ship is waiting for them, sometimes an aircraft is chartered by a single group, such as members of a company, a sports team, or the military. In general, charter flights are sold as part of a package holiday in which the price paid includes flights, accommodation and other services. In the past, this was a regulatory requirement. With the EU deregulation the 'flight-only packages' can now be sold only to those who want to travel to the destination.

Most European charter airlines now form part of vertically-integrated organizations, incorporating a tour operator, travel agency chain, airline and, more often hotels and ground transportation companies. Some examples of vertically-integrated charters are Britannia GmbH, Condor, Air Jet, and Virgin Sun. Some FSCs have set up charter divisions: for example, KLM owns Martin Air or Lufthansa owns Condor. For a detailed description of the charter market, we refer to Doganis (1991).

Furthermore, CCs frequently operate from airports, or dedicated terminals, where there is no scheduled service. Much of the traffic through small- and medium-sized airports in the United Kingdom consists of charter flights, and the survival of these airports often depends on the airline landing fees they get from the charter companies. The economy of density pursued by CCs requires that the flights should operate on the basis of near 100 percent seat occupancy, and the standard of seating and service may be lower than on scheduled airlines. (But this is by no means always the case).

Mason et al. (2000) reveal that in 1997 the two largest LCCs in Europe, easyJet and Ryanair, had unit costs more than double those of the largest UK charter airlines. CCs were divided into the ones that form part of vertically-integrated tour operating groups and those that remain independent. The sources of cost advantage that the two types of charter airline have over the LCCs were analysed and identified as the following:

- Larger aircraft and longer-haul destinations;
- Higher load factor, aircraft utilization and labour productivity; and
- Lower distribution costs, landing fees, aircraft leasing costs, and admin & finance costs.

Williams (2001) provides a brief overview of the charter carrier business model and its vertical integration in the EU. He addresses the question whether Europe's charter carriers will be replaced by LCCs and his answer is negative.

2.5 Competition between Business Models

Competitive interactions between firms always result in adapting the player's own business model to that of the competitors, and this is also occurring in the airline industry. The LCC sector continues to grow strongly, and as it does so the business

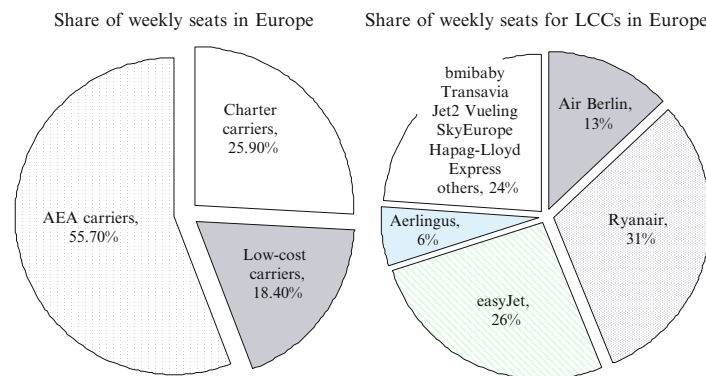


Fig. 2.1 Weekly seats supplied in Europe in summer 2006 (Source: European Parliament Study, 2007)

model is refined and adapted. Figure 2.1 gives the weekly percentage share of seats, and refers to the supply of seats in Europe. The 'other' group corresponds essentially to the CC. Three companies (Ryanair, easyJet and Air Berlin) account for 75 percent of the LCC's seats. Some LCCs have tried to avoid mutual competition. Ryanair, for instance, focuses on smaller markets and regional airports, while easyJet is targeting bigger markets and primary airports.

The European LCC market continues to grow strongly: for example, Ryanair (+23 percent) and easyJet (+16 percent) in 2006. The flag carriers are slightly losing market share to the LCCs. The main question is whether the same growth rhythm and market share evolution will continue and whether those companies can keep their current cost structure. Indeed some inputs, such as fuel, labour cost and aircraft leasing, could become much more expensive, resulting in a slowdown in this growth. But also an explosive growth can become a threat to the low-cost philosophy, and generates higher wages and a more complex management structure. As an example, Air Berlin with the acquisition of dba in 2006 and the charter company LTU in 2007 is growing with economies of scope, as LTU has rights over a considerable number of valuable slots at congested airports (e.g. Düsseldorf).

Airbus and Boeing, the main aircraft manufacturers, have a huge list of orders from airlines and this has changed their negotiating positions resulting in higher purchase prices and lease costs for the carriers. The same cost increases for LCC applies to pilots. Ryanair, for instance, is not longer charging pilots for their training. Finally, some airports are becoming congested, resulting in cost increases for the airlines. These developments may reduce the future competitive cost advantages of LCCs compared with FSCs or CCs.

A study by Mintel (2006) has concluded that there are some signs that the market has reached a certain level of maturity. Some of the signals are the potentially increasing competition from conventional carriers on city pairs. This is demonstrated by, amongst other, Brussels Airlines' price reaction to the entry of easyJet on the Brussels-Geneva route. With increased competition there is the

Table 2.2 LCCs consolidation and bankruptcies in Europe (Source: European Parliament Study, 2007)

Year	Airline	Country	Event
1999	AB Airlines	UK	Bankruptcy
	Color Air	Norway	Bankruptcy
	Debonair	UK	Bankruptcy
2002	GO	UK	Merger with Ryanair
2003	Air Lib	France	Bankruptcy
	Buzz	UK	Merger with Ryanair
	Goodjet	Sweden	Bankruptcy
2004	Air Polinia	Poland	Bankruptcy
	Basic Air	Netherlands	Re-branded in Transavia
	Duo Airways	UK	Bankruptcy
	Germaia Express	Germany	Merged with dba
	Flying Finn	Finland	Bankruptcy
	GetJet	Poland	Bankruptcy
	Jetgreen	Ireland	Bankruptcy
	Skynet Airlines	UK	Bankruptcy
	V-Bird	Netherlands	Bankruptcy
	VolareWeb	Italy	Bankruptcy
	Air Andalucia	Spain	Bankruptcy
	Eujet	Ireland	Bankruptcy
2005	Intersky	Austria	Bankruptcy
	Maersk Air	Denmark	Merged with Sterling
	Air Tourquoise	France	Bankruptcy
2006	Air Wales	UK	Bankruptcy
	Budget Air	Ireland	Bankruptcy
	DbA	Germany	Merged with Air Berlin
	Flywest	France	Bankruptcy
	HiFly/Air Luxor	Portugal	Bankruptcy
	MyTravelite	UK	Reintegrated into MyTravel Airways
	Snalskjusten	Sweden	Bankruptcy
2007	LTU	Germany	Merged with Air Berlin

possibility, as in any competitive market, of short-term excess capacity, and then bankruptcies, mergers and takeovers can occur. Table 2.2 shows that for some airlines (e.g. Air Berlin) the strong growth can partly be explained by the acquisition of other airlines.

The CCs as well were confronted with a decreasing market share due to LCC competition. Some of them, such as Thomsonfly in the UK, introduced LCC characteristics into their business model. Both Air Berlin and Sterling Airways are also good examples of traditional CCs that re-branded into LCCs. Other charter companies started to offer air-only tickets, besides their traditional holiday packages.

To compete with the LCCs, the FSCs implemented more strategies, the main ones are the following:

Table 2.3 Examples of LCC subsidies created by FSC

Holding	LCC subsidy
AirFrance-KLM	Transavia
Iberia	Clickair
SAS	Snowflake
Bmi	Bmibaby

- Creation or acquisition of LCC subsidies in order to establish a multi-brand strategy and maintain a strict distinction between the products. Some examples of subsidy creation are listed in Table 2.3.
- Network rationalization by cutting the less profitable routes. For example, Lufthansa abandoned Berlin when Air Berlin became a dominant carrier, the same happened for Swiss in Geneva with easyJet dominance.
- Reinvention of the business model into an LCC. Aer Lingus (2006) and Meridiana (2003) are two examples of network carriers that transformed themselves into LCCs. Aer Lingus is the most significant example as it faced a major challenge to survive in the new environment after September 11, from its main short-haul competitor Ryanair. The reaction of the Board of Aer Lingus to the new environment was the creation of a survival plan for the company which was unveiled in 2001. Its main objectives were to create a more efficient business model, implement a significant cost-reduction programme, reduce staff numbers by one-third, and radically change the way it does business. Aer Lingus had to implement some low-cost principles and redefine itself as a quasi-LCC facing a prominent competitor, Ryanair. Willie Walsh, known as a miracle worker for the Aer Lingus plan, is today the new chief executive of British Airways.

This evolution shows that most of the FSCs are continuously adjusting some important characteristics of their business models. The reaction is basically the same for most of the European traditional carriers. In the markets where the competition from LCCs is strong, traditional carriers are endeavouring to decrease their unit cost in order to offer lower prices.

2.5.1 FSC Aiming for Higher Cost-Efficiency

The differences in operating costs between FSCs and LCCs are quite relevant. IATA (Economics Briefing No. 5, 2006) reported that in Europe these differences were 40 percent versus easyJet and 64 percent versus Ryanair in 2004, while in the USA there was a 36 percent cost gap in terms of operating costs per available seat kilometre (ASK) for the three largest US network airlines versus Southwest. The advantage of the LCCs in Europe reflects the premium service offered by the FSCs, and the use of short-haul traffic to feed into long-haul networks, which enables the FSCs

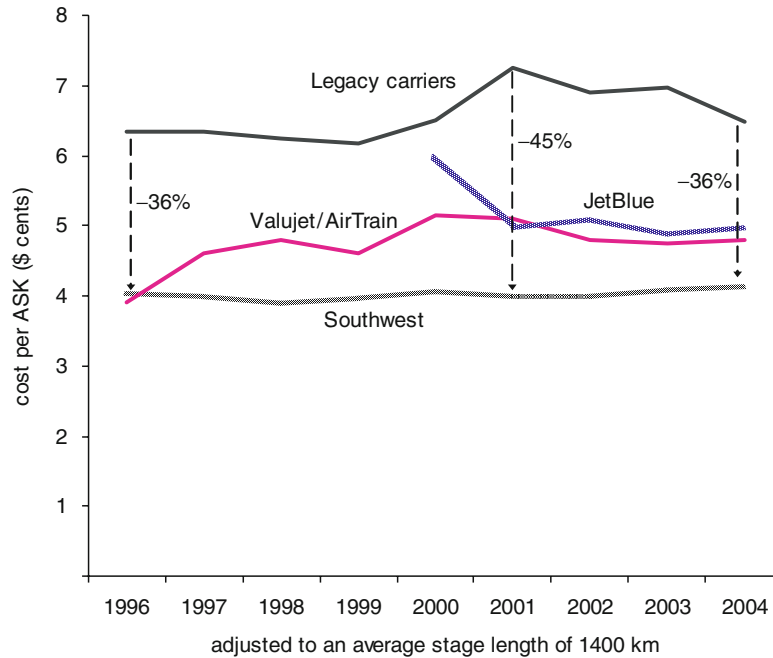


Fig. 2.2 Cost per ASK for US airlines, 1996–2004 (Source: IATA)

to derive higher average yields than the LCCs. Major restructuring among the US FSCs has seen the gap with Southwest Airlines narrow from 45 percent in 2001 to 36 percent in 2004 (see Fig. 2.2).

Southwest Airlines shows a stable cost trend and the difference versus FSCs in 2004 was the same as in 1996. JetBlue and AirTran have also managed to maintain a significant cost difference with the FSCs.

European FSCs have reduced their unit costs since 2001, especially on the sales and distribution side (see Fig. 2.3). However Ryanair, easyJet and Virgin Express have also managed to reduce costs to a similar or even greater magnitude. While the larger LCCs continue to exert strong low-cost competition, it is not such a clear picture for other smaller LCCs. The smaller LCCs (e.g. AirTran in the US, Virgin Express in Europe) have less of a cost gap compared with the FSC and have seen a more volatile movement in costs over time.

Cost restructuring should involve short-term cost reduction in order to conserve cash and supply with constrained demand. The FSCs and CCs have already cut staff, deferred marketing expenses, reduced capacity, retired equipment early and cancelled plane deliveries. Those initial cuts will however, not be sufficient. Surviving companies will need to make longer-term adjustments, including restructuring their fleets, product reconfiguration, and renegotiation of labour agreements, some carriers have even sought bankruptcy protection as a means of resetting their cost structure (Delta and Northwest Airlines benefit from the so 'Chap. 11' legal conditions).

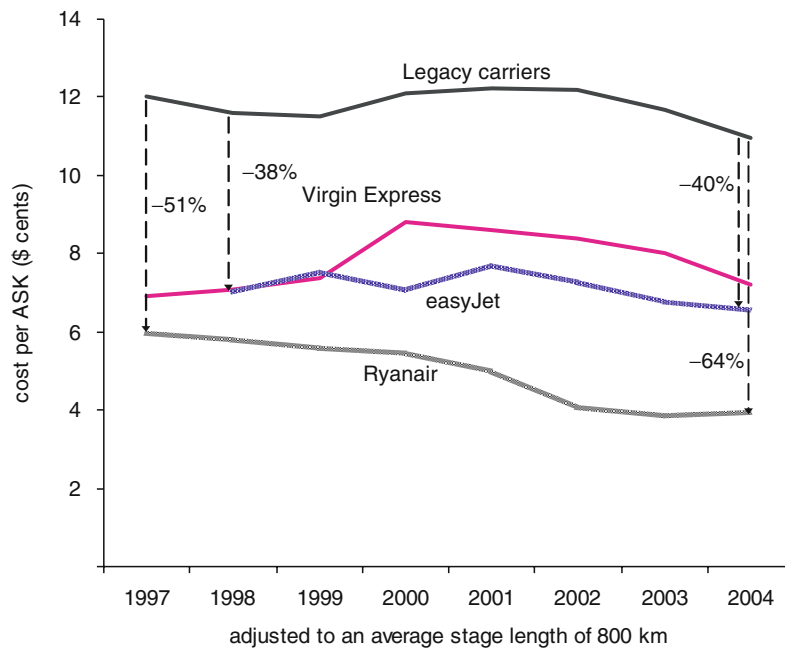


Fig. 2.3 Cost per ASK for European airlines, 1997–2004 (Source: IATA)

2.5.2 The Rise in Fuel Prices

The emergence of LCCs empathize the need for many existing airlines to improve their cost efficiency. The sharp rise in oil and jet fuel prices since 2003 has added greater urgency to the need to cost cutting. The average crude oil price has increased from \$31 per barrel in 2003 to \$60 per barrel in 2006 and an expected average of \$106 per barrel in 2008 (see Fig. 2.4). The FSC has used a combination of stronger revenue growth and higher efficiency gains to offset the large impact of higher fuel costs. However, though the industry has made substantial improvements it still faces a degree of inefficiency to bear the actual oil price increase. Today in May 2008 the crude oil price has reached levels \$120, and analysts expect it to reach \$ 200 in 2009.

Most airlines hedge their fuel costs. *Fuel hedging* is the practice of making advance purchases of fuel at a fixed price for future delivery to protect against the shock of anticipated rises in price. In this period of rising in oil prices, hedging is a crucial part of business for the most successful airlines as fuel is usually an airline's second highest cost (after labor). All the major airlines have hedged fuel prices since the 1980s, but as the major carriers have run into financial difficulties in recent years, they have no longer had the cash to play the oil-futures market. Last year Delta held positions but was forced to sell them in a short-term cash crunch. Those hedges would have protected about a third of its fuel needs. Continental has no hedges in

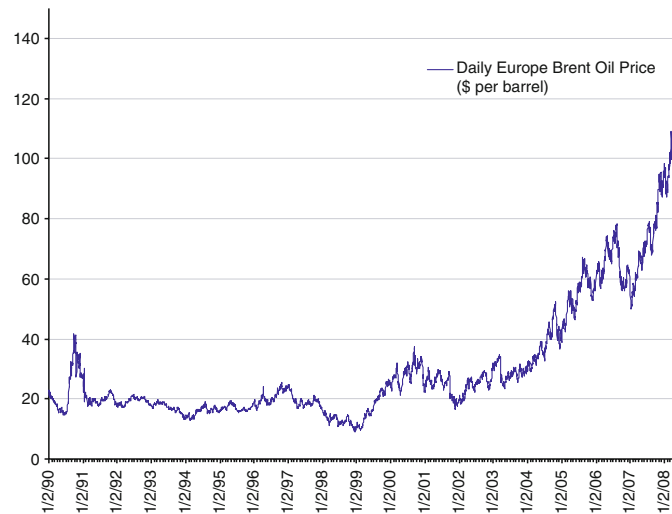


Fig. 2.4 Europe Brent Spot Price FOB - Dollars per Barrel. (Source: US Energy Information Administration)

oil-futures contracts this year. United Airlines, which filed for bankruptcy protection in December 2002, has 30% of its fuel hedged at \$45 per barrel.

Even the most successful airlines are likely to run into difficulties on the hedging front soon. With oil prices so high for so long, no investment bank is willing to cover \$106 barrels of oil, no matter how much cash the airlines can provide. Thus, the challenge for the coming years is to control energy costs, maintain the low airfares that consumers increasingly favor and not transfer entirely the jet fuel surcharges to the final price.

LCC can be particularly vulnerable to the fuel price increase. They benefit from 37% operational cost advantage on FSC, which comes from higher seat density. This advantage can vanish as the fuel price will impact more on their higher fleet utilization costs than the FSCs.

Small airlines and with small scale cost advantage are entering bankruptcy or stopped operating. Some bankrupted small companies in 2006–07 are: Western, Aloha Airways, Ata Airways, Skybus, Frontier, Eos, Big Sky Airlines, Champion Air, Harmony Airways Nac Air in Usa and Canada: Euromanx, Silverjet, Quick Airways, Air Adriatic, Direct Fly, Coast Air, Fly Air in Europe: Adam Air, Oasis in Asia.

Andy Harrison, chief executive of EasyJet, said:

Oil remains the biggest challenge and uncertainty.

The FSC sector in Europe has gone through a consolidation. We may expect that it is now the turn of the LCCs. In Europe there are some LCCs with good profit margins (EasyJet, Ryanair, Air Berlin), and around three or four majors will consolidate the others that can not face this emergency situation.

2.6 Airline Network

The network is a key strategic factor of airlines, as it is the main driver for generating revenue and costs as well as a source of competitive strength or weakness. Gillen (2005) considers the network strategy to be an integral part of the airline strategy, and the network structure to be a function of demand side externalities and uncertainty, as well as supply-side network economics. Network economies have mainly been on the demand side, while in the airline networks they are viewed as being, for the most part, on the supply side. Network configuration is not just a cost issue: a network strategy can confer revenue advantages as well.

The network structure ranges from fully-connected or point-to-point (PP) to hub-and-spoke (HS) to alliance (fully-contracted), or to a mix of these strategies. The forces leading to the choice of each strategy will be described in the following sections and analyzed in Chaps. 6 and 7.

2.6.1 Network Economics

The US deregulation has resulted in the rise of the HS system by the FSCs and the increased adoption of the PP system by the LCCs. In the EU this result has not been widely documented in the literature. Berechman and Shy (1996) have highlighted three elements to explain the rise of the HS structure: firm costs; demand and entry deterrence.

Network costs are driven by economy of scope, economy of density and route length. Economies of scope arise when many travellers of different city-pair markets are combined for at least part of their journey on a single aircraft. These are exploited by bundling traffic over one or more hubs of an HS or multi-HS system. Economies of density are derived from the aircraft size. Unit costs (seat-kilometre costs) decrease with the aircraft size, but they do not necessarily have a linear relationship (production scale). Economies of density are exploited if the network is designed in order to bundle small traffic flows onto routes that would otherwise support smaller aircraft with higher seat-km costs. Caves et al. (1984) and Brueckner et al. (1992) provides empirical evidence of economy of density in airline network. Hendricks et al. (1995) show that economies of density can explain why the HS system is the optimal system. The key to this explanation lies in the level of density economies. However, when they compare the HS with the PP system, they find that an HS network is preferred if the marginal costs are high and demand is low. But given fixed costs and intermediate values of variable costs, a PP system is preferred.¹²

Route length affects the aircraft unit cost, which falls as route length increases. This holds since the fixed costs related to the flights are spread over a larger

¹² Pels et al. (2000) explored the optimality of airlines networks using linear marginal cost functions and symmetric demand functions.

output, and the variable costs do not increase proportionally with distance (see Holloway (2003)). There are a few papers that model airline network competition. Among these, it is worth mentioning Oum et al. (1995), who present a network game in which carriers *investing in hubbing* make a firm ‘tough’ in the multi-product market competition. The use of HS networks turns out to be a device for entry deterrence. Another contribution to the analysis of network competition is given by Adler (2001) who studies a two-stage duopoly competition where carriers first choose their hubs, the connections to spokes and the frequencies, and then they compete both on direct and indirect routes. She finds that there are multiple equilibria as well as no equilibrium, depending on the parameters. Other papers on the topic include Hansen (1990), who studies hub competition in choosing the level of frequencies, and Hong and Harker (1992), who mainly analyse the competition for slot allocation. Bhaumik (2002) investigated the welfare implications of carriers’ competition and the role of a regulator. Finally, Hendricks et al. (1997) analyse asymmetric duopoly competition where departure time is used as a crucial competitive variable.

2.6.2 Network Management

Carriers determine network supply through a process called network management. This process can be described in four steps (see Fig. 2.5; for a recent review of network management, see Holloway (2003)).

1. *Network strategy*. This is the highest level of network decision with two to three years’ horizontal time ahead, including fleet development, financial targets and alliances for passage, cargo and maintenance production lines. The decision is based on the current and forecasted situation in terms of traffic, air-politics, economics, and competitors’ development. Chin and Tay (2001), Smith (1997), and Bruning and Hu (1988) focus on the profitability and investment decision to expand the fleet of North American and Asian carriers.

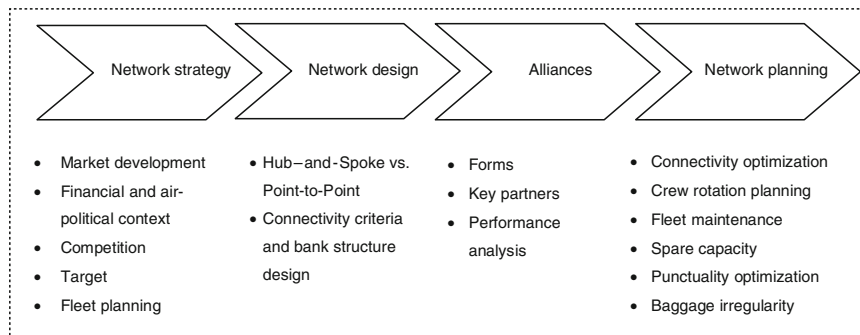


Fig. 2.5 Network Management phases

2. *Network design.* This is the translation of the network strategy into network configuration (HS or PP), connectivity, and hub developments. It includes long- and medium-term fleet planning and supply issues such as frequency, aircraft rotation and hub waves design.
3. *Alliances.* The network can be broadened by incorporating the departures of alliances partners in order to increase the offer to the customers. No airline has—or it is likely to develop—a truly global network. Dennis (2000) considers the scheduling issues that particularly affect alliances including multiple-hub operations, other interfaces between routes, airport slot and terminal allocations, and the through-working of aircraft. Chang and Williams (2002) and Janic (1997) investigate the relation between the liberalization, alliance, and performance of the airlines. The reasons behind the developments of alliances will be presented in Sect. 2.6.
4. *Network planning.* This refers to short-term adjustments of schedules and production planning on a day-to-day basis, which takes place every semester. Those include action to optimize connection time at the hub, ad-hoc changes of the aircraft size, crew planning, punctuality and baggage irregularity. This process follows the short-term demand fluctuation and competitor moves. Crises such as September 11 or the SARS epidemic have affected the network planning of the European carriers. Chapters 3 and 4 are dedicated to analyzing how the carrier's network planning has functioned to react to the global crises.

2.6.3 Network Definitions

There is no unique or even widely-used definition of what exactly constitutes an HS or a PP network, instead a number of definitions coexist. From a network design perspective, the HS or PP network can be described by using a simple network of four nodes. Figure 2.6 depicts two ways of connecting the nodes: on the right, the nodes are fully connected through point-to-point relations, while, on the left, there is a hub-and-spoke relation. Airport H is the hub through which the other airports are connected. Note from the Fig. 2.6 that it takes three routes to connect all the nodes in the HS system, whereas this takes six routes in the PP network. Generalizing the example, given n airports, the possible number of city-pair combinations is $n(n-1)/2$. Hence, the pure PP system requires $n(n-1)/2$ routes to cover all combinations, whereas the HS system allows carriers to cover the same airport combinations with only $(n-1)$ routes.

From an air traffic management perspective, Reynolds-Feighan (2001) identified the HS configuration of a carrier when there is a high concentration level of air traffic in both space and time. Burghouwt and de Wit (2003) explain the spatial configuration by the levels of concentration of an airline network around one or a few central hubs. This definition was adopted in many geographical network analyses and measured by the Herfindal index (McShan, 1986), or by Gini index or Theil's entropy index (Reynolds-Feighan, 1998). Temporal configuration is related to the

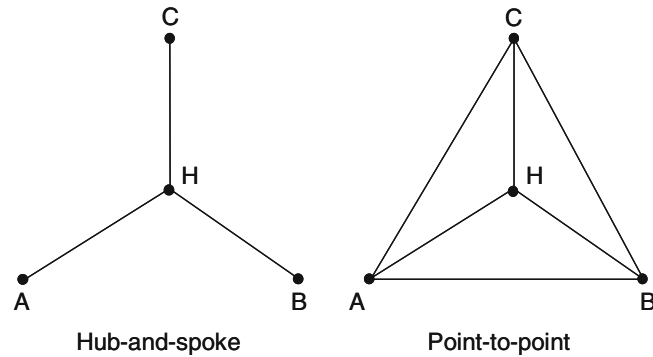


Fig. 2.6 A scheme of point-to-point and hub-and-spoke configurations

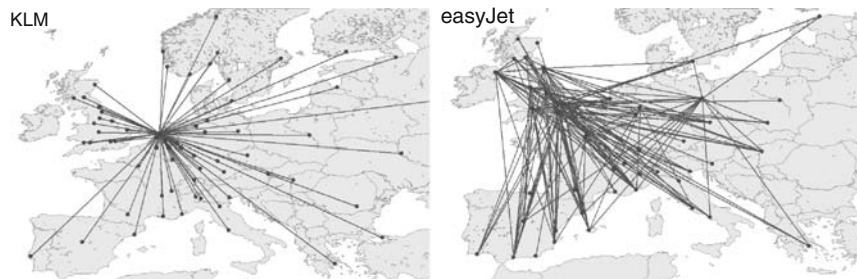


Fig. 2.7 The hub-and-spoke network of KLM in Europe versus the 'almost-fully-connected' (point-to-point) network of easyjet (Source: OAG, November 2004)

airline's flight schedule. Bootsma (1997) defines the temporal configuration as 'the number or quality of indirect connections offered by an airline or alliance by adopting a wave-system structure in the flight schedule. A wave-system structure consists of a number of connection waves, which are a complex of incoming and outgoing flights, structured such that all incoming flights connect to all outgoing flights [...]' Bootsma (1997, p. 53).

In contrast, a network is PP-structured when traffic flows are temporally and spatially dispersed. However, the development of a PP network originates from one or few airports, called bases, from which the carrier starts operating routes to the main destinations. The number of routes may increase, but hardly ever reaches the ideal PP configuration where all the airports are connected to each other. The reasons for this strategy are economic and air-political. Not all the city-pairs have enough demand volume to justify the operation of profitable flights, or there may be difficulties for carriers to obtain slots at all airports, and finally, logistic costs of fleet rotation may make it convenient for the airlines to develop operational bases. Figure 2.7 provides an example of real HS versus PP configurations.

2.7 Pricing and ‘Yield’ Management

Air-travel demand is characterized by factors such as high fluctuations, consumer heterogeneity, and uncertainty about the traveller’s departure date or even the ultimate destination of the journey. On the other side, airline supply is limited by aircraft capacity and has a very perishable nature, i.e. the unsold seats cannot be reused after the flight has departed. Thus the process of pricing and inventory control (allocation of aircraft seats) is among one of the most complex ones faced by the modern airlines.

Over the past years, a set of techniques to allocate limited and highly perishable resources among differentiated consumers have been adopted by carriers. These techniques are known as ‘yield management’,¹³ also known as revenue management or revenue enhancement. Lieberman (1991), defines yield management as a ‘systematic approach to applying pricing and inventory controls to the sale of a perishable asset’. The goal of yield management is to maximize the operating revenue in such a complex market environment. In this definition there are three keywords: (a) differentiated customers, (b) limited and perishable resources, and (c) revenue maximization. Customers are not homogeneous in travel behaviour and in willingness-to-pay, thus carriers can segment the demand and differentiate their product to fulfil the demand. The second and the third item can be explained jointly. Once the perishable output is produced (availability of seats), costs can be considered sunk costs, and therefore the yield maximization problem coincides with profit maximization.¹⁴

2.7.1 The FSC Yield Management

We call *FSC yield management* the set of techniques that are usually adopted by the FSC. A recent review of research in yield management as well as a taxonomy of the FSC revenue management is given by Weatherford and Bodily (1992) or Gallego and van Ryzin (1997). Weatherford and Bodily identify 14 descriptors that can be used to set the yield management problems. Our description is organized in terms of seven simple principles:

- (a) *Market segmentation*. Travellers do not have homogeneous behaviour and demand can be segmented. The demand for business travel is concentrated on flights at the start and end of working days of the week. Business travellers book later than leisure travellers and need to change travel arrangements at short notice. Some of the segmentation key variables are: the purpose of travel (business or leisure); the purchase timing (early bookings or last-minute bookings); and the purchase location (country of purchase, Internet, travel agent or

¹³ For a review of different yield management techniques, we refer to Weatherford and Bodily (1992).

¹⁴ This explains why it is called revenue or yield management and not *profit management*.

airport ticket office). Further segmentation can be created through distribution channels; specialist markets such as marine, missionary, ethnic and students, are sold tickets through dedicated agents.

- (b) *Product differentiation.* To respond to the market segmentation, airlines differentiate the supplied quality by adding extra services to the basic transport. Those are typically in-flight services, ground services (food and entertainment, fast check-in, VIP waiting lounges, etc.) and fences (see c below).
- (c) *Booking classes and fences.* In order to ensure that any segment of passengers purchases its required levels of quality, the carriers apply fences. Product fences are rules that regulate the ticketing purchase and the conditions imposed on each traveller category. In general, the fences are known to the passenger as the travel rules and conditions included in the tickets. Some examples are: ticket cancellation or travel date change penalties, purchase time limits, or minimum number of days to stay at the travel destination (see Table 2.4). Air products are offered to the market through the aircraft reservation classes.¹⁵ One or more airfares are applicable to each class of reservation.
- (d) *Price setting.* The purpose of travel and the passenger's personal characteristics influence their willingness to pay, their price elasticity, and their quality demand. Leisure travellers may be very price-elastic, and businessmen may be more time-sensitive and less price-elastic (see Fig. 2.8). Airfare levels are set according to the different willingness-to-pay and product quality desired by the travellers. The theoretical literature shows that the use of booking classes and

Table 2.4 KLM travel conditions from the Netherlands to Europe in 2005 (Source: www.klm.com)

Product	Booking classes	Conditions (fences)			
		Minimum stay	Changes	Cancellations	Combinations
TAKE OFF Super-deal fare	E, N, T, L, K	3 nights or one Saturday night	No	No	No
OVERNIGHT attractive and flexible fare	B, S	1 night	Yes at € 25	Yes at € 75	with Same Day Return Fare and/or Select Fare
SAME DAY RETURN Economy class same day return fare	X	None	Yes at € 25	Yes at € 75	with Overnight Fare and/or Select Fare
SELECT comfort and ease fare	Z, C, J	None	Yes	Yes	with Overnight Fare and Same Day Return Fare

¹⁵ Carriers label classes with capital letters. For example, the booking classes of KLM are: J, C, I, Z for business cabin and X, S, B, M, H, K, L, Q, T, V for economy cabin.

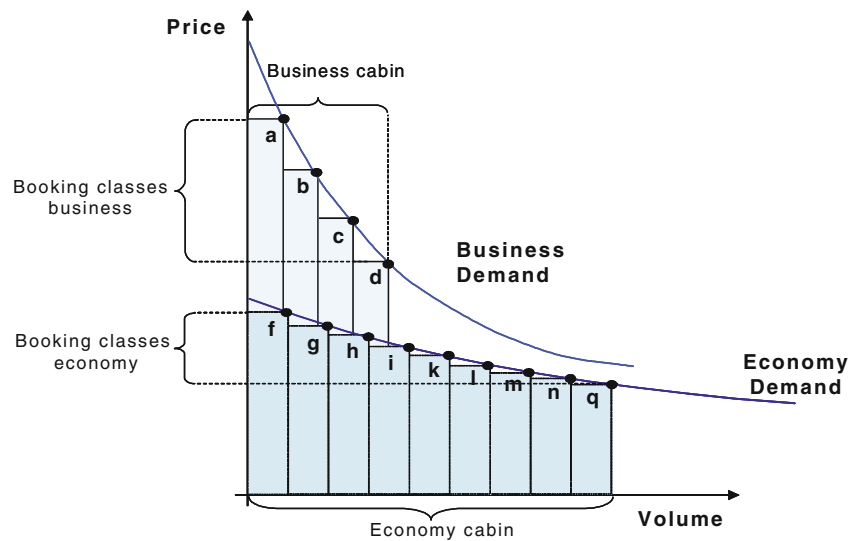


Fig. 2.8 Demand curves for economy and business product and the use of booking classes to price discriminate the passengers

fences allows carriers to price discriminate (see Fig. 2.8). Dana (1998) showed that carriers use those restrictions to screen consumers when their demand is heterogeneous and uncertain. Although even those restrictions have some effect on air carriers' costs, they constitute major discriminatory tools used by airlines. Two theoretical studies have addressed the connection between price discrimination and market concentration in the airline market: Dana (1998) showed that price discrimination by air carriers could be observed even if market concentration is low and a carrier has no market power; and Gale and Holmes (1993) proved that, under certain conditions, a monopoly airline will offer tickets with restrictions so that they will be selected by the consumer with a high valuation of time. Both studies pointed out that carriers use fences to price discriminate. Empirical studies of the airline market show that, as market concentration increases, so does the average price level (Borenstein, 1992; Morrison and Winston, 1990). Borenstein and Rose (1994), in their seminal paper on price dispersion in the airline market, found a negative effect of market concentration on price dispersion.

- (e) *Forecasting and inventory control.* By having discrete fare classes, the yield management system has to face the problem of forecasting the demand and then allocating the right number of seats to each class in order to optimize the revenue. This activity is called *inventory control*, and it is usually implemented for all flights operating between any combinations of city-pairs of the network up to one year into the future. The approach is to forecast and protect enough seats for high yielding demand and then leave other seats progressively available for lower fares. The seat availabilities are set to obtain that particular mix of business in each class which will maximize the expected revenue. In short

the yield management problem is to get the best mix from a portfolio of fares with different values and risks attached. The problem is solved by optimization algorithms, which depend on forecasts of demand for each booking class. These forecasts are based on large databases recording the complete booking history of each booking class per flight, per day over several years.

- (f) *Overbooking, no-shows and go-shows.* Because of the possibility of no-shows (a passenger who books a seat but does not show-up at the departure time) and go-shows (a passenger who has a valid ticket without a reservation but just shows up at the departure time), most airlines accept reservations in excess of capacity. This may result in flights being overbooked and the possibility of refusing seats to ticketed passengers (*denied boarding*). The overbooking level is set equal to the difference between the forecasted no-shows and go-shows. When demand exceeds capacity, customers are serviced by other airlines or given compensations (nearby hotel, free taxi, etc.). The problem is to determine the pricing and the overbooking policy, that maximize the expected revenue. In the absence of a proper overbooking policy the unpredicted no-shows means that the flight departs with empty seats. For a more detailed analysis of this topic, we refer to Gallego and van Ryzin (1997), who developed a dynamic, stochastic yield management model including the overbooking policy.
- (g) *Distribution.* From a yield management perspective, the airline product is the combination of a route connecting point A to point B of the network, rules and travel conditions, and seat allocation, which is all sold for a certain airfare. The distribution system should display the product's characteristics and its actual availability (seat availability) for each origin and destination and booking class. Therefore, inventory control and the distribution system must be linked. The modern GDS (global distribution system) is able to support the different airlines' own inventory control.

The airlines price setting will be extensively analysed in Chap. 5 where a theoretical model of airline price competition with product differentiation and consumer heterogeneity is developed and empirically tested.

2.7.2 The LCC Yield Management

The LCC yield management differs radically from traditional yield management. It is based on the concept that there is a latent large-price sensitive market, which will travel (or travel by plane) only at a low enough price.

- (a) *No-explicit market segmentation.* There is no explicit segmentation or, at least, the segmentation is only applied through time of booking and choice of flight. The passenger who wishes to pay lower prices must book early or on the flights for which there is less demand.
- (b) *No-product differentiation.* The product is not differentiated and the fences are removed: no Sunday rule, date limits, changes fee, and so on. This means that one-way pricing is possible with the outbound and inbound journey being priced

separately but fully combinable. Those factors make the inventory control of LCCs from a technical perspective simpler to manage than FSCs.

- (c) *Price versus demand is a continuum function.* The key factor in being able to offer low fares is to have low operating costs. However, the LCC fare setting is counter to the traditional model. LCCs modify the selling price of each flight as a function of the departure date. If a price is too low, the flight will fill up early and higher-yielding late-booking business will be turned away. On the contrary, if the price is too high, the flight is at risk of departing with empty seats.
- (d) *Booking classes.* Each flight only has one price available at any point in time and not as many booking classes as the FSC.
- (e) *Internet distribution.* The passengers purchase via the Internet and have the transparency to compare prices as a function of date or time of departure. Those who are more price-sensitive can choose the lower demand flights.

The problem is therefore much simpler than that of the FSCs. The idea is that the demand will be such that on busier flights a premium fare can still be applied. Indeed, it is often observable that LCCs are actually more expensive than their FSC competitors. At the same time, on other flights the lower prices ensure a reasonable load factor. Solving this problem requires an understanding of the relationship between the demand and the price. Thus, the traditional approach of booking-class mix has turned into a price optimization problem. Prices are no longer fixed but dynamic and adjusted to reflect demand at one point in time. This can be achieved by plotting the optimal path through the price/demand graph as in Fig. 2.9. The

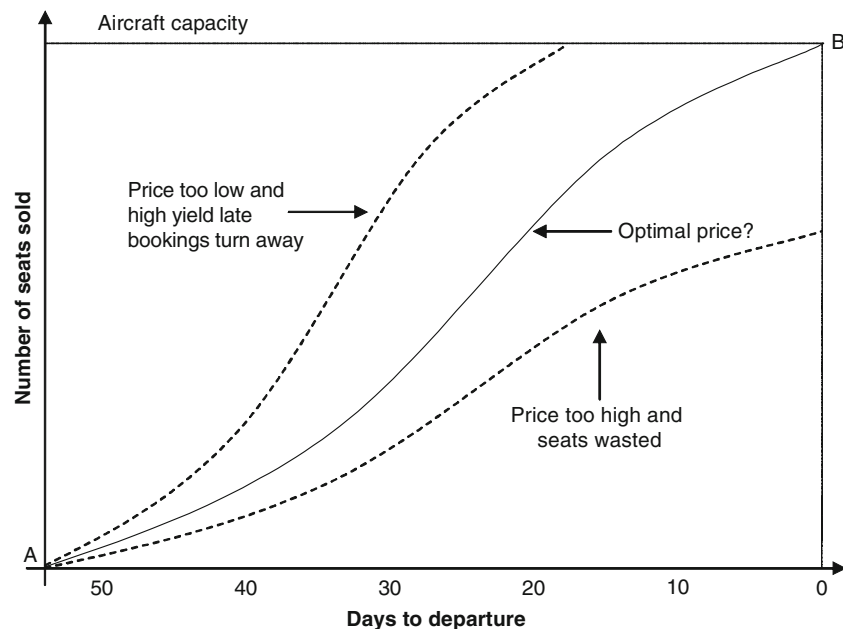


Fig. 2.9 Optimal and sub-optimal booking patterns up to the day of departure (Source: Fletcher (2003))

difficulty with this approach is that the price elasticity can change throughout the period before the flight departure as the mix of travellers can change.

To summarize, the LCC yield management is much simpler than the conventional approach of the FSC. Instead of forecasting the different segments of demand and trying to achieve the best booking-class mix, the alternative is to create demand by low fares and use the pressure of the created extra demand to fill the flight and increase the yield (price optimization).

2.8 Airline Alliances

The emergence of the international alliances occurred after the market deregulation. The alliances affect the major activities of the carriers depending on the type and level of alliance. Networks could be integrated into different forms by incorporating the departures/arrivals of a partner carrier. The major objective is to add as many destinations as possible by accessing the connection system of the partners. The reasons for creating the alliances are *air-political*, i.e. the airline has no traffic rights and is precluded from controlling a foreign carrier that has this right; *economical*, e.g. its costs or fleet are unsuitable for that market; *infrastructural*, e.g. slots are not available; or *financial-related*, e.g. the airline has insufficient resources to develop new markets. Pels (2001) analysed the benefit for both airlines and customers to enter alliances. For an airline, the benefits are the same as adopting a hub-and-spoke network: cost factors, demand factors and entry deterrence. By entering into an alliance, a carrier can increase market densities and reduce fixed costs in the markets with, for example, a code-sharing agreement. From the customer's perspective, Pels states that the major sources of the potential increase in consumer surplus are: the network effect; increased densities on different links; and joint pricing of complementary links. Park and Zhang (2000) find that consumer surplus tends to increase if an alliance is a complementary alliance, but it decreases if the alliance is parallel (collusive) in nature. A recent paper of Zhang (2005) examines the competition models for three types of strategic alliances: vertical, horizontal and hybrid alliances. The authors define vertical alliances when two firms link up their complementary products. This form of alliance confers a strategic advantage by allowing the partners to commit credibly to greater outputs, and the strategic effects arising from the elimination of the double-marginalization problem in vertical integration. The horizontal alliances reduce competition not only in the market where prior competition between the partners takes place, but also in the other markets of the alliance network. The hybrid alliance is a mix of vertical and horizontal alliances and it is likely to have both pro- and anti-competitive effects.

From the airline perspective, network complementary amongst partners is clearly one key factor in creating an alliance. This stimulates the creation of multi-hub systems to capture traffic flows from a secondary or tertiary airport behind one hub to a secondary or tertiary airport behind another hub. Dennis (2000) considers the scheduling issues that particularly affect alliances including: multiple-hub

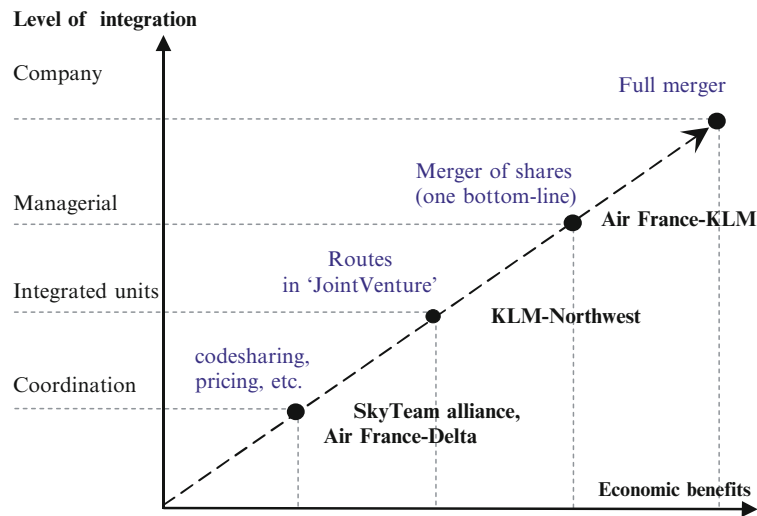


Fig. 2.10 Different forms of alliances (Source: KLM, (2005))

operations; other interfaces between routes; airport slot and terminal allocations; and the through-working of aircraft. The idea behind alliances is the outsourcing of capacity supply when the use of the carrier's aircraft is not possible. The types of outsourcing most adopted are: the code-sharing agreements; the blocked-space agreement; franchising and/or leasing agreements; and joint venture service. For a complete description of these agreements, we refer to Holloway (2003).

Figure 2.10 shows different forms of alliances plotted according to the increased economies of scale and scope levels that can be reached. Coordination alliances are the first levels of cooperation among partners, usually in terms of schedules, code-sharing, pricing and frequent flyer programmes. Examples of coordination alliances are presented in Table 2.5 and the global network created by Star alliance is displayed in Fig. 2.11.

Airlines can integrate part of the network or company unit. An example is the joint venture of KLM and Northwest Airlines for the routes between the US and the Netherlands. A joint service requires that one of the carriers undertakes the revenue management activities for both carriers. Inventory on the joint service is jointly priced and promoted. In this case, the partners are not competing against each other. Joint services generally require either a revenue sharing agreement (based on some level of assumed costs attributed to the operating partner) or a cost-and-revenue sharing agreement. A specific joint revenue management unit has been established in the KLM headquarters in Amsterdam to manage these joint routes for both carriers.

Before the market deregulation, national institutions and regulation were against mergers and takeovers, constituting international barriers that lead to the formation of alliances. Recently, both in the US and the EU, these barriers are being reduced and alliances are evolving in company merging. Brueckner and Spiller (1994), and

Table 2.5 Major airline alliance groups in 2008

		
Aer Lingus	Aeroflot—Russian Airlines	Air Canada
American Airlines	China Southern Airlines	Air China
British Airways	Aeromexico	Air New Zealand
Cathay Pacific	Air France—KLM	ANA
Finnair	Alitalia	Asiana Airlines
Iberia	CSA Czech Airlines	Austrian
LAN Chile	Continental Airlines	BMI
Qantas	Delta Air Lines	LOT Polish Airlines
Japan Airlines	Korean Air	Lufthansa
Malév Hungarian Airlines	Northwest Airlines	SAS
Royal Jordanian Airlines	Air Europa	Singapore Airlines
	Copa Airlines	Shanghai Airlines
	Kenya Airways	South African Airways
		Spanair
		Swiss
		Thai Airways International
		TAP Portugal
		Turkish Airlines
		United
		US Airways

**Fig. 2.11** The global network of Star Alliance in 2006 (Source: OAG)

Keeler and Formby (1994) demonstrated the cost incentives for airline consolidation. On the revenue side, the stronger market presence of the merged networks may translate into higher fares (Morrison, 1996).

In 2004, KLM and Air France created the first-cross border merger in Europe. A new group, called Air France-KLM, controls 100 percent of the two former operational airlines, which so far remain operationally independent. Apart from Air France-KLM, a new consolidation in the EU is taking place between Lufthansa and Swiss or in the US between American West and US Airways. Carlton et al. (1980) developed a methodology for estimating consumer' benefits resulting from a merger in the US. They indicated that airline mergers may confer substantial consumer benefits in the form of superior service (single carriers in place of multiple-carriers).

2.9 Mergers and Acquisitions; Three Mega-Carriers in Europe?

Cost efficiency can also be achieved by mergers or acquisitions (M&A). This consolidation phase has started mainly in Europe between the FSCs but also between LCCs, and it could reshape the national carriers' scope and increase competition between US, EU and Asian carriers. Indeed, consolidation can yield three major benefits to airlines.

First, operational synergies can provide opportunities for cost rationalization, from scale benefits in procurement, sales, maintenance, and airport operations to sharing overheads and information technology systems. Secondly, network synergies can reduce costs and improve asset utilization by eliminating of redundant routes. Increased revenues can be generated through pricing harmonization achievable thanks to the increased market share and improved load factors. Third, consolidation can improve carriers' competitive positions by providing a platform for growth, greater negotiation power with partners, and benefits from improved capital management. Therefore, consolidation would usually provide the greatest scope for value creation.

The acquisition of KLM Royal Dutch Airlines by Air France in 2004, has shown its rivals what can be achieved with greater economy of scale in the highly fragmented industry. After integrating its two networks and hubs, Air France-KLM SA has reached a growing portion of European market share, particularly among high-paying business travellers on long-haul flights. Lufthansa followed in 2005 with the smaller acquisition of Swiss International Air Lines. The success of that deal has made Lufthansa open to the possibility of further acquisition, as its executives have declared. Iberia declared itself to be open to a potential acquisition and received a proposal from British Airways which already owns 10 percent of Iberia. British Airways could face further competitive pressure from Lufthansa. Scandinavian Airlines System planned to sell its 20 percent share in British Midland Airways (bmi). Lufthansa already owns 30 percent shares of bmi and it will most probably become the client of SAS to reach 50 percent ownership of bmi. Lufthansa could gain market

Table 2.6 Largest network airlines in EU by share of ASK and speculation about mergers

% ASK	in 2004	in 2006		Mega-carriers (?)	
British Airways	20.4	Air France—KLM	22.5	Lufthansa Swiss	31.2
				SAS Austrian	
				Virgin Atlantic	
Lufthansa	17.8	Lufthansa—Swiss	20.6	Air France KLM	27.4
				Alitalia	
AirFrance	14.9	British Airways	20.4	British Airways	27.2
				Iberia	
KLM	7.6	Alitalia	4.9	Other	14.2
Iberia	6.8	Virgin Atlantic	4.0		
Alitalia	4.9	SAS	3.8		
Virgin Atlantic	4.0	Austrian	2.8		
SAS	3.8	Other	21.0		
Swiss	2.8				
Austrian	2.8				
Other	14.2				

Source: OAG(2004) and own elaboration.

shares by buying a large stake in Virgin Atlantic Airways Ltd. Singapore Airlines is looking for a buyer of its 49 percent stake in Virgin Atlantic.

Table 2.6 illustrates that British Airways, Lufthansa and Air France are the principal FSCs in the EU market (the data exclude the LCCs). These three carriers are responsible for over half the ASK and over 40 percent of weekly flights operated by the EU network airlines. If KLM's operation is added to that of its owner, Air France, or Swiss's operation is added to that of Lufthansa, then 63.5 percent of ASK are performed by the top three carriers. The rest of the EU's airlines offer much smaller shares of capacity.

In the coming year, a series of deals could result that may even leave the European airlines industry built around the region's three biggest carriers: British Airways PLC, Deutsche Lufthansa AG and Air France-KLM SA.

This could put the European FSC, even more in competition with US carriers that have expanded their international network in recent years to escape from competition from the LCCs in the US domestic market.

2.10 Conclusions

In this chapter we have provided a brief description of the airline industry in terms of new airline business models and a comparison of their main characteristics. The process of deregulation and the subsequent process of privatization have induced important changes in the strategy of the airlines. At least three new business models can be identified: full-service carriers (FSCs), low-cost carriers (LCCs), and charter carriers (CCs).

The FSC model developed from the former state-owned flag carrier model, through the market deregulation process, into a new airline company with a hub-and-spoke network or, through international alliances, multi-hub-and-spokes systems. Sophisticated yield management techniques were adopted in order to control the aircraft availability and to provide an even more differentiated product. The LCC business model has experienced fast growth in Europe after the deregulation. LCCs have successfully designed a focused, simple operating model around a point-to-point, no-frills product. They did not suffer as much as the FSCs from the crisis in the air transport industry after September 11, thanks to the low fare levels which still continue to attract many passengers and the diversion away from sensitive regions (North America and Asia) towards intra-European flights.

Nowadays, FSCs and LCCs often compete on the same routes and for coincident segments, while the LCCs' performance indicators are in general higher than those of FSCs. The conclusions of this chapter are threefold:

1. *LCCs can provide some important cost lessons for FSCs.* There are still large cost differences between FSC and LCCs both in EU and US, though the nature of the gap can differ between the US and the EU. For example, there is less of a difference in infrastructure costs in the US than, in other regions, with less opportunity for LCCs to concentrate on secondary airports. The size and spread of the cost gap highlights that there are several areas, from distribution to aircraft utilization, where the network airlines can move closer to an LCC approach in order to lower costs.
2. *Greater Cost Efficiency is already being achieved by FSCs.* US and European FSCs have managed to make progress in lowering their unit costs (and particularly non-fuel unit costs) since 2001. A reduction in distribution and overhead costs has been the main driver. Cost efficiency is also being achieved by merger or acquisitions (M&A). The acquisition of KLM Royal Dutch Airlines by Air France in 2004 has shown its rivals what can be achieved with greater economy of scales in the highly fragmented industry.
3. *The Hub-and-Spoke model can, however, also provide some competitive advantages.* The higher product quality that can be offered by FSCs (e.g. comfort, more convenient airports, personal rewards through loyalty schemes) can be used to attract customers willing-to-pay a premium for the additional service. FSCs do still have advantages within their own business model by for distance using multiple aircraft types to adjust capacity to prevailing demand conditions on different routes. In addition, the airline network itself provides several advantages over LCCs on many routes. For example, over half of all European long-haul traffic originates from short-haul traffic on feeder routes, thus, FSCs can benefit from a higher level of economy of scope.

In the remainder of this study, first, in Part II, we analyse how the FSCs have conducted themselves and reacted to the September 11 and the SARS crises in view

of their short-term network planning and long-term network strategy. Then, in Part III, the competition between LCCs and FSCs is addressed in terms of both network and pricing. The price reaction of the FSCs to the entry of the LCCs, is analysed theoretically and tested empirically in relation to the revenue management strategies. Finally, the differences between, and the coexistence of, different FSC and LCC network designs are discussed and measured empirically.



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