4 Airports as cityports

4.1 Introduction

The internal geography of the competitive city-region has shown a variety cityports, the locations that combine economic, infrastructure and urban dimensions and fulfil the role as a port, a place and a node in the city-region. The airport is one particular kind of cityport that rapidly develops due to its economic importance in the quintessentially polycentric regional economies. The city-regions in the case studies, however, preliminarily show a mixed picture of airports developing into cityports. This chapter is the final step to answer the first main research question: *what is the spatial-economic position of the airport as a type of cityport in the city-region?* Answering this question will complete the spatial-economic analysis that focuses on the economic reality behind planning. Spatial and economic factors however do not explain the development of airports as cityports in the city-region alone. Market actor's behaviour co-determines this development process in relation to governmental regulations. Therefore, it will be necessary to focus further in the following chapters on the actors and institutions that set the playing field of planning within the context of this spatial-economic picture.

In order to answer the research question, the following steps are taken. Studying airport areas can then be distinguished in the airside (aviation), landside (urbanisation) and the airport as an interface in between. First, a theoretical framework for determining the meaning of airports as cityports is constructed (4.2). The airport case studies are briefly introduced (4.3). To understand the position of airports as cityports, current developments at the airside (4.4), the landside, and with the airport as interface (4.5), require further analysis. The landside of Schiphol, Frankfurt, Haneda and Narita airports are considered via economic impacts (4.6) and urban development of the case study areas (4.7). The comparison and conclusion (4.8) answers the first main research question with regard to the spatial and economic position of the airport as cityport in the city-region and will stress the need for and importance of institutional analysis in the second part of this book.

4.2 Airports as cityports

Although the globalizing city-region is characterised by a variety of new and existing cityports, as has been shown in chapters 2 and 3, the focus here is on the development of the regionally embedded airport as a particular kind of cityport. The airport as a cityport has been categorized as external edge city, that creates economic dynamics with its large-scaled infrastructure of runways and terminals causing noise and safety conflicts with the surrounding land uses, particularly in the case where airports are inside the metropolitan area as at Frankfurt, Schiphol and Haneda. This section will determine the understanding of the airport as a cityport, what it is and what it's not, by focussing on quantitative and qualitative elements.

Runways, terminals, roads and rail infrastructure are amongst the most important business settlement conditions for airports and a condition for real estate development. In return this economic growth and urban development improves the attractiveness of the airport as a destination. The embeddedness of the airport in the city-region is essential for the development towards a cityport. This excludes wayports from the analysis, airports that are limited to freight and passenger transfers, and that are not related to the city or region. These wayports are located in the geographical periphery; for example, freight transfer in Anchorage, Alaska (providing shorter routes over arctic regions), or passengers at Charlotte, North Carolina in the U.S.A. and until recently, Clermont-Ferrand in central France.

Weisbrod, Reed and Neuwirth (1993) argue that few types of economic development have been as poorly predicted as development around airports. Some airport environments showed unexpected rapid development, where in other cases, land reserved for development remained vacant for decades. According to them, apart from institutional reasons (that are quintessential and discussed in the following chapters) spatial and economic conditions turn out to be crucial in the success or failure of the airport environment as a business location, as well. In particular, important conditions include: the status of the airport; user value; user costs; services to travellers and employees; attractiveness to businesses; land development in the airport vicinity; and indirect and induced effects of airport-related businesses elsewhere in the city-region (*ibid*.). For example, international operating businesses, business managers and services take advantage of the direct accessibility to the airport, as found in the previous chapters with major business locations in the Frankfurt Rhein-Main and Randstad city-regions.

In the cases where airports act as a magnet for business in the city-region one can be more selective in development than in the cases of failed land development near the airport. In the position of the airport as a cityport in the city-region a continuous tension exist between exploiting the potential of the airport for business on the one hand and not hindering or protecting the aviation activities on the other hand. Two approaches how to accommodate businesses and develop the airport region can be distinguished: the *exploit-the-site* approach, that makes full use of the business opportunities and in contrast *protect-the-site* that is more selective and prioritises airport related activities (H+N+S *et.al.* 1998).

Aviation specialists prefer the protection of sites by only admitting platform related activities as handling of cargo and baggage, and maintenance of airplanes. This is to avoid congestion and the downfall of the airport due its own success. The exploit-the-site approach, however, has a corporate background and sees the scarcity of the market as essential; land prices and rent levels will sort out the activities with the highest added value at the airport, often offices. In practise, the actors involved will choose a vulnerable balance of exploiting the airport's economic potential and spin-off while protecting the core business. The question is then whether these processes should be concentrated at the airport, or wider into the airport region.

While development of the aerotropolis can be seen as site protection, the prime example of site exploitation is the airport city model. In the 1970s and 1980s, interest grew for the airport area as business location. On the one hand, the airport needed protection and on the other hand, the airport itself was not the most suitable location for all kinds of economic activities attracted to the airport. For economic reasons in particular, a relatively low added value (and

thus, lower affordable rents) and the required large space for goods storage and distribution, it was more attractive not be directly at the airport but within the airport region. This regional approach considers the wider context of the airport in developing the city-region and is labelled *aerotropolis* by Kassarda (2000).

The increase of the services, businesses and leisure in the 1980s and 1990s with a higher added value per square meter has increased the pressure to exploit the direct airport environment. These extensions of business activities are facilitated by multi-modal transport connections on the airside and landside and show the development of what Güller and Güller define as the *airport city*:

"…the more or less dense cluster of operational, airport-related activities, plus other commercial and business concerns, on and around the airport platform. However, this cluster is called the airport city only if it shows the qualitative features of a city (density, access quality, environment, services)." (Güller and Güller 2002:70)

The modern airport has developed in the last 40 years from an air-station (1960s), shopping centre (1970s) to a business centre (1980s) and an entertainment- and leisure centre in the 1990s (Hartwing 2000). Güller and Güller classify the current wide range of activities at and surround airports and put them in relation to the airport-relatedness of the activities, thereby addressing the tension between the low added value airport-related activities and the high-added value loose-airport-related activities. In Table 4.1 aviation and activities specifically related to the airport are plain, and activities which were previously exclusively metropolitan are in italics.

The economic potential and urban pressure these activities generate, either in the airport region or at the airport territory itself, does not necessarily mean that the potential of the airport to become a cityport is used. Some of the most developed airports lack sufficient infrastructure and quality of land use, and there are mismatches with the local land use plan (Hack 2000, Güller

Table 4.1 Airport relatedness of activities and added value

Added value per m²	**Core business**	**Airport-related**	**Airport-oriented**	**Airport-image**
	Terminal-services: duty-free, IT, etc.	International Logistics Company Headquarters	*Intl. business activities HQ's/WTC*	*Shopping ICT-business Other offices*
High	Ground handling	Post services Test & training Catering	*Medical care* Hotel Conference Restaurants	*Entertainment Science park R&D Education*
Average	Airplane maintenance	Flower-fair European distribution Parts centre	Value-added logistics Intl. exhibition centre	*Pharmaceutical High-Tech Electronic Food industries*
Low	Freight centres		Expo centre region Intl. large-scale distribution	*Regional transport and distribution Recreation & golf*

Source: Güller and Güller 2002:164

and Güller 2002, Güller 2001). Accessibility of sites can be poor, and the airport territory can become a location with all kinds of business settlement, since land market prices and land use policies influence the location and concentrations of business. Therefore, we can argue that the possibilities of the airport area are often not used to its full potential. The question raises then, what the quality of the airport as a cityport in the city-region is. Hartwing (2000) discusses the position of the airport as a new urban node and provides a useful definition of the urban node, here referred to as the airport as a cityport:

"An urban node must fulfil the function of a port, place and a node: here is the stop-over and transfer at the same time and offers a diversity of uses to the heterogeneous audience. The mere function of the traffic node has a high concentrating and magnetic effect on the surrounding. A node is dependent on the connectivity to the city(-region), in a reciprocal functional relationship." (Hartwing 2000:181)

Hartwing found that even though Frankfurt's airport comes close, German international airports do not simultaneously fulfil the function of a port, place and a node, as for instance train stations do, as a place to stay. The airport is often considered as a *gateway to the world*, but not as a *gateway to the city-region* (Hartwing 2000:66). Hartwing argues that this relationship needs to be more reciprocal, and recommends taking the airport out of its isolation and making the airport itself more responsible for its direct environment by a more open planning process with the airport taking on a more important role in regional planning. The local and regional embeddedness of the airport as a cityport challenges the institutional system and in particular, the strategic behaviour of actors in the city-region. These institutional issues will be discussed in chapters 5-9, but in the following we limit the focus to the spatial and economic factors that contribute to the airport as a cityport in the city-region.

4.3 History of the airport case studies

In the next sections, the case study airports are considered in the context of the provided theoretical framework that focuses on the regional and economic position of the airport as a cityport in the city-region: Amsterdam Schiphol Airport in the Randstad, Frankfurt/Main International Airport, Tokyo International Airport at Haneda and Narita International Airport in Chiba prefecture. Essential for understanding in their national contexts and for reference, Franz Josef Strauss International Airport in München, Kansai International Airport in Osaka and Chubu International Airport near Nagoya are sometimes referred to, while the Netherlands does not have a second major international airport for reference.

Amsterdam Schiphol Airport
Schiphol Airport (AMS), 18 km from Amsterdam, is Europe's fourth largest airport with 42.5 million passengers and 1.42 million tons freight per year (Schiphol Group 2004). Schiphol is not located in the municipality of Amsterdam, but covers 2878 hectare of lower polder land in the municipality Haarlemmermeer, and borders the city of Amstelveen. The Schiphol airport territory is on average larger in hectares than international airports in Japan and Frankfurt but smaller than Paris Charles de Gaulle. Schiphol is relatively large in proportion to the catchment area of 6.8 million inhabitants in the Randstad or 16 million in the Netherlands. The airport

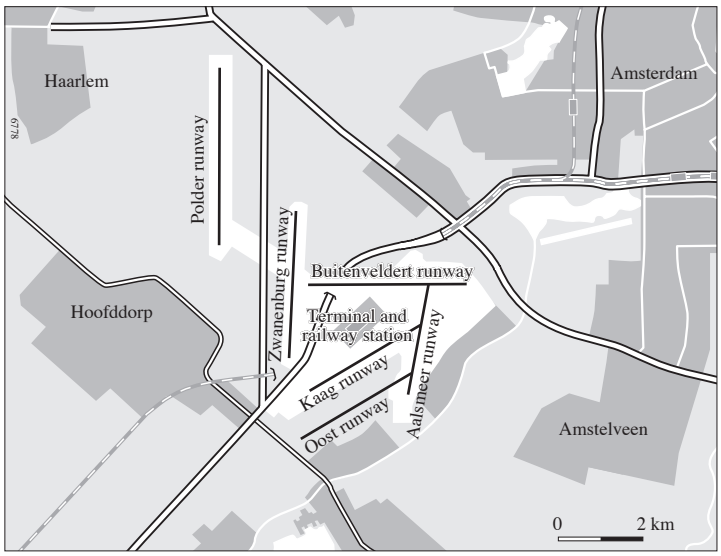

Figure 4.1 Amsterdam Airport Schiphol territory

has a 5-runway system (see Figure 4.1).[1] The parallel major runways are the north-south located Aalsmeerbaan, Zwanenburgerbaan, and Polderbaan. The Buitenveldertbaan and Kaagbaan are crosswind runways. The single terminal concept of Schiphol makes the airport efficient for transfers, despite long walking distances between the six piers. The limited liability company NV Luchthaven Schiphol manages the governmental-owned airport.

Aviation historians Marc Dierikx and Bram Bouwens (1997) comprehensively describe Schiphol airport's 90-year history. They mark four stages of development where the airport has become the current international hub: the start (1916-1945); growth within limits (1945-1967); rapid development, airport expansion, and relocation plans (1967-1985); and, since 1985, mainport as a mission.

The name of Schiphol refers to run aground ships in the former Haarlemmermeer lakes that was reclaimed in 1852. Stage one started in 1916 as a military airport (Table 4.2). Due to the founding of Royal Dutch Airlines KLM in 1919, civil aviation grew more rapidly, and after Amsterdam bought the airport, the city expanded the airfield into an airport with metalled runways. In this first stage of development Dierikx and Bouwens (1997) found strong society support and governmental investments in aviation, though it was not yet profitable.

In the second stage of airport development (1945-1967), Amsterdam and the Ministry of Transport further expanded the airport and it was decided by the national government that Schiphol should continue being the main airport in the Netherlands. The high costs involved in expanding made Amsterdam to decide to sell a share majority to the Dutch state in 1958. KLM's position as third largest carrier in the world and general rapid economic growth contributed heavily to the development of Schiphol in this period. This was supported by a national interest in the airport caused by the desire to be part of the worldwide network of air routes and

Table 4.2 Chronology of Amsterdam Airport Schiphol

Year	Landmark
1916	Opening Schiphol airfield
1919	KLM airlines founded
1926	Amsterdam buys and extends Schiphol
1958	N.V. Luchthaven Schiphol founded, Dutch state buys majority of Amsterdam's stocks, Government decides upon further growth on current location (I)
1967	Move from Schiphol-Oost to Centrum with one terminal and 4 runways
1978	Schiphol railway connection to Amsterdam
1979	Government decides upon further growth on current location (II)
1987	Schiphol Area Development Company (SADC) founded
1992	El Al airplane crash in Amsterdam
1996	Schiphol building expanded with underground railway station
1997	First government plans to sell minority of shares
1998	Start Schiphol Real Estate with Airport City concept
1999	Government decides upon further growth on current location (III)
2003	Opening fifth runway

Source: Dierikx and Bouwens (1997)

established by effective international lobbying for bilateral contracts on air routes. Despite the growth of civil aviation, the business was still hardly profitable (Nyfer 1999).

In the third stage of development (1967-1985) Dierikx and Bouwens found that airport authorities further specialised their organisations, costs and revenues, further increasing the share of non-aviation revenues. European airports introduced tax-free shopping and the airport becomes a business meeting location (Hartwing 1999). Despite a decade long economic recession from 1973, aviation kept growing and airports became increasingly blamed for noise pollution. Therefore, Paris and London partly built new airports, but Frankfurt and Schiphol had enough space for growth on the current sites. However, a study of the Kosten Commission (1967), that also introduced the noise contours based on calculations, made clear that there were limits to Schiphol's future growth, as well. This conclusion was politically sensitive and future research of the Falkenhagen Commission (1968) was demanded for finding alternative locations for airport expansion into the sea. Doubts about the costs of airport relocation and unsure about expected growth led to postponing political decisions until 1979. Based on the Structure Scheme Civil Aviation Areas report, in 1979 the national government finally decided to expand the airport on the current location in the Haarlemmermeer. This decision was in favour of the aviation sector and close to developments in reality as the expansion of the terminal building and the planned underground railway connection.

In the fourth stage of Schiphol's development (1985~), there is a parallel rapid development of aviation on the one hand (see section 4.4) and the 'mainport' status with priority in economic development on the other hand (discussed in 4.6 and 4.7).[2] The economic development of the hub and the mainport in the region became fact in a period of long and intensive debates on environment and safety in Parliament. Another major period of studies by the commission *Toekomstige Nederlandse Luchthaven Infrastructuur* (TNLI) on airport relocation and reconfiguration of runways was held in 1999, with the same result as in 1979 and 1958: growth

on the current location until 2020. The costs of an airport island in sea were considered too high and the aviation sector too dynamic and unpredictable, where budgetary deficits could not be foreseen. Further growth, despite strong opposition of environment- and community groups, was made possible with the introduction of the new Aviation Act (*Wet Luchtvaart*) and Schiphol Act (*Schipholwet*) that took effect with the opening of a new fifth runway in 2003. The current political debate is on further privatisation of the airport by selling a minority of government shares, and options for future aviation growth.

Frankfurt International Airport

Frankfurt International Airport (FRA) is currently Europe's third largest airport with 51.1 million passengers and 1.72 million tons freight per year (Fraport 2004). The airport is located in the southern part of the city, 13 kilometres from Frankfurt on a narrow territory of 1910 hectares surrounded by forests. The airport borders the towns Kelsterbach, Raunheim, Rüsselsheim, Mörfelden-Walldorf and Neu-Isenburg. The catchment area of Frankfurt airport is in the Rhein-Main region of 5.3 million and due to the central location with 82.5 million German potential passengers. Currently the airport has a two-terminal concept with a people mover as connector, served by 4000-meter runways. One runway runs north-south and the other runway east-west – or the latter counted as two parallel runways that cannot be used simultaneously (Figure 4.2). A third runway is planned in the northwestern section of the airport. The airport is managed by the limited liability company Fraport AG and owned by local, state and federal government and private shareholders, such as Lufthansa.

The development history of Frankfurt airport has a similar pattern as Schiphol. The stages of development are a late start (until 1955), make up arrears (1955-1972), rapid growth (1972-1984) and hub status (since 1984).

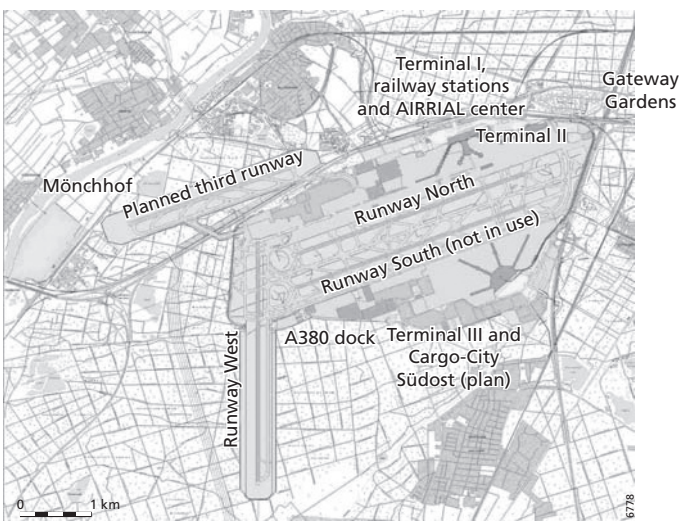

Figure 4.2 Frankfurt International Airport territory (Source: Fraport AG (2006))

The start of Frankfurt's airport in the current downtown park Rebstock was geared up with the foundation of *Südwestdeutsche* airlines in 1911 and later in the start up period became predominantly a military airport (Table 4.3). During the Nazi regime, the airport was relocated and expanded in the city forests, and after the war, used by US air forces. From 1955 on, the Federal Republic of Germany could restart civil aviation and due to the isolation of West Berlin, Frankfurt soon became Western Germany's major airport in the heart of Europe with Lufthansa as home carrier.

Frankfurt airport's development as a latecomer was soon made up for by the rapid development in the 1960s. Since the two parallel runways could not be independently used and the nearby US air force base could not be replaced, airport expansion with a third parallel runway was not possible (Dierikx and Bouwens 1997). Frankfurt Airport AG (FAG) therefore proposed a new north-south runway in 1964, but due environmental protests, riots that even lead to deaths, and revoking of former judicial decisions, it was not until 1984 that the second runway was opened. In the mean time, FAG built airport terminals, an underground railway station, airport services and introduced a permanent noise monitoring system; all unique and leading projects for European airports in the period making up arrears and rapid aviation growth (*ibid.*).

Frankfurt airport became in the late 1980s and 1990s a hub for both international and domestic flights. Environmental opposition, the location in the forest and the possible competition with downtown Frankfurt forced the airport to concentrate and limit urban development, with the AIRRAIL centre on top of the railway tracks as best example of this regime. In 2005, the US Army handed over the air force sites completely to Germany, prime locations for further airport related development for Fraport AG. The current political debate is on further expansion due increasing pressure on the Frankfurt's runways. In 2000, the Airport Mediation Committee recommended further airport expansion (Hänsch *et.al.* 2002), which was followed by a political

Table 4.3 Chronology of Frankfurt International Airport

Year	Landmark
1911	Construction of airfield Rebstock in Frankfurt
1924	Start of *Südwestdeutsche* airlines
1936	Rhein-Main airport and airship baseopened in Frankfurt city forests
1945	Rhein-Main airbase becomes major hub for U.S. and later NATO armies
1955	Restart of passenger aviation by Lufthansa airlines with HQ's in Köln
1972	Opening Terminal 1 with underground train station
1980	Start of underground regional light rail
1982	Lufthansa cargo centre
1983	Widespread violence after commemorating the approval of a second runway
1984	Opening of western second runway
1988	Frankfurt Airport Center and start plans for Airport Conference Center
1994	Opening Terminal 2, connected by Sky Line people mover
1997	Cargo-City Süd
2000	Government decides upon further growth on current location with third runway
2002	AIRRAIL centre opened for long distance trains and commercial real estate
2005	Rhein-Main airbase and settlements returned to Germany

Source: Freund (2002:95)

preliminary decision and court ruling in Darmstadt in 2001 to plan a third runway in the northwest area near Kelsterbach. The last five years, the expansion debate dominated the political arena. The likely result is a compromise of constructing a third runway and a ban on night flights.

Tokyo International Airport at Haneda and Narita International Airport

The Tokyo Metropolitan Area has a multi-airport system, with three airports: the US air base Yokota in Tachikawa, 38 kilometres west of Tokyo; the domestic airport at Haneda (HND) in Ota, 31 kilometres southeast of Tokyo; and the international airport 78 kilometres east of Tokyo in Narita (NRT), Chiba prefecture.[3]

Tokyo International Airport at Haneda was with 62.3 million passengers Asia's busiest and the world's third busiest passenger airport (MLIT 2004).[4] Haneda is located on a reclaimed island in Tokyo's Ota ward and borders the city of Kawasaki. It's is the most central and convenient located airport, with monorail and underground rail connections and highway access relatively close to downtown Tokyo. Haneda is fully owned by the Japanese national government, and the Ministry of Land, Infrastructure and Transport (MLIT) delegates management to Japan Airport Terminal Co. Ltd. as airport authority. Currently, three runways serve Haneda in 24-hours operation on the reclaimed island in the Tokyo Bay: two major parallel runways of 3000 metres and a cross runway of 2500 metres, with in the middle two airport terminals with infrastructure access (see Figure 4.3). The usage of the small 580 hectares island is considering the

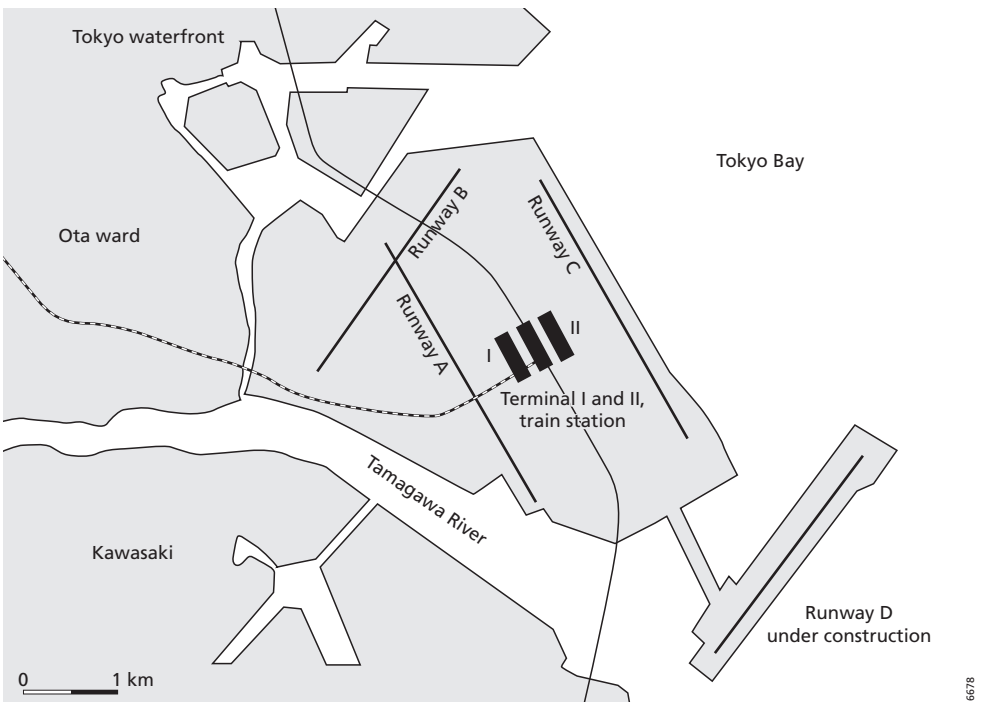

Figure 4.3 Tokyo International Airport at Haneda airport territory

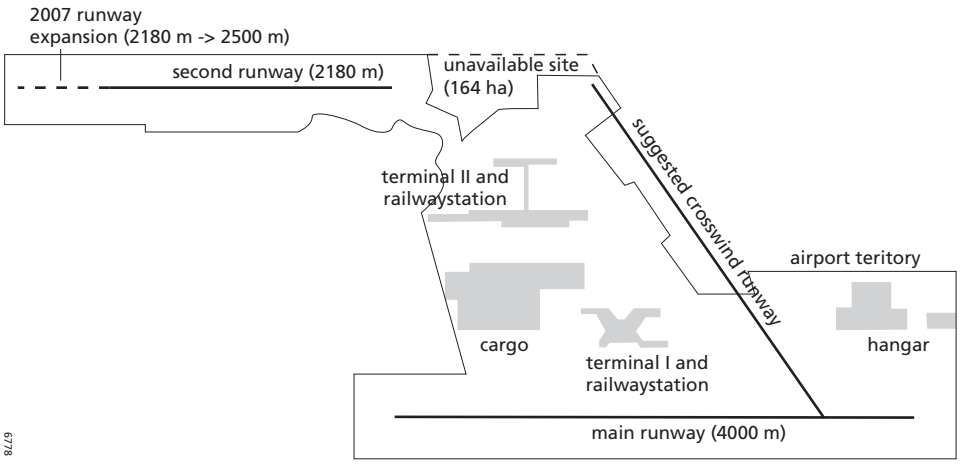

Figure 4.4 Narita International Airport territory

number of passengers very efficient, but air cargo handling is limited. A fourth runway is under construction.

Formerly known as New Tokyo International Airport, Narita International Airport is located in the heart of Chiba prefecture, 78 kilometres east of Tokyo. Narita airport of 940 hectare is the main international air traffic and cargo centre of Japan: with 2.37 million tons of freight in 2004, Narita is the world's third largest cargo airport and the world's 25th largest passenger airport with 31.1 million passengers in 2004. Figure 4.4 shows that two connected terminals serve the parallel 4000- and 2180-meter runways. Similar to Haneda airport, Narita has the legal Class A (international) airport status in Japan and managed by Narita Airport Authority. The airport is owned by the national government, which plans to privatise the airport.

When Haneda and Narita airports are considered together, the development pattern from the start through the current status shows many similarities with the Schiphol and Frankfurt airports (see Table 4.4). The development can be distinguished in the start up of Haneda airport (1931-1958), growth within limits of Haneda (1958-1978), slow internationalisation with Narita airport (1978~), and 1990s-2000s rapid growth of both domestic and international flights.

Tokyo airport near Haneda opens in 1931 and in the starting stage was mainly used as a military airport during the war period and afterwards for US occupational forces. In 1958, the US returned Haneda to Japan, although domestic flights by JAL and international flights by Northwest Airlines already took place. In the same period the airport was expanded further into the Tokyo Bay.

Growth of air transport lead to the opening of the new arrival terminal at Haneda in 1970. Founding the new airport in Narita became necessary after Haneda's lack of future capacity, environmental problems and deconcentration of economic activities from Tokyo into the more peripheral areas of Japan. Landowners, farmers and community activities did not agree with the location decision that came as a surprise and with a lack of negotiation opportunities with the

Table 4.4 Chronology of Tokyo-Haneda and Narita International Airports

Year	Landmark
1931	Opening of Tokyo Airport at Haneda
1953	Start construction on reclaimed land and passenger terminal, civil aviation start-up
1958	US returns Haneda airport to Japan
1962	Government decides upon further airport growth at Narita
1964	Haneda Monorail line opened for Tokyo Olympics
1970	New arrival terminal opens at Haneda, start construction Narita
1971	Start riots over construction of Narita airport
1978	Narita airport opens with single runway
1985	JAL airplane crash on route from Haneda to Osaka
1988	Chiba Expropriation Committee for expanding Narita resigns after violance
1991	Symposium replaces the Chiba Expropriation Committee
1993	Terminal 1 opened at Haneda
2002	Second short runway opened at Narita for FIFA world cup
2004	Terminal 2 opened at Haneda, government privatisation of Narita airport
2004	Tokyo third airport discussion postponed with construction of Haneda fourth runway

Source: Japan Airport Terminal 2004, NAA 2004

governments. Environmentalists' and landowners' protests and violence were the reasons for delay of the opening of Narita International Airport in 1978 and the current short runways (see Figure 4.4). After four decades of conflict, in 2006 Narita could finally start constructing the final part of the second runway in northern direction (Asahi Shimbun 11.09.2006).

Since the opening of the new international airport of Narita in 1978, there are only few international connections with South Korea and foreign holiday resorts in the Pacific from Haneda. Therefore, in theory both airports do not compete but are complimentary. The period of rapid growth in the 1980s and stabilization afterwards means a rapid growth of domestic travel continues at Haneda, and the internationalisation of Japan since the 1990s suggests further growth for Narita. Haneda focuses on domestic passengers and constructs new terminals and plans a new runway. Haneda expects to grow to 73 million passengers in 2012. Few airport-related industries can be found near the airport island.

Kansai- and Chubu International Airports

The constructions of Chubu and Kansai airports and the future expansion plans for Haneda are comparable subcase studies with a different timeline and institutional setting. For understanding Tokyo's airport area development and the economic impact and actor coalitions, it is crucial to have a wider outlook on more recent airport development in Kansai and Chubu. Tokyo's airports are thus introduced in context of Japan's international airport development near Osaka (Kansai International Airport) and in Nagoya, Chubu prefecture (Central Japan International Airport (CJIAC or Centrair)). With Haneda, Narita and Osaka-Itami these airports have the First Class airport status in Japan, but Kansai and Centrair have a mix of public and private ownership.

In 1994 Kansai International Airport opened as the world's first airport in the sea. The direct reasons for building a new international airport were noise problems at Osaka-Itami Airport, economic revitalisation of the Kansai region, and the demand for a second international airport

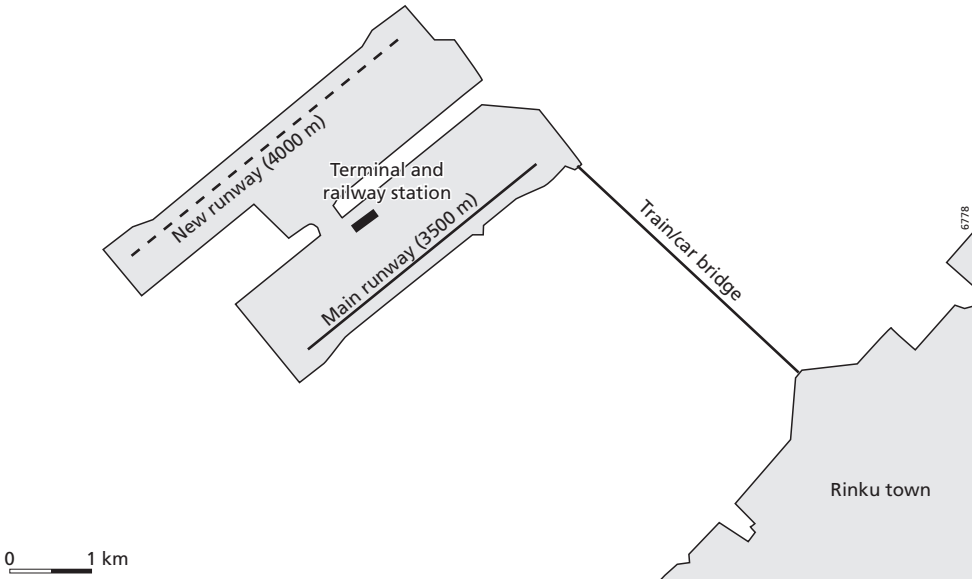

Figure 4.5 Kansai International Airport near Osaka

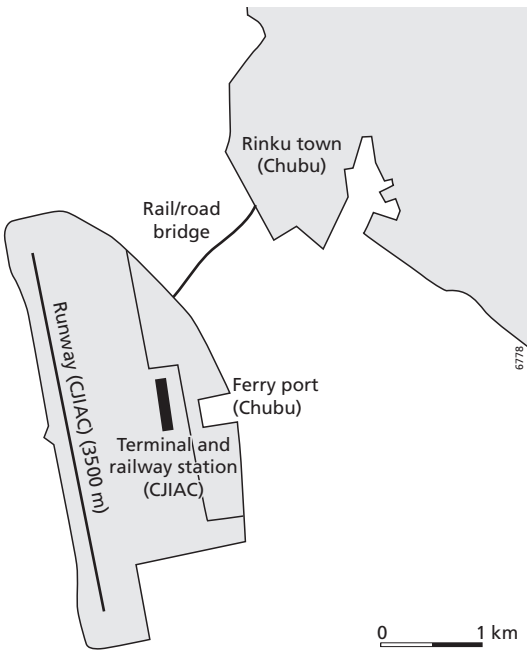

Figure 4.6 Chubu International Airport near Nagoya

in Kansai. Currently one terminal designed by Renzo Piano serves in 24-hours operation one runway on the 510-hectare island, with a second runway on an additional island under construction (Figure 4.5). In fiscal 2003, over thirteen million passengers used Kansai airport for 19 domestic routes and 72 international destinations (Osaka Prefectural Government 2004). Due economic recession in Kansai causing lacking traffic demand, the continued opening of Osaka Itami airport, one hour distance to Osaka, the new competing low-budget airport of nearby Kobe in 2006, and continuous land set that causes high maintenance costs, the financial situation of KIX is problematic and the second runway is severely criticised (Asahi Shimbun 17.8.2004).

The physical structure of Centrair as an airport island connected by a bridge with a reclaimed shoreline is similar to but smaller than Kansai International Airport (see Figure 4.6). Noise problems at the old airport of Nagoya, the 2005 Aichi World Expo and the sustainable economic growth of the Chubu region led by Toyota are the main reasons for constructing the new airport (MLIT 2004). Centrair is built on a 700 hectare reclaimed island in the Ise Bay, by train 28 minutes south of Nagoya. Centrair has one runway and one terminal building that operate every day for twenty-four hours.

In sum, the history of the airport case studies shows parallels in their developing stages. The start-up was delayed in both Japan and Germany due to consequences of the Second World War. Both countries could catch up with the Netherlands rapidly in the era of brisk economic growth. The effect of this rapid growth in the era of greater environmental and social consciousness in the 1970s however, led to violent conflict over airport expansion (Frankfurt) and airport construction (Narita). Therefore, Japan preferred from then on airport islands in the sea. Schiphol could continue to grow due to a lack of political courage to open up a mega-project at another location, uncertainties in aviation, and a required majority consensus.

4.4 Airside development

The development of aviation networks, the connections, price and services for travelling, determines the status of the airport and the attractiveness of the airport as a business location or cityport (Weisbrod *et.al.* 1993). Therefore, understanding the types of airports and trends in aviation is essential. Liberalisation and deregulation are the main influencing factors and facilitate hub-and-spoke networks, airlines alliances, low cost carriers, and increased airlines competition. These airside developments need further explanation in general and aviation trends in the case study analysis in particular.

Deregulation and liberalisation
The U.S. aviation market deregulation since the 1970s showed major changes in strategies, efficiencies and network economies of airlines in North America. The European Commission follows this example since 1987 in aiming to achieve a single European aviation market (Burghouwt 2005). Deregulation and liberalisation can be distinguished in three stages: liberalisation of the domestic market, bilateral treaties, and multilateral treaties in economic blocks. The deregulation and liberalisation of the aviation market is enforced by the 'nine

freedoms of the air' where airlines are allowed to use foreign airports and air routes (Mendes de Leon 2003).

An *open skies* agreement of western countries replaced the formerly common bilateral agreements between countries, based on effective lobbying and negotiating. In East Asia, however, the aviation markets are separated, conservative and limited in size due to required bilateral political treaties between countries (Interview Yamauchi 2004). Therefore, the airlines strategies and network formations are different from the western aviation networks, despite the formation of global airlines alliances. East-Asian countries therefore focus on increasing capacity and connections rather than increasing frequencies as Western countries do. Increasing frequencies favours the development of hub-and-spoke structures with multilateral treaties in aviation economics.

Hub-and-spoke networks

In the American and European markets, deregulation and increased competition led to the rise of low-cost carriers complementary to the development of a hub-and-spoke system of full-cost- or main carriers (Burghouwt 2005). The national airlines are the main carriers of the hub and spoke network, but are increasingly complemented by point-to-point low-cost carriers that are less spatially concentrated at the hubs, and also less focussed on regional and local airports as often is assumed.

In the hub-and-spoke system, a few major hubs dominate the aviation market. They can be either major destination airports (Tokyo, London, New York) or transfer hubs (Atlanta, Amsterdam, Frankfurt). It shows that these hubs benefit much more from aviation growth than smaller hubs or national airports (*ibid.*). In Europe, London Heathrow, Paris Charles de Gaulle, Frankfurt and more recently, Amsterdam Schiphol and Madrid, become important hubs with a concentrations of airlines for intercontinental transportation. They followed the example of hub development of Atlanta and Chicago in the U.S. Despite shifts on the American market, Burghouwt (2005) shows that the European market, despite liberalisation, remained relatively stable due to the spatial concentration of the national main carriers in their home countries. These European carriers with a historical regional embeddedness also show major differences in adjustment to the institutional competitiveness to the new hub-and-spoke networks (Lehrer 2001).

Tokyo used to be the strategic hub for Asia for American carriers, and Japan had leading airports compared to other Asian cities. Japan gradually lost its position as hub due the construction of modern, sophisticated and cheaper airport hubs in Singapore, Hong Kong, Shanghai, Kuala Lumpur and Seoul on the one hand, and the limited number of bilateral treaties that closes the aviation market on the other hand. This increased competition with Asia in combination with the high costs of landing and land in Japan are the main reasons for the current focus on the domestic market (Interview Ueda 2004). Furthermore, there is no clear strategy for airport development in Japan (NAA 2003).

In the case of Schiphol and Frankfurt, the airports have more than average benefited from the liberalisation and hub-and-spoke network developments in the 1980s and 90s. The competitiveness of Schiphol is on the one hand explained by the commercially successful corporate strategy of landing- and departure times of KLM (the so-called 'wave-system', referring to the waves of connected incoming and outgoing airplanes) On the other hand the

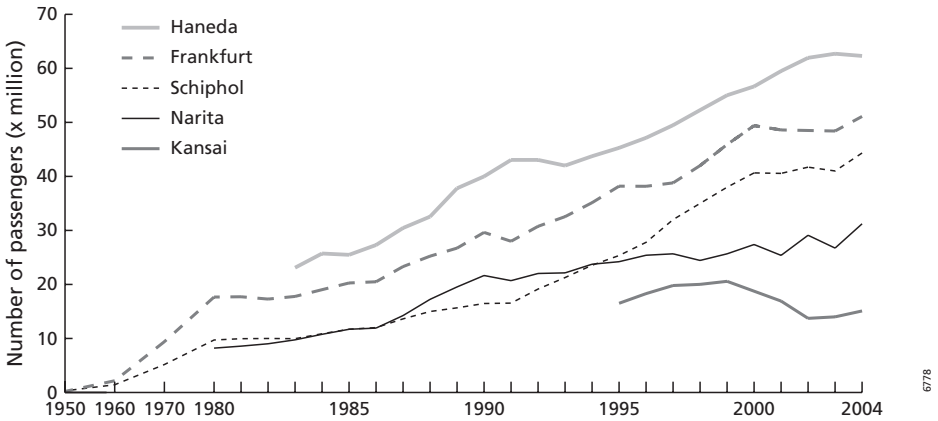

Figure 4.7 Passenger growth at Schiphol, Frankfurt, Haneda, Narita and Kansai airports (Source: Dierikx and Bouwens (1997), MLIT (2002), NAA (2004, 2005). No data for Haneda before 1983.)

one terminal concept of Schiphol airport contribute to the airport's efficiency. Both create short transfer times for multiple connections and thus an efficient airport despite the relative small domestic market in the Netherlands (Ministry of Economic Affairs 2000).

The long-term developments of the airport case studies are shown in Figure 4.7. This figure shows a stable development for Schiphol and Frankfurt in the 1980s and a rapid development of Japan's international airport. The faster growth of passengers in the 1990s for the Schiphol and Frankfurt emphasises the importance of the hub function combined with economic growth, where Japan's airports shows economic stabilisation. Finally, the capricious development of aviation in the 2000s reflects the effects of 9/11 and SARS. In forecasting aviation developments, specialists agree that the market is much more volatile then ever before because of increased competition amongst airports in a deregulated market.[5] This creates uncertainties for airport planning, as well.

Airlines alliances

The formation of three world alliances with monopolies or dual-hubs (two hubs cooperate in one alliance) is the latest trend in aviation. Aviation network analysts disagree on the strengths and dominance of the airlines alliances in the future (Niemeier 2002). Currently, these alliances have duopolies in Europe with strategic hubs in North America and East-Asia: One World alliance in London (BA) and Madrid (Iberia); Star Alliance in Frankfurt and München (Lufthansa); and Sky Team in Paris (AF) and Amsterdam (KLM). The merger of Air France and KLM brought the status of Schiphol to discussion, but a lack of capacity in Paris, serving a complementary geographical market, and protection of the hub-status in the AF-KLM agreement until 2008 has prevented Schiphol from a shift towards Charles de Gaulle thus far.

The dominant airlines at the hubs furthermore prefer clustering in their own terminals for business efficiency reasons, in particular short transfer times. Although Schiphol primarily focuses on accommodating the SkyTeam, it did not plan a separate terminal for the SkyTeam yet and it accommodates other alliances and low-cost carriers as well, in order to make the airport

less vulnerable for dominating airlines alliances. Clustering airlines alliances are also seen in the Star Alliance hubs in Germany. In Frankfurt, the Star Alliance of Lufthansa, United Airlines and ANA is clustered in terminal 1, with additional capacity for partners as Thai Airways in München.[6]

The geographical concentration of aviation of duo hubs is also existent in the large domestic Japanese market. Almost half of the flights in Japan start or end in Tokyo's airports Haneda and Narita (Feldhoff 2002). Even though the Japanese aviation economy is different from the East-Asian market, Japan's main carriers are still involved in international cooperation and focus on reducing costs and improve competitiveness. The competitiveness of Japanese carriers was in a bad condition for decades (Porter *et.al.* 2001), and initiatives are taken to improve this situation by improving quality, decreasing costs and offering more connections. Japan Airlines (JAL) has as partner of One World heavily invested in international connections and thus concentrated in Narita.[7] All Nippon Airlines' (ANA) role in the Star Alliance is to connect American carriers to the East-Asian market and thus heavily invested in Haneda airport, where ANA concentrates in the new second terminal (Interview Namekata 2004). The most-likely scenario is that Haneda will become the domestic airport with short-distant international flights to East-Asia, and Narita will stay the international long-distance airport.

Pressure on landing fees and importance of transfers

The volatile aviation market and increase competition puts further pressure on airport to welcome every passenger, including transfer passengers. The question is, what added value does the transfer passenger offer the airport and the regional economy? At Schiphol, the share of transfer has grown from 20% in 1990 to over 45% in 2004 (CPB 2000, Schiphol Group 2004). In Frankfurt's airport the transfer ratio is even more than half (54%), where Narita has only 10% transfer passengers.

Strictly speaking, the direct added value is very limited, since spending at the airport is limited. However, as the Netherlands Bureau of Economic Policy Analysis CPB (2000) points out, the added value is mainly indirect since the transfer passengers increase the quality of the entire network, the frequencies and destinations. This leads to efficiency advantages and lower costs than other airports. Without transfers at Schiphol, Amsterdam aviation economists at SEO expect that half of the travel destinations fall off and passenger numbers will drop 40%, freight transport will drop 60-80% and direct employment 50%, a total decrease of 1% of national GDP (SEO 2003). The transfer passengers therefore contribute to the network quality, growth of the airport and indirectly, the attractiveness of the airport area as a business location.

Also deregulation and liberalisation sets landing fees under pressure. The high landing fees in Narita and Kansai are currently the most serious problem of Japan's airports. Narita is ranked most expensive, Kansai second and Chubu third in the world with highest landing fees for cargo and people (NAA 2004a). Chubu's lower landing fees are competitive with Schiphol and Frankfurt in terms of freight. In terms of passengers, Narita becomes world competitive and comparable to Schiphol and Frankfurt due lower passenger- and airplane fees. The international flights and improved hub-function can take away flights from Kansai International Airport and Narita International Airport. The current expansions of Haneda, Kansai and new airport in Nagoya increase airport competition within Japan and already led to a decrease of landing fees (Asahi Shimbun 29.6.2004, Japan Times 27.1.2005).

Size and efficiency of the airports

Now that a general background is given of changes at the airside of the airport area, we can see how the case-study airports perform within the context of aviation network formation. Figure 4.8 gives insight in the largest airports in the world. The size of the airport as a sum of both passengers and freight are leading to the world's largest airports.[8] Atlanta and Chicago O'Hare are the world's largest airports. Figure 4.8 shows that Los Angeles has a strong cargo position, and therefore it surpasses Haneda airport as number four in the global hierarchy. Haneda is close to Paris Charles de Gaulle and Frankfurt airports with 62 million passengers plus 8 hundred million kilo's freight (62+8= 70 work load units (WLU)). Amsterdam Schiphol is the world's tenth largest airport, with Narita nearby due to the large cargo handling in Narita. Not shown in Figure 4.8 are München (27 million WLU), Kansai (24) and Osaka-Itami (19).

Figure 4.8 shows that not only passengers, but also cargo transport is of strategic importance for Schiphol, Frankfurt and Narita. Where recent trends of passengers demand has been influence by 9/11 and economic recession, cargo continues to grow steady and rapidly and is the competitive edge of the SkyTeam alliance with cargo giants Korean Air and Northwest Airlines at Schiphol (Interviews Wade 2005 and Kerckhoff 2005). For example, the Air France-KLM cargo headquarters will be established at Schiphol. Nevertheless, the airports in Frankfurt and Tokyo do not yield Schiphol. Frankfurt is the world's eight largest airport and Narita is the world

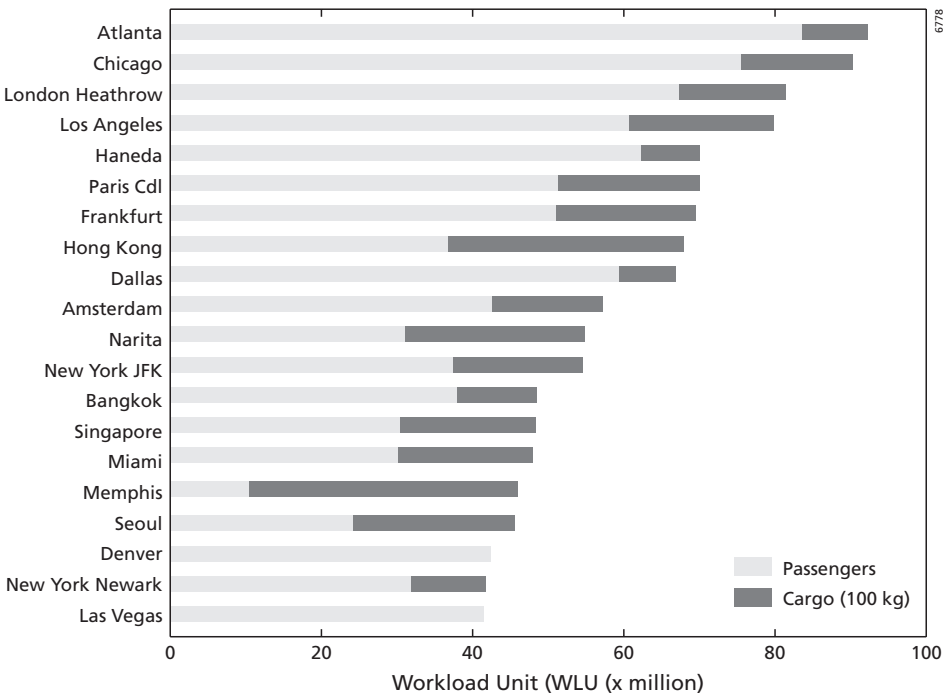

Figure 4.8 World's largest airports by passengers and freight (2004) (Source: Airport Council International (2006))

third largest airport in terms of cargo (see Figure 4.8). Narita's short second runway is a serious problem for large aircrafts, but at Narita there is space for cargo handling and distribution – space that lacks or is expensive on the Haneda airport island.

The large international airport, however, does not always mean connections to the world centres. Especially large freight airports as Anchorage in Alaska and Memphis or domestic oriented airports as Haneda do not give access to the international network of global city-regions. Therefore, it is important to consider the access to world centres as well (Schaafsma 2003). European major hubs London (125 connections to major cities), Paris (119), Frankfurt (116) and Amsterdam (100) as well as New York (115) and Moscow (102) have most connections to world centres in 1995. Tokyo's major international connections are limited to 67, comparable to Miami.

In sum, the case study airports are amongst the largest in the world due to passengers (Haneda), freight (Narita) or both (Frankfurt and Schiphol). Narita's development lacks behind the rapid growth of the other cases as passenger hubs in the 1990s. Airport deregulation and liberalisation changed the position of airports, in particular, hub development in the case of Frankfurt and Schiphol. Bilateral treaties in East-Asia are still dominating airlines networks, but competition increases for Japan in East-Asia as well. Airports are forced to compete, due to airline alliances clustering at the hubs, and pressure on landing fees.

4.5 Airport development

The alliances of airlines increase competitiveness, but also bolster the negotiating position of the airports, for which direct competition is a new phenomenon. These leading airport users are becoming more dominant as the leading U.S. market shows, and currently airlines alliances claim their own space inside the airports: the dedicated terminals (Graham 2001). Increasing competition and airport benchmarking lead to three key developments in the airport sector, discussed below: commercialisation, globalisation, and privatisation.

Airport commercialisation

The airports' commercialisation process that dominated the 1970s and 1980s includes financial management, non-aviation revenue generation and airport marketing. Here we focus on the changing balance of aviation and non-aviation revenues for airports in particular, a development that has direct impact on urban development. The main reasons for the changing revenue structure are that, on the one hand, liberalisation of the aviation market forces the airport to reduce landing fees and work more efficiently, on the other hand, it turned out that real estate developments as hotels, conference rooms and offices in addition to parking fees where amongst the most profitable businesses for the airport operators. This leads to a share of non-aviation revenues that can be larger than the share of aviation revenues in modern and competitive airports. The 2005 worldwide highest productive airport Tampa (U.S.), for instance, has over two-thirds of airport revenues in non-aviation (ATRS 2005). On average, however, the balance is fifty-fifty in North America. The non-aviation revenues at Asian and European airports are one and a half times higher than North-American airports (Graham 2001), which can partly be

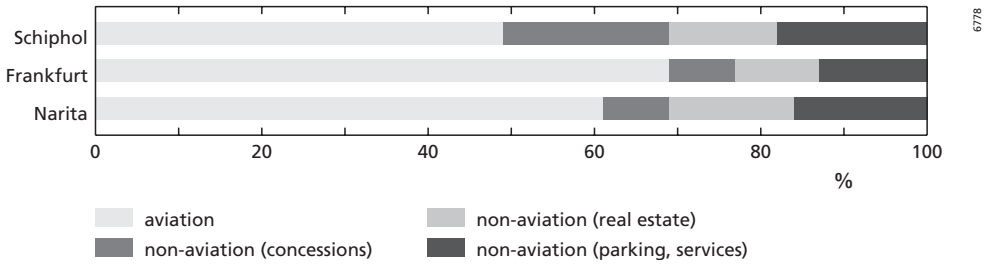

Figure 4.9 Revenue structure of Schiphol and Frankfurt (1999) and Narita (2004) airports (Source: Güller and Güller (2002), NAA (2004b))

explained by the more dominant position and co-ownership of airports by airlines in the U.S., with a primary focus on aviation revenues.

Figure 4.9 shows the revenue structure of the case study airports. The difference of aviation revenues, mainly airlines, cargo handling and agents, is explained by the outsourcing of cargo handling by Schiphol compared to Frankfurt. Since an EU-ruling in 1998, Fraport is forced to end a monopoly and partly tender cargo handling, slowly changing the balance. Furthermore, despite finishing tax-free shopping in the EU, Schiphol continues to be successful in retail (concessions for shops). Furthermore, Schiphol is successful in generating parking revenues, despite modal split policies that favour train transportation to the airport. All case studies have at least over 10% of income generated by real estate. For Haneda airport, no comparable data are available.[9]

Airport globalisation

The current trend of airport globalisation is reflected in the tendency of airport corporations to buy shares, partly own or operate airports abroad in order to spread risks and gain influence at possible partner airports. For instance, Fraport had shares in Lima airport, where Schiphol Group owns parts of Brisbane and a New York JFK terminal. Fraport has set the business target at 50% external activities in 2005 (Fraport 2004), but had little success in the foreign acquisitions. Schiphol Group expands abroad due to the limited size of the domestic market (Graham 2001). More successful is the Macquarie Bank that rapidly buys airport shares in, amongst others, Australia and Italy. Rather than buying other airport shares, Japanese airports first have to focus on improving their own weak competitiveness, and therefore pass by the trend of airport globalisation (cf. Porter *et.al.* 2001).

The financial results show the problematic competitiveness of Japanese airports: airports are profitable businesses in general, but until recently only Japanese airports are suffering from financial losses. In 1999, The Port Authority of New York and New Jersey, British Airport Authority (BAA), Orlando and Singapore were leading and made more than €200 million profit. Schiphol Group (€125 million) and Fraport (€70 million) also show positive financial results. Only Japan's international airports at Narita (€9 million) and Kansai (€199 million) made losses amongst the thirty largest airport operators (Graham 2001). Only recently, Kansai International Airport was able to have a positive financial result, following other airports in Japan (Asahi Shimbun 24.11.2005).

Airport privatisation

Changing ownership of a airport companies by privatisation can be seen as the next step in commercialisation and is a major institutional discussion (see chapter 8.7). There are considerable differences in the ownership structure of the case studies. Schiphol's majority of shares is currently owned by the national government (75.8%), with the cities of Amsterdam and Rotterdam as co-shareholders (see Figure 4.10 left). The national government plans to bring a maximum minority of all shares (49%) to the market, has for approval of parliament but faces the opposition to privatisation of Amsterdam as minority shareholder (Ministry of Transport and Water Management 2003, City of Amsterdam 2006).

In Frankfurt, the City of Frankfurt and *Bundesland* Hessen are the majority shareholders of the airports. In the 1990s, 29% of the stocks were privatised for generating money for airport investments. In 2005 the German national government also sold their shares to private shareholders and Lufthansa airlines (Figure 4.10 right). Although governments on the regional and local level still own the majority of the airport, investing in the airport is more and more an affair for private actors (Dehn *et.al.* 1998). However, that is not the case with the airports of Haneda and Narita owned by the Japanese national government. Government bonds at the Tokyo stock exchange in 1990 made heavy investments in Haneda airport possible. Although Narita airport is now fully owned by the national government, privatisation started in 2004 foresees a long-term planned sale of all shares from 2007 onwards (MLIT 2004). In the case of Kansai airport, a new public-private ownership structure was set up with many small shares for companies involved in the construction and expansion process (Bongenaar 2001).

In sum, the dominant trends in airport development can be found in the case studies. Airport commercialisation leads to a larger share of non-aviation revenues in Narita, Frankfurt and Schiphol. Although governments are still the main owners of airports, privatisation has taken effect in Narita and Frankfurt, and is under discussion in the case of Schiphol. At Haneda and Frankfurt, this is done in order to generate money for investments. Privatisation of Narita however aims at making Japanese airports more competitive.

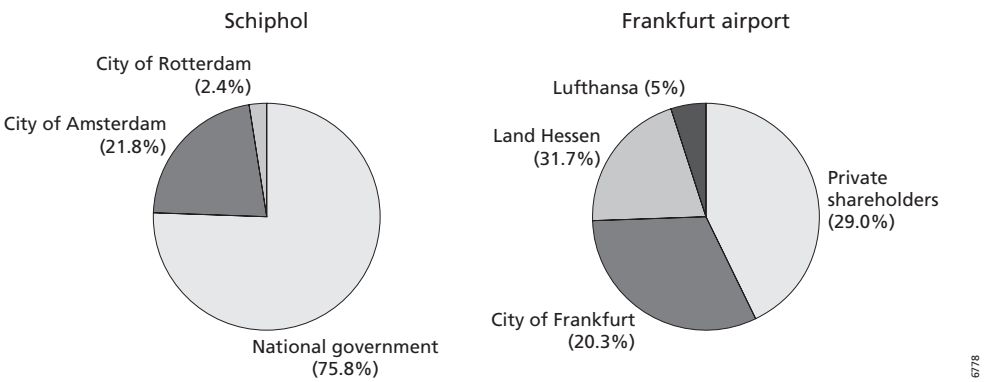

Figure 4.10 Ownership structure of Schiphol and Frankfurt airports (2005) (Source: Ministry of Transport and Water Management 2003, www.airportcity-frankfurt.de 2006)

4.6 Landside development: economic impacts

The dynamics in the aviation market and the trends in airport privatisation and commercialisation are directly related to developments on the landside of the airport. This section focuses on the economic impacts, before urban dynamics are discussed in section 4.7. There is ample research on measuring the effect of the airport in creating added value and jobs in the region.[10] Despite different definitions and research results, researchers agree the economic impact of international airports is considerable.

The total economic effects of airports, in terms of added value and jobs, are caused by direct impacts, and the spin-off or secondary jobs of the airport caused by indirect, induced and catalytic effects (Graham 2001:184). Direct impacts are employment and income generated directly by the operation of the airport. Indirect impacts are employment and income generated in the chain of suppliers of goods and services to the direct activities at the airport and the airport vicinity, for instance fuel, utilities, cleaning and construction. Induced impacts are employment and income generated by the spending of airport workers, e.g. food, retail and transport. Finally, the airport as a business factor can generate catalytic effects in the city-region.[11]

International airports create more direct jobs than national airports: 950 jobs per one million passengers (mppa) for international airports versus 750 jobs mppa for national airports (Graham 2001; York Aviation and ACI 1998, 2004). In addition, every on-site job generates roughly one additional job in the airport region, leading to the rule-of-thumb of 2000 jobs per million passengers for international airports (*ibid*., see Table 4.5). Airports in liberal market economies as Canada and the U.S. show high direct and indirect impacts due to outsourcing with flexible and part-time labour contracts.[12]

The case studies are put here in perspective with other major competitive airports. Despite the inaccuracies and variations in worldwide definitions, Table 4.5 shows considerable differences

Table 4.5 Direct and indirect jobs per million passengers per annum (mppa)[13]

Airport	Year	Passengers (millions)	Direct jobs (mppa)	Secondary jobs (mppa)	Total jobs (mppa)
Phoenix	1996	30.4	1213	2998	4211
Vancouver	1997	14.8	1546	2005	3551
Paris CdG	1996	31.7	1560	1910	3470
Tokyo Haneda*	2002	62.0	532	2195****	3282****
Tokyo Narita*	2002	29.1	2061		
München	1996	15.7	1057	2131	3206
Frankfurt**	2003	48.4	1281	1674	2955
Schiphol***	2003	41.0	1390	1439	2829
Schiphol	1997	31.0	1581	806	2387
Milan	1994	13.0	649	1984	2633
Washington Dulles	1998	15.6	992	796	1788
Washington Natl.	1998	15.8	646	402	1048
Barcelona	1994	10.7	458	463	921

Source: Graham (2001), *NAA (2002), **York Aviation and ACI (2004), ***Regioplan (2005),
**** For Tokyo-Henada and Tokyo-Narita jointly

between the economic impacts of airports in terms of employment. Schiphol used to have the highest number of jobs in the airport vicinity, with a lower regional spin-off. However, more recently, either definitions have been adjusted or the balance has changed in favour of the number of secondary jobs in the region: 57.000 direct and 59.000 secondary jobs in total. The reverse effects can be found in Milan: few direct jobs, with many jobs in the region. Frankfurt airport is the largest labour site (*Arbeitsstätte*) in Germany with 62.000 jobs in total, where the indirect effects are larger due to a large German catchment area. Nevertheless, related to the number of passengers München creates more jobs.

The different position of national and international airports is illustrated by the airports in Tokyo and Washington D.C., with fewer jobs and spin-off for national airports. Haneda have a lower economic impact than international airports and the proximity to downtown Tokyo makes direct employment near the airport less necessary (33.000 direct jobs in total). The position of Haneda as Asia's largest airport could not compensate the massive job loss of industrialised Ota ward (-12%) and Kawasaki (-7%).[14] In contrast, Narita's remote location force airlines to offer tickets that include local hotel stays for domestic to international transfer passengers, and furthermore, freight is labour intensive at Narita (in total 60.000 direct jobs). This had a major effect on the regional economy around Narita, where double-digit job growth figures are found in Narita (19%), Sakura (17%), Togane (15%) and Mobara (10%) between 1991 and 2001 (Van Wijk 2005).

A final tool of benchmarking the performance of airports is passenger satisfaction surveys that measures attractiveness of the airport as a place to stay and to see if the airport is a gateway to the city-region, or in other words: the airport as a cityport. Skytrax considers new Asian airports as best in the world.[15] For five consecutive years Hong Kong is chosen as best airport, followed by Singapore. New airports of Seoul, Kuala Lumpur, and Dubai are also highly appreciated. Schiphol is chosen third best airport in the world and is the best European airport. Frankfurt and Narita are less appealing to passengers. U.S. airports are found lower in the rankings.

In sum, the case studies (with the notable exception of Haneda) generate relatively many jobs in the airport region. This sets the case studies as coordinated market economies apart from the liberal U.S. and Australian markets, where labour productivity and direct impacts are higher due to outsourcing and flexible contracts, but less jobs are created. Schiphol combines the best of these worlds: high airport quality and outsourcing. Fraport prefers to conduct its own baggage handling instead, and is therefore by airport benchmarks estimated less efficient. High costs and low airport quality makes Japanese airports less competitive than other Asian airports.

4.7 Landside development: urban dynamics

Section 4.6 offered an overview of the economic impact of the airport case studies on the local and regional level. This however does not necessarily mean that economic spin-off means a high quality of the airport as a gateway to the city-region. Gary Hack (2000) was quoted as saying before that some of the 'elite corridors' between city and airport with full economic potential do not make full use of the urban potential and lack basic qualities as regional infrastructure and there is a sensitive balance of public and private economic and environmental interests near

airports. In this section therefore the case studies are analysed in terms of urban development on the landside to determine whether the airports are not only gateway to the world, but also gateways to the city-region itself. Or in other words: airports as cityport in the city-region. Therefore, first the landside urban position of the airport is addressed: Schiphol as an airport city, Frankfurt as a polycentric airport city, Narita as a sprawled aerotropolis, and Haneda as isolated airport island. This includes an overview of urban development in the airport region and a focus on the current crucial regional economic issues in the airport vicinity. Therein, brief attention is paid to the social and economic effects of environmental problems.

Schiphol as an airport city

Schiphol Airport primarily focussed on protecting the airport fields until the 1990s (cf. Dierikx and Bouwens 1997). The appointment of a national mainport status, first mainly an infrastructure concept that evolved into an spatial-economic planning concept, in combination with the position as an hub, started exploiting the economic potential of the airport vicinity. Schiphol Group gradually extended the real estate, parking and services business sectors. As the interviews results show, in the Randstad city-region, the airport city-marketing concept is generally accepted and acknowledged. The concept was successful in the sense that it attracted European headquarters and distribution centres in the region and generated retail and office facilities at the centre of the airport complex (Ministry of Economic Affairs 2000).[16]

Three zones of urban development can be distinguished in the airport region (see Figure 4.11). First, office and hotel development is concentrated in the axis of Hoofddorp-Schiphol Centrum-Riekerpolder-Zuidas. Second, a cargo complex in the southern domain can be distinguished (locations 17,19,20). Third, another cargo complex between the harbour of Amsterdam in the north, along the new A5 motorway Osdorp and Lijnden rose.[17]

The exploitation of the economic dimension of Schiphol as a cityport in the Randstad city-region raises spatial and economic problems in the region: protection, accessibility (infrastructure dimension of the cityport) and the quantity and qualitative elements of urban development (urban dimension) and noise problems. The backside of the economic success is an increasing pressure on the airport vicinity in terms of urban development and traffic congestion. Therefore, the discussion rose whether the airport potential in the city-region should be protected. Formally, the policy of protecting the site from over-development is applied in the 2003 regional plan (Provincie Noord-Holland 2003). In this regional plan, the province distinguishes strict zoning including tests of airport-relatedness and not-airport relatedness of office and industrial locations: the closer to the airport, the more airport related businesses should be. SADC and the province Noord-Holland check the airport-relatedness by fixed criteria. Today, in practice, the criteria are more flexibly interpreted (Interview Mast and Schaafsma 2005), which contributes to the further clustering at the airport's centre; a problem discussed in chapter 7.8. Project developers now conclude the market should sort out the activities by land prices and rent levels, as illustrated by the recent moves of Numico and Microsoft headquarters to Schiphol Centrum.

Second, the clustering of offices at the airport territory and beyond puts accessibility under pressure. Accessibility is good at the airport centre itself but more problematic in the airport region, where accessibility is a key to further city-region development. Schiphol Centrum is well accessible by train and motorway and the airport invests with the region and central government

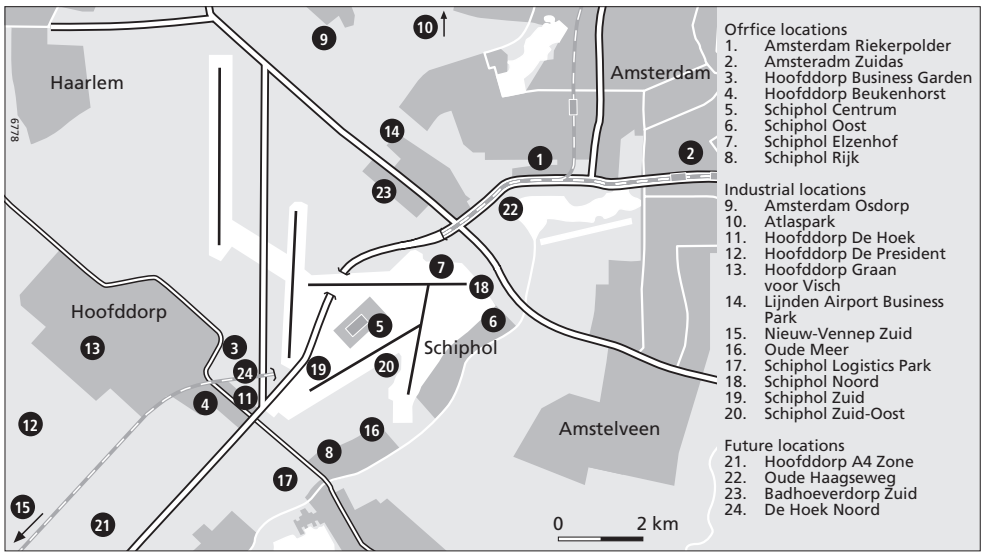

Figure 4.11 Office and industrial locations in the Schiphol airport region (Source: Amsterdam Airport Area (2005))

in motorway expansion, e.g. the recently opened A5 motorway and the planned investment in the A9 motorway by-pass. However, the region itself is trapped in a Gordian knot on how to bypass and expand the provincial road N201. One should not overlook the importance of the flower auction south east of the airport in Aalsmeer, a rapidly growing cluster that offers 40.000 jobs including suppliers and services and, which despite lower land prices, seriously competes with the airport territory.[18] Therefore, the flower auction in Aalsmeer and business sites as Schiphol Rijk and Zuidoost are queued during rush hours. It is clear that the region has grown more rapidly than the infrastructure can facilitate, and that bottleneck solving-strategies and budgets were used instead of infrastructure as a facilitator of urban development (Interview Jacobs 2005). This conclusion can be drawn for both car infrastructure and public infrastructure. Although there is a train running underneath and stopping at Schiphol, Hoofddorp and Nieuw-Vennep, no light rail or subway network is developed, and the Zuidtangent bus lane is considered 'high-quality' public transport.

Third, in the rapidly urbanising airport region, matching office and industrial property supply and demand is difficult to manage, in terms of quality and quantity. The national plan PKB Schiphol in 1995 reserved new areas for industrial and office locations in the region. However sites are due slow land acquisition and lack of coordination delayed for development. In addition, the period 1995-2000 shows a higher demand of airport related sites than expected (Ministry of Transport and Water Management 2000). Mismatches exist, not only in time, but also in type of development. It is more attractive to develop offices and hotels than warehouses and distribution sites, since they generate more returns for developers, asset managers and the municipal landowners. The effect is an oversupply of offices (12% vacancy) and undersupply of industrial sites.[19] Recent large-scale plans for a distribution city *Werkstad A4 Zone* aims to bring the region in balance (Air Cargo Nederland *et.al.* 2005).

Fourth, one of the repeated discussions is competition of office and industrial locations within the region in the context of the quality of development.[20] There is some variety in office locations in the airport region. This variety is, in general, planned, and is not a natural development process of specialising locations as in Frankfurt Rhein-Main. However, some office and industrial locations, and in particular warehouses, suffer from 'hit-and-run' development (Interviews Meijdam 2005 and Tordoir 2005). These locations have lower quality standards, lack a long-term market value and lack unique identities; their contribution to the city-region's competitiveness on the longer run might be limited. There are few technology-intensive manufacturing and distribution sites in the Schiphol area.

Finally, although the economic potential of the airport as a cityport might be taken to its limits for retail, office, services, warehouses, distribution and manufacturing, the problematic relationship with housing for an airport city or an aerotropolis is self-evident. There is rigorous analysis in the region to measure and calculate aviation noise pollution, an issue recently evaluated by the Committee Eversdijk (2006). Due to the fifth runway, the number of citizens suffering from noise hindrance has decreased, in particular in Amsterdam and Amstelveen, but in return, in newly affected areas as Leiden and Castricum, people suffer from noise hindrance that is lower than official standards. New governmental regulations have direct impacts on the development sites in the region, and do not allow large-scale housing construction in the official noise contour, and industrial construction in the runway approach routes close to the airport. These regulations have direct impact on the stakes of project developers in the region. Nevertheless, noise or safety consideration did not negatively influence house prices in the affected area.

Frankfurt as a polycentric airport city

The development of the Frankfurt Airport as a cityport in the city-region is politically sensitive. This is mainly due to the fact that the positioning of the airport in the city-region is different from the case of Schiphol[21] (Interview Dehn 2003, Joosten 2003): the airport is located in the city forests that have a higher environmental and emotional value than polders in the Randstad. Schiphol is located in the polder; a concentration of uses is possible and necessary with increasing traffic jams in the Randstad. Frankfurt has better regional accessibility and a corporate office at the airport itself is not necessary. Furthermore, the American Army settled for decades in Gateway Gardens near the airport and limited the urban development. For these reasons, Frankfurt airport has developed less near the airport. The infrastructure access is excellent with direct access to Germany's most important highway intersection of the north south route Hamburg-Basel and the west-east route Köln-München, and with the underground light rail and long distance trains. The terminal and commercial real estate areas are concentrated in the north near the highway, and cargo handling is concentrated in the southeastern part of the airport territory.

Near the two terminal buildings with shopping facilities, Frankfurt airport centres (FAC1 and 2) with the Airport Conference Centre are the main office facilities. Recently completed is the AIRRAIL center on top of the new high speed train station, near the passengers terminals a masterpiece of architecture and civil design of 170.000 square meters of offices, hotel and retail. Opposite of the airport terminal in the northern domain of the airport, next to the A3 highway, is a recently constructed hotel and Lufthansa office development (see Figure 4.2).

The southeastern part of the airport concentrates cargo facilities in the first and second line of handling, where a third terminal is planned. In 2006, trade logistics centres are constructed at 72 hectares Mönchhof, a location at the Rhein River between the city and airport. The 35 hectares Gateway Gardens US Army base in the northeast in the motorway "armpit" is a location for mixed-used redevelopment after 2005 (FR 27.09.2005).

In the discussion of the position of the airport within the regional economy, the central issue of airport planners' debate is whether economic activities should concentrate at the current location or not: protection or exploitation of the site. The plans for concentration include the expansion of the AIRRAIL centre, Cargo City Süd and the future redevelopments of the former military base Gateway Gardens and the bankrupt Holzmann industrial site in Zeppelinheim, Neu-Isenburg (FAZ 15.06.2004). Concentration near the airport emphasises that the airport obviously generates jobs, and this invites support for new runways.[22]

Specialists worry whether the natural boundaries will be maintained in the near future. Companies as Lufthansa threaten to leave Frankfurt and move to München and are successful in this power play; trees of the forest had to be cut to build the training centre between railway and motorway. Furthermore, Fraport claims that the third runway would generate an additional 100.000 jobs, a claim heavily contested in public (FR 30.09.2005). Another controversy is the large Airbus A380 accommodation near Cargo-City Süd, which replaces distribution from Kelsterbach to the airport area (FR 23.08.2005). Urban development near the airport remains limited and restricted despite the addressed exceptions.

Most actors see further expansion of the airport as necessary for the region, despite the local environmental problems and opposition. Particularly the fact that the airport creates all kinds of jobs is considered as fair; not only high-educated workers benefit. In return both and airport and forest should be protected from urban development. The airport is in the city-region considered as '*Ein Standort unter vielen*' (one location amongst many): there are several cityports in the region and only airport-related activities need direct settlement near the airport (Interview Dehn, Bothe and Kornmann 2003). Therefore, we call Frankfurt here the polycentric airport city.

The dominant idea of developing a polycentric airport city while protecting the city forests is supported and carried out by the well-developed train and car infrastructure network in the city-region.[23] The development of back office cities in Niederrad and Eschborn, transportation sites in Kelsterbach, retail and corporate headquarters in Frankfurt's downtown and hotels in Darmstadt and Frankfurt are supporting the notion of a polycentric region with the airport and CBD as main centres. The widely developed light rail network and centres development in the Frankfurt city-region supports a further polycentric development of businesses using the airport, most with airport access within fifteen minutes by train – the infrastructure dimension of the cityport with high node values as found in the previous chapter. The transit network, tax competition and town specialisations furthermore avoid uniformity of commercial real estate with moderate quality in the city-region.

There is, finally, also a political argument for exploiting the potential of the (polycentric) airport region. If the airport expands, the neighbouring communities want something in return for increasing noise pollution and safety concerns. The general idea of airplane noise pollution causing municipalities to loose attractiveness, however, cannot be proven. Compared with other municipalities in the Frankfurt Rhein Main area, there are no negative, but rather, equal social

and economic impacts, of the airport in terms of demographics, personal income, tax revenues, unemployment and land prices in the affected municipalities (Langhagen-Rohrbach 2002).

Narita as a sprawled aerotropolis

Narita International Airport has limited development of the area surrounding the airport. For an airport as a cityport, it is crucial that the airport is considered as a place to stay, and Narita is for a variety of reasons, is not considered this way. The remote location chosen for the airport is the result of strategic, long-term planning, that relieves the citizens of the Tokyo city-region from noise and safety concerns into the far future. However, activists and landowners opposed runway construction and further commercial urban development successfully (see section 4.3). Despite the local opposition to sell the land, the airport attracted airport-related industry to Narita on a moderate scale. Urban sprawl in the wider airport region is the result, and therefore this case can be called a 'sprawled aerotropolis'.

Although the economic impact of the airport is considerable for the small towns near Narita, the absolute number of hotels, warehouses and offices in the wider airport region is limited. Only recently are relationships slowly improving and development plans made by the prefecture government. The name was changed to Narita International Airport City. Although the regional government planned manufacturing sites, it is mainly cargo handling and distribution in the airport vicinity that is demanded, as Japan changed from an export manufacturer in the 1970 and 1980s to an importing service economy today.

The major spatial and economic problems in the Narita airport area are not only the urban sprawl in the region, but also accessibility to the remote location and limitations to airport expansion. First, Narita has no possibility to expand the intensively used runway-system, because of the deep-rooted land ownership conflicts, and despite the local importance of jobs.[24] At the airport, the main focus is therefore on the airside with the current redevelopment of the terminal buildings (Interview Namekata 2004). This will increase the currently limited service facilities and shops. Office and congress facilities remain limited to the airport buildings, where the far distance to Tokyo and the negative image are main reasons not to open offices in Narita. The large distance to Tokyo and Haneda airport however, attracted hotels to the airport area for transfer passengers taking early flights from Narita International Airport.

Narita's cargo handling is sprawled over the wider region, partly due to the unavailability of sites, and partly because of regulations. The city of Narita is stricter in planning than surrounding smaller municipalities (Interview Yamada and Kawaguchi 2004). Most of the industrial parks are therefore located in smaller neighbouring communities as Shibayama and Sakura in the southeast of the airport. AMB Blackpine's seven-hectare air cargo centre in Sanlizuka is one of the few cargo handling centres in Narita, although the city preferred housing development there. It is only recently that cargo distribution is clustered in seven planned airport vicinity industrial parks (see Figure 4.12).[25]

The current poor accessibility (by Japanese standards) with travelling times ranging from one to three hours to Tokyo is another major problem. For this reason, the Narita sprawled aerotropolis is not only limited to the area shown in Figure 4.12. Real estate developer Mitsui-Fudosan invested in Makuhari, a location halfway Narita and Tokyo. Despite large scaled investments of Chiba prefecture and Mitsui Fudosan, even Makuhari is still considered as too far away from Tokyo and unpleasant to stay after business hours (Interview Tada and Yoshimura

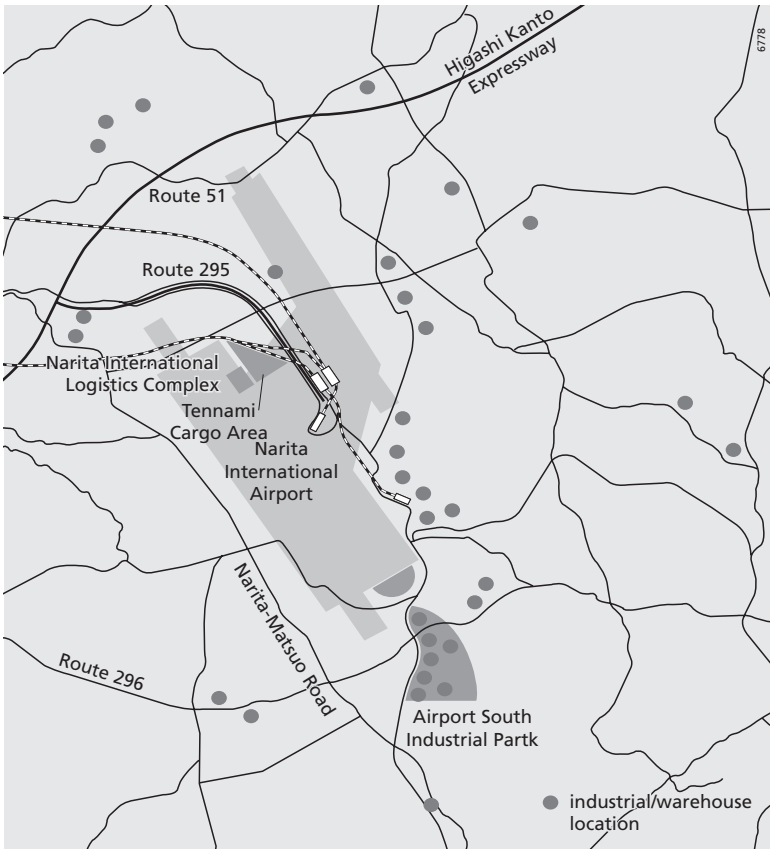

Figure 4.12 Industrial locations in the Narita airport region

2004). Therefore, Makuhari could not cross the gap between airport and city in the attempt to further develop the network of cityports in Tokyo more to the east. The accessibility will be improved in 2010 when an upgraded connection New Narita Rapid Railway is e reducing travelling time from Tokyo-Nippori to 36 minutes, which will have a major positive impact on Narita's distance and competitiveness (MLIT 2004).

Haneda, isolated airport island in Tokyo Bay

The connection of Haneda to downtown Tokyo, Kawasaki and Yokohama is well developed with a monorail, trains, and a highway that passes the terminal buildings underground and the bridges. The short distance to the urban centres is the main reason why the demand for hotels, offices and other investments on the airport island itself is limited. In addition the focus of Haneda, is solely on the airside of the airport island. The two terminal buildings offer space for shops and a few hotels. The recent opening of Terminal 2 enlarged the capacity of these activities, but the total volume and expansion opportunities and plans for other urban developments on the island of nearby are limited. Furthermore, there is no kind of airport city marketing or strategy at Haneda.

Haneda hopes to become an international airport with limited flights to East Asia that might lead to 130.000 extra jobs in the Kanto-region in 2009 (MLIT 2003:25).

Environmental issues like noise and safety are limited with the concentration of international flights in Narita and the location in the Bay of Tokyo.[26] Major spatial-economic issues near Haneda are the isolation on the airport island and closely related to this is a limited spin-off of activities in the bordering areas and the remote location. Although the accessibility of the airport to Tokyo is well developed and relatively short, the position is as the awkward age: it is not as remote as Narita, but not close enough to the city to count as a major business location, or in other words: cityport. For example, ANA's headquarters were first located in Kasumigaseki, Tokyo's CBD, when the aviation sector was hit hard and ANA had to move to the cheaper location of Haneda. Employees and visitors found Haneda too far away and inefficient since it requires one hour travelling time. After one year, ANA returned to the city and opened its main office in the new business district Shiodome.

The limited spin-off of urban development related to the airport in the neighbouring western areas are enforced by the older chemical and manufacturing sites in Kawasaki as well as housing in Ota ward that both turn the back to the airport island with Tamagawa river as a borderline. The position of Haneda could not compensate the massive loss of jobs in Ota and Kawasaki as a result of manufacturing outplacement to China and South Korea (Fukao 1997). Plans for redeveloping the coastline in Kuko-Nishi and the Kawasaki Tamagawa river delta are under discussion, but difficult due soil pollution (Figure 4.3). The city of Kawasaki hopes a new bridge connecting the city with the airport can accelerate coastal redevelopment, with hotels, entertainment and logistic parks in the delta of Kawasaki (City of Kawasaki 2003, 2004).

However, downtown Tokyo, with its recent large-scale redevelopment, and at a secondary level Hokimi, Toyosu and Kiyosumi in the Bay of Tokyo, are, in the near future, more attractive for redevelopment than Haneda (Interview Sato 2004). Project developers as Mitsui Fudosan are nevertheless interested in developing real estate near the airport island in Ota ward or Kawasaki (Interview Tada and Yoshimura 2004). ProLogis is also interested in sites, when available for the less-welcomed air cargo handling (Interview Tanizumi and Kumuda 2004). Furthermore, the airport that is in the geographical heart of Tokyo Metropolitan Area does have some urban development spin-off, in terms of manufacturing and distribution, halfway down the Tokyo-Haneda monorail line in Ryuutsuu.

Not only Haneda but also the airports of Kansai near Osaka and Chubu near Nagoyaare airport islands located in bays and cope with similar spatial-economic problems. Although Kansai's airport is located offshore and relatively far from Osaka, public and private initiatives are undertaken to create a spin-off of economic activities along the Kansai shoreline. A railway and highway bridge connects the island to the newly founded Rinku area, where manufacturing, distribution, leisure and office activities are planned by Osaka prefecture. However, economic recession and high land costs of the reclaimed land are making an economic spin-off for the new Rinku Town (106 hectares) and Hannan Sky Town (171 ha.) in the last decade problematic (Osaka Prefectural Government 2004).

Since 2005, the CJIAC Co. Ltd. builds and runs the new Chubu International airport, and appointed a former Toyota CEO to reduce the costs of the airport construction and attract business to the airport. Hotel, air cargo handlers and many shops in the terminal are

attracted to the airport territory (Chunichi Shimbun 4.10.2004; Mainichi Shimbun 7.10.2004). The northeastern part of the island, the bridge and land at the Tokoname shore is reclaimed for economic spin-off of the airport under authority of Chubu prefecture. The Tokoname Rinku Town is of a similar size as Kansai's Rinku Town and this land is also not developed according to potential due to high land prices (Interview Takayama, Futatsumata and Tenda 2004; Chunichi Shimbun 30.9.2004). It turns out that in the case of airport islands it is to a certain extent, possible to attract tourists to the terminal as a theme park and businesses in the vicinity of the airport terminals and cargo handling, but development at reclaimed sites for business settlements are hard to plan, especially in the case of Japan with high land prices.

In sum, the landside development of the airport case studies shows a variety of urban dynamics. The hub airports of Schiphol and Frankfurt attracted many urban land-uses and could become airports as a cityport. However, due to different settings and land use planning, Schiphol and Frankfurt vary in their final shape: at Schiphol activities cluster nearby the airport (airport city), while activities attracted to Frankfurt's airport cluster within airport's reach (polycentric airport city). The picture in Tokyo is different. Local opposition and lack of regional planning led to regional sprawl in the Narita airport area. This happened despite the economic importance of the airport for the small towns. Also Haneda airport could not develop as a cityport due to the attractiveness of downtown Tokyo, land use planning, and old industries in the airport vicinity. Haneda has therefore become, similar as Kansai and Chubu, an isolated airport island in a bay.

4.8 Conclusion

Airports and airport vicinity require relatively high rents for offices, shops and warehouses, even if they are remote on airport islands or in the case of Narita far outside the city. The previous chapter pointed out that these locations are cityports with best accessibility in the city-region and to the outside world. But could these airports become true cityports? This chapter therefore questioned the position of the airport as a gateway to the city-region by focussing on airside, airport, landside and further regional development, with major differences between the case studies.

In historical perspective, the airport case studies have a similar life cycle of start-up, slow and rapid growth, and currently are amongst the largest airports in the world. There are major differences in type of airport, where Tokyo is a major destination and Frankfurt and Schiphol are hub airports with high transfer rates. These transfer passengers add to the network quality, the city-region as a business location and incorporates path-dependent development in an international battle for more passengers and freight. Tokyo's airports are too expensive, inward-oriented and lack a distinct airport strategy to compete on this level with the convenient new airports in Asia. The investments in airports on remote locations create a financial burden for the airport authorities, but are also future-oriented since they do not have noise- and safety problems any longer. Frankfurt Rhein-Main and Randstad, with the airports in the centre of the city-region have major noise and safety problems, where politicians repeatedly decided not to relocate the airports. On the other hand, the close distance to the cities is a major spatial-economic competitive advantage, too.

As a successor of changing airlines competition and strategies, airports are increasingly challenged to compete in commercialisation, globalisation and privatisation. Non-aviation revenues are becoming more important than aviation in order to spread business income, which have major effects on the airport environments with increase of real estate, in particular shops, offices and industrial sites, but also parking. As an effect of competition, ownership structure changes from public to private shareholders. In the Frankfurt and Haneda case studies, that led to investment in airport expansion. In new Japanese airports as Centrair, privatisation lead to cost reductions and income increases, with higher efficiencies.

In terms of economic spin-off, the cases show an above-average number of jobs that are created at the airport, in the airport vicinity and wider into the city-region. Haneda, with relatively few jobs at the airport, and as a domestic airport with fewer commercial activities, is an exception, hardly following international commercialisation and privatisation that generates new revenues. The economic impacts of over 60.000 jobs locally and a similar additional number regionally in Schiphol, Frankfurt and Narita are considerable and extrapolated in order to push for airport expansion. In a wider comparative perspective, liberal market economies have higher productivity and jobs near airports but regularly are a less attractive place to stay or settle business.

Airside developments, airport commercialisation and privatisation and economic impact, however, do not necessarily lead to full use of the spatial potential the airport offers; as a place to stay or as a business location, as a gateway to the city-region and thus the airport as a cityport. The case studies analysis show here different results.

Schiphol exploited the airport area as one of the pioneers under the airport city concept with retail, offices, hotels and parking. Currently the wider region benefits from the spin-off of the airport as a business location, but not everywhere has high quality of development and sufficient infrastructure has been developed. The future threat of Schiphol is the classic future of airport exploitation: be ruined by its own success since the airport on the one hand needs another terminal which makes it less convenient for transfers and the airport becomes less accessible by road and rail due urban development in the wider region.

On the contrary to Schiphol, bitter political clashes that even turned into riots in Frankfurt led to a more protective attitude towards the airport environs and development of locations more concentrated and better accessible by road and rail: the polycentric airport city. Apparently, Frankfurt was able to find trade-offs in deals between proponents and opponents of the airport. Fraport has to prove that this creates new jobs and bans night flights.

Although riots and political clashes were also at stake in the planning and expansion of Narita, here no trade-offs or deals were created. Narita is a major success in generating jobs, but in terms of spatial planning, a situation exists with both government and citizens as losers. In the end there is an airport with one and a half runway, and economic activities are sprawled all over the region and poor access to the remote airport.

Haneda did not suffer from strong opposition and is located in the heart of the metropolitan area of Tokyo, a convenient gateway to the city. It is Asia's largest airport but it neither generates many jobs near the airport, nor does it create an attractive business location.

The case studies point out that the airport as a cityport to the city-regions have different results in Schiphol/Randstad, Frankfurt/Rhein-Main and Narita-Haneda/Tokyo. The urban and

economic reasons for these mixed results are pointed out in the last chapters. Many questions are however, unanswered and new issues are raised. In particular, the question is why, despite their economic success, Schiphol and Frankfurt could become cityports when the Japanese airports could not? On the other hand, the development strategies at Japanese airports might be more sustainable for the long-range future. In order to answer these kinds of questions, economic competitiveness has to be widened to institutional competitive advantages and disadvantages. Therefore, actor-oriented institutional analysis in the following chapters is required, in addition to conducting spatial-economic analysis.

Notes

1 For wind-technical reasons there is a 5-runway system. The major runways are ranging between 3.300 and 3.800 meter in length. In fact there are six runways if the older 2000-meter Oostbaan is included in the counting, used in case of southwestern storm as a runway extension of the Kaagbaan.

2 The term mainport is a concept only used in the Netherlands, in particular by urban planners. The harbour of Rotterdam and Schiphol airport are appointed as the two mainports. It was introduced in the Fourth National Memorandum on Spatial Planning (VROM 1988).

3 Although the Tokyo Metropolitan Government suggests Yokota as a third civil airport, US Army and the Japanese Ministry of Foreign Affairs are not exploring the possibility (Japan Times Weekly 03.07.2004).

4 Despite it's official name Tokyo International Airport, Haneda is mainly a domestic airport with only two foreign destinations.

5 For example, in the 1990s the hubs of Brussels, Copenhagen, Vienna and Zurich lost status as intercontinental hub due to the bankruptcy and take-overs of national carriers by larger airlines (Burghouwt 2005).

6 However, the long-term outlook does not give guarantees for these geographically close duo-hubs. The failure of geographical concentrated duo-hubs in the U.S. due economic network efficiencies might favour the geographically dispersed One World Madrid-London duo-hub in favour of the geographically concentrated European duo-hubs of Star Alliance and Sky Team (Burghouwt and de Wit 2005).

7 In aviation economics, it is more efficient to combine international and national flights than to separate them. Due the changing position in the alliance structures, JAL demands a domestication of Narita Airport and perhaps a reverse assignment of duties between the airports: Narita as domestic airport, Haneda as international airport (Interview Burghouwt 2005).

8 In performance benchmarking airports are often categorized in terms of number of passengers, tons cargo freight and aircraft movements. Aircraft movements however do not show the efficiency of the airlines and airport passengers and cargo transport. It is common to measure the performance in workload units (WLU), where one WLU stands for one passenger or hundred kg freight (Graham 2001).

9 Although there is no data available for Haneda, it is likely that the revenue structure of the airport is significantly different from the other cases. Domestic airports as Haneda need less hotels, parking, business facilities and other services.

10 There is a wide range of definitions and economic sector effects that makes precise international comparisons hard. Furthermore, specialised research of York Aviation for ACI is airport sector related and therefore outcomes are sometimes seen as exaggerated by specialists. Graham (2001) follows the ACI working method. More recently, economic effects are toned down, in order to avoid the problem of double counting; a job not created or disappearing at the airport does not exclude replacement by other kind of jobs (see Overview on Economic Effects of Infrastructure OEEI-guidelines in the Netherlands, Ministry of Transport and Water

Management 2000, CPB 2000). In practise, it is still hard to say what is exactly airport related and what not. Here we follow Graham and ACI comparable research results.

11 According to York Aviation, on-site jobs should be multiplied by 2.1 to estimate the number of indirect and induced jobs nationally; on-site jobs multiplied by 1.2 to estimate the indirect-induced jobs regionally; on-site jobs multiplied by 0.5 to estimate the catalysed jobs (York Aviation and ACI 2004).

12 The capacity, destinations and jobs alone are not enough to determine the competitiveness of airports. For economic development of the city-region it is important relate the number of jobs to the added value of the airport. Seen on a global scale, the revenues per employee are highest in liberal market economies (Graham 2001). Efficient airports however do not necessary lead to high added value and creation of jobs. In the ATRS benchmark of 2005, Tampa, Singapore and Copenhagen turned out to be the airports with highest factor productivity. In Europe, Schiphol has a moderate position. Frankfurt is due the fact that this airport handles her own cargo not considered a high-productive airport. In East Asia, Narita and Kansai have one of the lowest relative factor productivity, but due high costs still make money. Therefore, after Australia and Taiwan, Japanese airports have the highest total labour productivity in Asia.

13 Including double counting on the national level (see note 10), and excluding effect on travel behaviour.

14 Decrease of jobs in the period 1991-2001, which is in particularly caused by manufacturers moving outside the Kanto region and towards Korea and China (Van Wijk 2005).

15 Position based on surveys of passengers satisfaction, available at www.airlinequality.com

16 Güller and Güller (2002:165) found a continuous effect of every additional flight generating 1 square meter of office development in the Amsterdam airport region: from 100.000 square meters in 1965 to 550.000 square meter in 2000, although an causal relationship can not be proven.

17 Schiphol Real Estate (SRE) is within the Schiphol airport territory active in all office locations except Schiphol Rijk; areas that do not harm flights. This includes major hotels and world trade centres in Schiphol Centrum. Surround the green airport territory, Schiphol Area Development Company (SADC) develops industrial sites at Schiphol Rijk, Riekerpolder, Lijnden, Oude Meer, SLP. Project developer Chipshol developed office locations at Schiphol Rijk. In the near future large scaled developments are foreseen in A4 Zone (SADC/Haarlemmermeer) and Badhoevedorp, where Schiphol foresees a second terminal in the future and landowner Chipshol reserves land for urban development.

18 As Mr. De Groot of the flower auction argues, the flower mainport is developing independently from the airport, with only 3% of export using Schiphol and 2% of export using other cargo airports. However, the airport-flower mainport interrelations become more important with the increasing production in Africa. The regional plan foresees expansion of the flower auction with 90 hectares net and the greenhouse areas in Rijssenhout of 300 hectares net. However, in Rijssenhout currently Schiphol wants to reserve land for a 2nd Kaagbaan runway (Interview De Groot and Lambrechts 2005).

19 Rents vary from €130-€400 per square meter for offices to €65-€80 for industrial sites, and have a higher status in the urban hierarchy and therefore are more welcome. The result in 2005 is 12% vacancy of offices on average, one third price drop of rents, and a shortage of distribution sites (Haarlems Dagblad 14.01.2006). Quite in contrast, in terms of demand cargo experts praise the competitiveness of the airport as very efficient infrastructure with skilled workers, and point at the strong logistic complex based on past and present aviation and cargo real estate knowledge, and the rapid development of the Chinese market. The strongest growing world trade lane is China-Schiphol, annually 26% growth on average. Most actors found the Schiphol's expected growth of 5% annually for the coming years reliable (Interview Wade 2005).

20 Actors as office developers at Schiphol Real Estate and the project coordinators at Amsterdam-Zuidas simply put aside the discussion by arguing that not cities within the region should compete, but Randstad cities

should compete with Frankfurt or London. This might be true as we found in chapter 2, and is in particular not problematic for high-class development as Schiphol-Centrum and Zuidas.

21 It is often argued that Frankfurt's airport would compete, more than Schiphol, with the downtown of Frankfurt. Haro (1995) concludes in her thesis the limited competition of the airport as a shopping location for employees and citizens, since retail prices and parking costs are too high for daily use by citizens; the region does not have to worry that citizens will buy their vegetables at the airport

22 This has happened before with the construction of the Airport Center in terminal 1 of the airport that accommodates 4000 jobs (Interview Schien 2003).

23 Rhein Main Verkehrsverbund (RMV) has a crucial position in the development of public transportation. RMV integrates infrastructure and urban development in plans, but some exceptions show that because of tax competition between communities this is not always happening in practise. Cheaper new business locations and residential areas are built without light rail station nearby (Interview Lunkenheimer and Stanek 2003).

24 Expansion of the airport would lead to an extra increase of 0.5% in manufacturing jobs and 0.5% to 2.5% in service jobs in the region every year until 2010 (NAA 2000).

25 Facilities are clustered in 243-hectare plot areas in a ten-kilometre radius of the airport (www.pref.chiba.jp/business/narita/narita-e.html 2006). The largest industrial park is the remote 114-hectare plot area in Sakura. Another development is ProLogis' two Narita Parcs three kilometres from the airport.

26 Recently the direction of the planned fourth runway was changed due local opposition on the other side of the Bay in Chiba that feared increasing aviation noise problems. Noise hindrance can furthermore be found at Daiba Island in Tokyo Bay due to approaching routes (Nihon Keizai Shimbun 26.5.2004).