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**COMMISSION 1: *Airports and their Surrounding Zones as Catalysts of
Metropolitan Development***
**COMMISSION 1: Les plate-formes a roportuaires, comme facteurs de
d veloppement des m tropolises**
**COMISI N 1: *Las plataformas aeroportuarias como factores
de desarrollo de las metr polis***

PART/PARTE I

**FINAL REPORT
SYNTH SE FINALE
INFORME FINAL**

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This is a digest of the findings of Commission 1, based on case studies used in preparing its report for presentation at the Metropolis '99 Congress (Barcelona). The report has been published as a congress document and forms one of the key topics of discussion.

1. EXECUTIVE SUMMARY

1.1 BACKGROUND

The work of Commission 1 started in 1997. Its objectives were to provide city and airport planners with a clearer understanding of the role of airports in the regional economy and shaping the development of large metropolises, and the role of cities in shaping the use and development of airports.

The following were the subsidiary aims of the Commission.

1. To enhance the expertise of city and airport planners with the benefit of the experiences of participating cities.
2. To encourage participation of city authorities not yet members of the Metropolis Association.
3. To identify critical aspects of the relationship between city and airport authorities.

Participant cities were invited to complete a case study which addressed a number of key questions, allowing for both a qualitative response to and assessment of specific data. It was in a format that encouraged the "story to be told" by the participants. Additional information was provided by the Airports Region Conference and through research of city and airport sites on the Internet.

The Commission analysed and compared the data and experiences contained in case studies from 28 cities (representing 38 international existing or proposed airports). It examined the economic, environmental, infrastructure, social and political aspects and explored the means for their integration into development strategies for the metropolitan area and for the airport and its surrounding zones. The value of this Commission's work has been in assembling a volume of lessons learned from the experiences of the participating cities.

The Commission working group met twice: in November 1997, in Melbourne, and in June 1998, in Tokyo.

1.2 THE CITY AND THE AIRPORT IN THE GLOBAL CONTEXT

By 1996, the globalisation of the world economy and rapid growth in communications, air transport and services had shifted the focus of competition, from competition between countries to competition between cities. Cities require effective and well-integrated infrastructure to best secure investment and sustain and enhance local economic activity. The global economic context has radically changed since the work of the commission began in 1997 and particular strategies are needed to deal with new uncertainties when programming new airport and infrastructure investment.

Cities need to position themselves to offer unique advantages to investors and economic development. They are beginning to evaluate their performance in terms of competitiveness and liveability against other successful and competing cities to highlight those things they do well and areas for improvement.

Increasingly authorities are recognising:

- the need to develop communication infrastructure and integration with wider regional interests
- the need to reach consensus on a strategic, integrated approach to airport and metropolitan development
- the importance of the airport as an industrial strategic centre, for tourism and to local government, and
- the need to involve private businesses and other stakeholders in consultation.

Airports have become the modern city national gateways. They are fundamental to the participation of cities and regions in the global economy. They play a major role in export oriented economies through freight and business and for multinational businesses. They are essential to tourism, particularly in countries such as Australia, an island continent, which are principally, or solely, accessible only by air.

Airports, too, are changing the way they measure their performance and position themselves in the global aviation networks. The focus has changed from quantitative measures of numbers of passengers or tonnes of freight to qualitative assessments of achieving world standards of service delivery.

A new trend in management of airports has emerged. Their traditional core business of servicing aircraft and moving passengers and freight is being redefined. Airport operations are required to deliver a return on investment and competitive service. The airport needs to be both effective in the facilities and services provided to airlines and in satisfying the range of facilities demanded by passengers and other users. Developing a broad range of commercial activities is seen as essential to the health of an airport as a business. Airports as activity centres are becoming more and more integrated with the overall transport network and the community generally.

Aviation has always been extremely sensitive and reactive to economic circumstances. For airport and city development, the downturn in economic influences will result in the likely capacities not being met in the predicted time frames. South East Asia, in particular, has been strongly affected by the current recession. The 1973 petroleum crisis similarly hit European and other countries strongly dependent on imported fuel, considerably slowing air traffic and related employment growth.

Airports, airport operators and cities are examining their exposure to markets most affected by the economic situation, particularly in South East Asia. They are implementing strategies to broaden their own markets and to diversify airport development opportunities. The airport performance and city benchmarking studies are important tools in understanding the global picture, allowing cities and airports develop new strategies and monitor outcomes of existing strategies.

1.3 ROLE OF THE AIRPORT IN THE REGIONAL ECONOMY

The airport is a symbol of a city's influence. Linking regions and their strategic nodes to the world rather than just to other parts of the country, the airport is a key attractor for growth and infrastructure investment. It can strengthen the metropolitan area and enhance the city's global competitiveness, and is essential in attracting higher level economic

functions and activities for which cities compete. It is also an important regional employment node.

The importance of metropolitan economic impact is linked to the quality of service provided by the airport and its ability to act as a hub. Globally, the number of “key hub” airports is limited. They are located in regions with strong economic development potential, and have the capacity for expansion to meet future aviation traffic demand and intermodal transport links, particularly with high speed trains.

The relationship between the airport growth and city growth may vary according to the “hub” or “final destination” role of the airport. A “hub” airport is convenient for airlines. However, cities would prefer their airports to be “final destination” for long haul flights, with an increased use of high speed railway to replace short-haul flights.

Economic benefits delivered by an airport seem to rely on its ability to deliver a range of competitive advantages compared to other airports. The most commonly identified advantages are a 24-hour curfew free operation, integrated domestic and international terminals, ample areas for airport expansion and large areas of surrounding rural land or, increasingly, water (oceans, lakes) to enable the airport to reach its full potential with minimal impact due to aircraft noise.

Many cities have allocated appropriate land and even provided the infrastructure (road, rail, telecommunications and physical services). It is necessary for cities to develop marketing strategies to encourage the development to occur so the resulting benefits can be felt by their communities and regions.

Today, the global airline network is dominated by key companies and their preferred hub sites. It is difficult to shift airline operators to a new airport contrary to their wishes. They will always favour an airport which offers a large choice of connections, even if congested. To meet the needs of the airline operators, airports and cities must address market needs and functioning requirements of airlines. Airlines are seeking markets in very large cities with dynamic economic development and good transport infrastructure to meet the business travel market. They require the quality of facilities and services to ensure timetables can be met with minimum delays for passengers and aircraft servicing.

It is not only relationships between airlines themselves, but also between airlines and other transportation companies which have implications for cities and regions. Integration of well-delivered aviation and on-airport services with the regional transportation network is critical for cities and metropolitan regions. Relationships between airlines and rail companies in Switzerland have enabled airport check-in processes to be undertaken at railway stations. The physical relationship between the airport and the city and particularly the reliability of land based transport, seems to confirm the role of the airport as a “broadcaster” of growth without it necessarily happening at or in the immediate proximity of the airport. The city is in the position of facilitating this role in the overall metropolitan planning perspective.

Airport related activities seem to prefer to locate a little further away from traffic congestion in the immediate area of an airport, at a rail/road integrated site. An airport which is part of an integrated transport network has benefits particularly for commuting and distribution purposes.

Airports will remain important regional employment nodes providing opportunities for the less qualified to work in airport related activities (construction, handling, maintenance, accommodation, catering) are of benefit to the region generally. Nevertheless a number of issues are emerging.

For **aviation companies**, which represent more than half airport employment, changing daily or seasonal traffic peaks has seen increased part-time or seasonal employment. Some **airport related activities** traditionally present on an airport, can be quite volatile. Aircraft maintenance can easily move away to cheaper sites, possibly another airport. On-board catering services can also be located away from airport sites. For **airport concession businesses** consumer spending is more variable than those activities linked to air tickets. These businesses are linked to airport visitors and users generally, not just passengers.

1.4 AIRPORTS AND LONG TERM METROPOLITAN PLANNING

Cities are increasingly recognising the need to develop an integrated strategy and key actions which address the performance of the network which serve gateways such as airports. They need to integrate the management of key port, airport and regional nodes and corridors of road and rail routes which connect national gateways and major production centres. All cities recognise that airports are part of the overall transport planning networks and the importance of addressing the bigger picture with complementary air, port, road and rail freight strategies.

Airport accessibility contributes to the quality of air service. Even at airports where there is a good public transport service, access by car remains dominant for passengers and even more so for employees. Many cities are planning to provide or upgrade rail services to airports. Apart from good quality metropolitan services, there are plans to link airports with national and international rail networks (eg. the very fast train) not only in Europe and Japan, but also elsewhere around the world.

Many cities have proactive policies for establishing a satisfactory framework for urban development around airports. The airport precinct is often attractive for businesses, not so much because of the airport, but because of the good access infrastructure serving it. If too many activities develop around the airport and generate significant road traffic, aggravating access to the airport, then its operation can be compromised. These areas ought to be reserved for those activities which have a functional need to establish there.

As with successful city strategies, airport master plans will need to evolve from being often isolated statements of on-airport development to become an integrated strategy which addresses key city, regional and national forward planning policies. They should address the implications of strategic planning by municipal and regional authorities on the airport and vice versa. They should be clear, concise statements of the key land use development issues and directions for the airport and its environs, provide the rationale for any land use planning controls and involve the community in their development. Such plans can offer unique opportunities to develop strategy which facilitate rather than control development.

In the past, airport expansion or redevelopment was triggered by targets which were set by the capacity of existing runways, terminal and freight handling facilities. Today, such criteria should not "trigger" the development itself, but, rather, the commencement of its

forward planning and consultative processes. The city, as much as the airport operator or any other affected party, needs some mechanism which will trigger its own infrastructure planning and investment processes. The reverse is equally true of city investment in infrastructure complementary to the airport and the airport's need to plan to accommodate it.

Airports are seen by many as a necessary evil. They are invariably noisy, windy, polluting and consume vast tracts of land. Their environmental impacts are felt far beyond the immediate vicinity of the airport. Often they are located on sensitive sites, in pristine areas, by the sea or beside a stream or river. It is important to recognise those environmental qualities and to ensure that airport development is integrated in appropriate ways.

Issues of bio-diversity and ecological balance are as important for an airport and its environs as they are regionally or globally. A number of airports are now promoting waste reduction and energy conservation policies. Airports are now moving towards obtaining international recognition in environmental management, such as obtaining ISO 14000 accreditation.

Cities and communities are well aware of the impacts of aircraft noise, which extend beyond areas defined as unsuitable in Noise Exposure Plans. They need to carefully balance the level of noise impact and the need for residential land, particularly for airport related employees. If necessary, planning authorities must restrict any housing proposals in aircraft noise affected areas to avoid importing future objectors. Measures by some cities to constrain development in these areas have not always been welcomed. Where such measures have not been implemented the affected communities have been outraged by the impacts on their lifestyles.

Preservation of environmental quality is not prejudicial to competitiveness. Cities recognise that rigorous ecological environmental management can stimulate progress, innovation and, consequently, competitiveness. Environmental costs associated with congestion, energy consumption and acoustic and air pollution are shared across all levels of society, with repercussions for the cost of living. The costs of any corrective measures are invariably borne by the public sector and, hence, the local community.

Strategies to reduce impacts of airport development represent investment in the future and in opportunities for employment creation. Projects leading to solutions of particular environmental problems (eg. dolphin habitat in Hong Kong) have demonstrated innovative practices which can be applied and marketed elsewhere.

1.5 RELATIONSHIPS WITH CITIES, COMMUNITIES AND OTHER STAKEHOLDERS

Airport ownership is changing and metropolitan governments are taking a far more proactive role in owning and running airports. National governments, while maintaining regulatory control of airport and aviation issues, are now seriously assessing whether they wish to continue owning and operating infrastructure assets such as airports.

Some national governments are entering into joint venture arrangements with lower tiers of government to own and operate airports. Others are maintaining ownership of key metropolitan airports, but are leasing the right to operate and develop the airports to private

companies. Some regional governments own and develop airports which are operated by government owned or non-profit corporations.

It is important for cities to become more involved in management policies for airports to ensure that the opportunities and benefits for regional economic development can be realised.

There are a number of aspects relating to airport development which can transcend several levels of Government. Most cities are recognising the need for integration amongst and liaison between the various players to enable investment in infrastructure to be linked to land use planning and to account holistically for economic, environmental, social, infrastructure and political elements of regional or metropolitan strategic planning.

Communities have become more aware of the impacts of aircraft noise and airport operations, more circumspect about the role of a private airport operator or developer and more aware of the full impacts of airport development on the economics of other activities they replace.

Airports need to develop ongoing relationships with their various stakeholders and local communities. Collaborations which include all the key stakeholders together have been found to be invaluable and beneficial to both the airport and the city. Communities are more supportive of a project if they can see and understand the whole picture rather than disjointed parts.

2. CASE STUDY ANALYSIS

2.1 PARTICIPATING CITIES:

2.1.1 Participating cities and their airports.

The 28 participating cities cover a broad geographic¹ area and many types of airports. Table 1 describes participating cities by geographic area and includes details of airport passenger traffic for 1996.

Table 1: Participating cities by geographic area and their airports - 1996

	Europe	Africa and the Middle East	North America	South America	Australia and the Pacific	Asia
Number of Metropolises	13	1	2	2	2	8
Passenger traffic at airports	OMSK - 0.35 WARSAW - 3.1 GOTHENBURG Landvetter - 3.3 GLASGOW - 5.6 HELSINKI Vantaa - 7.75 MOSCOW-9.45(1994) Sheremetievo - 3.78 Vnukovo - 2.36 Domodedovo - 3.54	CASABLANCA -	MONTREAL - 8.5 Dorval - 6.38 Mirabel - 2.56	QUITO - 1.50 (1995) GUAYAQUIL- 1.4 (1995) RIO DE JANEIRO - 8.7 Galeao - 6.3 Santos Dumont - 2.4		PUSAN - 9.29 NAGOYA - 9.52
< 10 mppa	12					
10-20 mppa	11				MELBOURNE - 13.7 SYDNEY -19.7	MANILLA - 12 GUANGZHOU-14.4 KUALA LUMPUR-14.5 JAKARTA - 14.6 Soekarno Hatta-13.7 Halim Perdan- 0.9
20-50 mppa	3		TORONTO-24.2			HONG KONG - 30.21
> 50 mppa	2					TOKYO - 72.04 Haneda - 46.63 Narita - 25.41

Source: *Aéroports magazine*, n° 277 or relevant metropolis

mppa - millions of passengers per annum

The Commission received case studies from cities from Europe (13), Asia (8), North America (Canada) (2), South America (2), Australia (2) and Africa (1). Nine of the cities are national capitals.

Their airports vary greatly in levels of activity- from Omsk with 350,000 passengers per annum to Tokyo with 72 million. 12 cities have annual airport traffic of less than 10 million passengers a year and 5 cities have more than 20 million.

The 28 participating cities represent a total of about 40 international existing or proposed airports.

Several Asian airports (Guangzhou, Hong Kong, Jakarta, Kuala Lumpur, Nagoya) demonstrate the importance of airport projects, either currently under way or proposed, to the

¹ It is regrettable that the Commission was not able to obtain any case studies from the United States of America

Asian region. New airport projects in Quito and Guayaquil indicate that Latin America is also experiencing strong growth in aviation transport (+8.2% in 1997).

2.2 RANKING

2.2.1 Airports and their ranking

Traditionally, airports have judged their performance by the annual volumes and growth in passenger and freight traffic and in aircraft movements. While these data are important, they are more and more considered to be the result of an airport's performance in a business sense and as viewed by their clients.

Each year the International Air Transport Association (IATA) conducts a world-wide survey of air travellers. Airport management and, indeed, cities use the results as a measure of airport (and even city) performance.

Of the participating cities, Helsinki, Manchester, Melbourne, Zurich, Montreal, Sydney, Hong Kong, Toronto and Paris have their airports well placed in the IATA ranking, appearing in the top 20 in many of the criteria. A full listing of ranking by criteria is included in the Appendix, but they include:

- overall passenger convenience
- speed of baggage delivery
- passport visa inspection
- ground transportation to/from the city centre
- customs inspection
- First Class/business/executive lounges
- availability of connecting flights to city in the same continent
- on time departures

Of the participating airports seven are among the fifteen highest ranked airports outside the USA with more than 20 million passengers per annum. Two airports, Hong Kong and Tokyo-Narita, are among the 5 highest ranked airports worldwide for freight. Tables 2-5 show world-wide ranking of airports in terms of passengers and freight volumes and passenger growth rates.

TABLE 2: 12 HIGHEST RANKED AIRPORTS IN THE WORLD (mppa 1997)

1.	London	91.52
2.	New York	87.34
3.	Chicago	80.36
4.	Tokyo	74.97
5.	Dallas	67.29
6.	Atlanta	68.20
7.	Los Angeles	66.45
8.	Paris	60.35
9.	San Francisco	40.63
10.	Frankfurt	40.26
11.	Houston	37.10
12.	Seoul	36.49

TABLE 3: AIRPORTS WITH MORE THAN 20 MPPA OUTSIDE THE USA (mppa 1997)

1.	London - Heathrow	59.97
2.	Tokyo - Haneda	49.30
3.	Frankfurt	40.26
4.	Seoul	36.49
5.	Paris - CDG	35.25
6.	Amsterdam - Schiphol	31.57
7.	Hong Kong	29.00
8.	London - Gatwick	26.96
9.	Toronto	26.09
10.	Tokyo - Narita	25.67
11.	Bangkok	25.61
12.	Singapore	25.17
13.	Paris - Orly	25.06
14.	Rome - Fiumicino	25.00
15.	Madrid - Bajas	23.63

TABLE 4: AIRPORTS HANDLING MORE THAN ONE MILLION TONNES OF AIR FREIGHT ANNUALLY (Millions of tonnes - 1997)

1.	Memphis	2.23
2.	Los Angeles International	2.06
3.	Hong Kong	1.81
4.	Miami	1.76
5.	Tokyo - Narita	1.67
6.	New York JFK	1.66
7.	Chicago - O'Hare	1.55
8.	Frankfurt	1.51
9.	Seoul	1.36
10.	Singapore	1.35
11.	Anchorage	1.29
12.	London - Heathrow	1.26
13.	Amsterdam	1.20
14.	New York Newark	1.04
15.	Paris - CDG	1.02

TABLE 5: HIGHEST GROWTH RATES IN PASSENGER TRAFFIC IN 1997 (airports with more than 10 mppa)

1.	Johannesburg	21.6%
2.	Brussels	17.9%
3.	Philadelphia	16.2%
4.	Munich	14.0%
5.	Manilla	13.9%
6.	Dublin	13.7%
7.	Amsterdam	13.6%
8.	Milan Linate	13.6%
9.	Zurich	12.6%
10.	Sao Paulo Guarulhos	12.6%

TABLE 6: AIRPORT CONTEXT AND DATA

	Population by region or metropolis (million)	Year airport opened	Distance from city centre (km)	Airport area (hectares)	Passenger Traffic 1996 (mppa)	Number of runways
BARCELONA	4.2 [■]	1916	10	590	13.4	2
CASABLANCA (c)	3 <i>Wilaya</i>	1969	30	1609	2.76	1
GLASGOW	2.5 <i>West Central Scotland</i>	1966	12	315	5.6	2
GOTHENBURG	-	-	-	-	3.28	-
GUANGZHOU	4 *	1933	6	330	12.6	1
GUAYAQUIL	2.5 <i>city</i>	1959	12	176	1.46 (1995)	1
HELSINKI - <i>Vantaa</i> (c)	0.89 [■]	1952	15	1485	7.75	2
HONG KONG :	5.5 *					
- <i>Kai Tak</i>	-	1965	<i>city centre</i>	-	30	1
- <i>Chek Lap Kok</i>	-	1998	25	1248	13.8	2
JAKARTA (c)	11.5 *	1979	20	1800	-	2
KUALA LUMPUR (c):	1.2 *					
- SAAS	-	1965	-	-	-	-
- KLIA	-	1998	50	-	-	2
MADRID (c)	4 *	1929	13	1250	20.5	2
MANCHESTER	2.2 *	1938	16	600	14.85	1
MELBOURNE	3.24 [■]	1967	22	2353	13.7	2
MILAN	8.9 <i>region</i>					
- Linate	-	1937	7	360	12.56	1
- Malpensa	-	1948	48	1220	3.80	2
MONTREAL :	1.8 [■]					
- <i>Dorval</i>	-	1941	20	1323	6.37	3
- <i>Mirabel</i>	-	1975	66	6760	2.56	2
MOSCOW (c):	8.6 [■]					
- <i>Sheremetievo</i>	-	1950	35	800	3.78 (1994)	2
- <i>Vnukovo</i>	-	1935	30	980	2.36 (1994)	2
- <i>Domodedovo</i>	-	1955	48	1600	3.54 (1994)	2
MUNICH	2.2 *	1992	28	1500	15.68	2
NAGOYA :	3.2 *					
- <i>Existing Airport</i>	-	-	-	-	9.51	-
- <i>Chubu</i>	-	-	30	470	-	1
OMSK	1.18 <i>city</i>	1929	3.5	662	0.35 (1995)	1
PARIS ILE de FRANCE(c)	10.7 <i>region</i>					
- <i>Orly</i>	-	1961	14	1540	27.36	3
- <i>Roissy CDG</i>	-	1974	25	3110	31.72	2
PUSAN	3.88 [■]	1976	15	506	9.29	1
QUITO (c)	1.6 <i>city</i>	1959	12	104	1.50 (1995)	1
RIO DE JANEIRO :	9.8 [■]					
- <i>Galeao</i>	-	-	15	1860	6.33	2
- <i>Santos Dumont</i>	-	1936	<i>city centre</i>	-	2.43	2
SYDNEY	3.88 [■]	1970	8	670	19.7	3
TOKYO (c):	11.7 [■]					
- <i>Narita</i>	-	1978	60	710	25.41	1
- <i>Haneda</i>	-	1931	15	1100	46.63	2
TORONTO	4.5 [■]	1960	25	1795	24.24	3
WARSAW (c)	1.64 <i>city</i> - (2.1*)	-	-	833	3.1	2
ZURICH	1.17 <i>canton</i>	-	12	807	16.22	3

(c) National capital city

* Urban agglomeration 1995

[■] Metropolitan area

mppa - million passengers per annum

Sources : An Urbanizing World, Oxford University Press, 1996, and relevant case studies

2.3 GENERAL CONTEXT AND CHARACTERISTICS OF THE AIRPORTS

2.3.1 Airport Management

The majority of airports are under direct government supervision. Only Melbourne Airport has a truly privatised management (although the Australian Government still owns the airport). Other airports are managed by private bodies, but with shareholders comprising public groups (Munich, Milan) or institutional players (Montreal). Sometimes the management of parts of airports have been privatised, for example terminals at Tokyo or Terminal 3 at Toronto.

When new projects are planned, they are often preceded by a call for expressions of interest for private partners (Quito and Guayaquil; Guangzhou; Omsk). This reflects the general trend from Government to private sector investment in the construction and management of airports². Large infrastructure construction and investment companies are the private sector participants in airport construction and management as well as institutional investors. This applies equally to other major urban infrastructure.

2.3.2 Airports and their city centres

Some airports are located practically in the centre of their city (Santos Dumont at Rio de Janeiro, Kai Tak at Hong Kong until the new Chek Lap Kok airport opened in July, 1998). Others are totally within developed urban areas and very close to the city centre (Omsk 3.5 km, Guangzhou 6 km, Milan Linate 7 km, Sydney 8 km). This also applies for some airports a little further out: Quito (12 km), Paris-Orly (14 km).

Other airports are very far from the city centre (about 50 km for the new Kuala Lumpur airport and for Milan-Malpensa, 60 km for Tokyo-Narita and 66 km for Montreal-Mirabel). The case studies for Montreal and Milan show that at such a distance problems arise for airport development when a good rail network does not exist. This is especially so where older airports, closer to the centre, maintain their levels of activity.

² *The construction market for airports has been valued at FF700 billion, of which about 100 is for the operating contract, 1997 - 2001 (source: étude Statorg pour GTM - 1996)*



Melbourne Airport

2.3.3 Sea based sites

A number of airports have sea based sites, which allow noise nuisances suffered by residents to be limited. It can also allow an older established airport (Barcelona, Rio de Janeiro - Santos Dumont et Galeao, Tokyo - Haneda) to develop more effectively while reducing its own noise impact.

Some airports situated by the sea have been enlarged on reclaimed land (Sydney, Tokyo-Haneda). Some more recent projects have been developed (or are envisaged) almost wholly on artificial sites (Hong Kong-Chek Lap Kok, Nagoya-Chubu).

2.3.4 Technical characteristics and operation of airports

Is there a relationship between airport traffic and its land area?

Airports land areas vary considerably ranging from 104ha at Quito to 6,760ha at Montreal-Mirabel of which only 2,100ha are really utilised.

There is no direct relationship between the areas of an airport and its existing or potential traffic. Some airports have high volumes of traffic on small sites. Guangzhou handled 12.6 mppa³ in 1996 on a site of 330ha and Tokyo-Haneda, 46.63 mppa in 1996 on 1,100. The reverse is equally true, that is, a large site can produce relatively low traffic volumes.

³ mppa - million passengers per annum

While these sites will be able to accommodate future traffic growth, there will be capacity for development of non-aviation uses.

Airports developed on reclaimed land are usually large enough to accommodate projected increase in traffic. Only those activities directly related to the functioning of the airport are on the site. Other facilities (eg hotels) tend to be located on mainland sites nearby (Nagoya-Chubu, Tokyo-Haneda, Hong Kong - Chek Lap Kok).

Runway capacity and management

Airports need to manage traffic on their runways. Hong Kong's Kai Tak Airport handled 30 mppa with only one runway. Tokyo-Narita handled 25.4 mppa on its runway and Tokyo-Haneda averaged 23.3 mppa on each of its two runways. In Europe, Manchester handled 15 mppa with only one runway and Paris- Roissy CDG averaged more than 15 mppa on each of its two runways (two new runways are proposed). Seven airports with traffic less than 4 mppa used two runways.

It should be remembered, however, that there are often different operational requirements between airports with intersecting runways and those with parallel runways. The ultimate development of Melbourne Airport, for example, will see four runways developed as two pairs of intersecting parallel runways.

Multiple airports can provide for specialised operations

Many participating cities have several airports. In **Tokyo**, Haneda Airport caters for domestic services and Narita Airport international services. In **Rio de Janeiro**, the Santos Dumont Airport, near the city centre, provides very specific domestic connections, mainly shuttle services between Rio de Janeiro and Sao Paulo.

In **Paris**, it was initially planned that Orly Airport would cater for domestic traffic and Roissy-CDG for international traffic. Liberalisation of aviation transport caused a change in this principle. As Orly was well positioned in the region, market pressures led to it redeveloping international links. However, limits on the number of movements at Orly, have resulted in a fall in traffic since 1996. Stronger development has occurred at Roissy-CDG which now accommodates traffic growth in the region.

In **Moscow**, the roles for the different airports have not yet clearly emerged. At present, Sheremetievo Airport handles most international traffic and is anticipated to continue in that role, with Domodedovo Airport handling domestic traffic.

Montreal and **Milan** are examples of the difficulty developing a new, but remote and poorly served airport, when another exists closer to the city centre. Mirabel Airport ought to have been the major airport for Montreal, but as Dorval Airport maintained its major role in the metropolitan aviation network, Mirabel had to reorient its services catering for charter and freight traffic.

Linate Airport, being close to the Milan city centre and more accessible to its residents, was planned to provide for domestic links between Milan and Rome. Airline companies were required to use Malpensa Airport for other links. This solution appeared to favour Alitalia, the only major airline authorised to remain at Linate Airport. Other airlines appealed this decision to the European Union for a review of the decision.

Munich chose to replace the older airport at Riem on its opening the new airport in 1992. Likewise, Kai Tak Airport in Hong Kong closed when Chek Lap Kok Airport opened.

Airport Saturation

Many participating metropolitan airports, for example, at Barcelona, Guangzhou, Jakarta, Sydney and Tokyo, are saturated or well on the way to saturation. Elsewhere, faced with approaching saturation, airports are having to manage traffic growth in difficult conditions, including increased delays in peak periods.

In the case of Paris-Orly, being in an urbanised area, airport saturation was defined and limited by a government decision to a ceiling 30 mppa. Traffic peaked at 27.3 mppa in 1996 and dropped to 25 mppa in 1997. In this case “saturation” is not merely the operational capacity of the runway itself, but takes account of nuisance in the surrounding areas.

Airports at Casablanca, Glasgow, Montreal have sufficient capacity for the medium term to accommodate projected traffic growth.

2.3.5 Airport Traffic Characteristics

TABLE 7: NATURE OF TRAFFIC

	Total airlines regularly serving the airport	Total destinations or countries served	International/ domestic traffic (%)	Business/ leisure tourist traffic (%)	Transit traffic (%)	Charter traffic (%)	Average loading (passengers)
BARCELONA	46	56 countries	40 / 56	55 / 26	3.8	12.4	-
CASABLANCA	24	-	74 / 22	- / 2.6	-	-	-
GLASGOW	43	44 dest	46 / 54	40 / 60	1.8	33	-
GUANGZHOU	22 dom - 7 int	63 dom. 13 int.	10 / 90	50 / 50 (peak season) 70 / 30 (Off season)	-	-	-
HELSINKI- Vantaa	26 (+100 charter and freight)	43 countries	70 / 30	-	6	16	-
JAKARTA	-	-	40 / 60	-	-	-	-
MADRID	80	46 countries	49 / 51	-	-	-	-
MANCHESTER	100 (total)	175 dest	80 / 20	-	-	54	-
MELBOURNE	33 int - 8 dom	-	17 / 81	27 / 73	2	-	-
MILAN							
- Linate	33	33 dest	54 / 46	68 / 32	0.1	0.7	86
- Malpensa	84	82 dest	94 / 6	20 / 80	11	38	102
MONTREAL :							
- Dorval	23 *	-	41 / 59	70 / 27	10	-	-
- Mirabel	27 *	-	97 / 3	24 / 69	26	-	-
MUNICH	171 (total)	60 countries 197dest	58 / 38	-	2	-	-
OMSK	18	-	12 / 88	-	-	-	-
PARIS Ile de France							
- Orly	40	150 (1/3 in France)	33 / 67	-	13	-	112
- Roissy CDG	68	120 countries 200 dest	90 / 10	-	20	-	86
PUSAN	7	7 countries 35 dest	12 / 88	-	-	-	-
RIO DE JANEIRO	27	-	-	-	-	-	-
- Galeao							
SYDNEY	47	-	32 / 68	-	-	-	72 (1993)
TOKYO:							
- Narita	51	38 countries 98 dest	97 / 3	-	-	-	218
- Haneda	-	44 dest.	2 / 98	-	-	-	219
TORONTO	-	45 countries 140 dest	-	-	-	-	-
WARSAW	27	60 dest.	88 / 12	52 / 13	-	-	218
ZURICH	73	81 countries 170 dest	94 / 6	-	-	14	-

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* - dedicated freight airlines not included

The importance and nature of airport traffic makes it possible to classify case study airports according to their role in the global airport network.

Key global hub airports.

Airports in Paris (Roissy-CDG), Tokyo (Narita) or Hong Kong fall into this category. These airports do not compete with other national airports. Their influence extends well beyond national boundaries. For example, Paris (Air France hub) competes, as a gateway to Europe, with London (British Airways hub), Frankfurt (Lufthansa hub) and Amsterdam (KLM hub). These airports currently handle 25 million passengers a year, handling mostly international traffic (97% at Tokyo Narita, 90% at Paris CDG) with a significant proportion of transit passengers (20 % at Paris-CDG).

Secondary global hubs.

These airports currently handle about 15 - 25 million passengers a year. They are key gateways for countries constituting an important market for aviation transport and have either a secondary or a specialist hub role, for example, Madrid (Iberia hub) with links between Europe and South America, or Zurich (Swissair hub). Toronto (as a gateway to part of the United States), Kuala Lumpur, Jakarta and Sydney could be included in this category. Moscow, despite a significant decline in traffic at its airports in the last 10 years, could theoretically fall into this category as well. Milan would be able to assume the role of a secondary hub for Europe if it develops as foreseen.

Airports of major national or regional importance

These airports handle about 7-15 million passengers a year (in Europe, Barcelona or Helsinki). Some can relieve pressure on already congested principal hubs, as does Manchester for London (particularly charter flights) or Munich for Frankfurt. In Australia, development at Melbourne Airport could benefit from congestion at Sydney. The same applies to Montreal in Canada, Rio de Janeiro in Brazil and Pusan, Guangzhou and Nagoya in Asia.

Airports serving isolated or smaller markets

Omsk, Casablanca, Warsaw, Gothenburg, Glasgow, Quito and Guayaquil fall into this category.

Tokyo - Haneda

Haneda Airport does not fall into any of the above categories. It is a major domestic airport (almost 50 million passengers in 1997) based on a strong internal air transport market. It resembles more the role of a number of airports within the United States. In complementing the international role of Narita Airport, it assists Tokyo's role as a global hub.

For some cities the aviation links are irreplaceable

For some cities, the airport is essential in opening the city to the world. Air transport is irreplaceable due to geographic isolation (Quito or Helsinki), being island nations (Japan, Indonesia, New Zealand or Australia) or the low population density and vastness of a country (Omsk). This is particularly so for tourism, business travel and the tight time constraints of high value air freight. For these cities, the airport does not compete with other transport modes, as it would in Europe, for example, with the very fast train network.



Air freight handling

2.3.6 Airport Based Infrastructure

Essential elements for development of airport infrastructure

To meet the remarkable increase in demand for air travel in recent years and the constant advances in aircraft technology, countries around the world are struggling with the common issues of upgrading airport facilities and expanding airport functions. Meanwhile, the need to address increased aircraft noise in regions surrounding airports is a common, urgent problem shared by all nations.

In the wake of rapidly increasing demand, airports worldwide have worked to expand their facilities and many are now reaching their limits. Consideration must therefore be given to how airport facilities should be in future. The following elements for development of airport infrastructure represent the basic essentials upon which others can be added to meet specific local needs and aspirations.

Effective use of existing facilities

With the serious difficulties involved in expanding existing airports, relocating airports (ie. construction of new airports) is often necessary. However, given the financial implications, airport and city authorities must explore more efficient uses of existing facilities and operational procedures (eg. operating hours) while considering demand and the reaction of the surrounding region to additional noise impacts etc.

Facility upgrades

As airport demand increases and the sources of that demand grow more varied, measures will need to be implemented, such as increasing runway construction, developing terminal concepts for streamlining the aircraft arrival and departure processes and improving aircraft operations.

While working to improve airport convenience by examining the facility layout and developing ways to conduct passenger processing on one floor, safe aircraft operations and maintaining airport security must remain a top priority. These facilities should be primarily designed to minimise crowd congestion in passenger terminals and shorten walking distances for travellers. Installing moving walkways in existing airports and offering an internal transportation system that includes shuttle buses will render those facilities more convenient for passengers.

In addition to optimising airport functionality, it is important to create a user-friendly environment that offers a full range of useful and desirable amenities for travellers. Future considerations could include enhancements that add value to the functionality of the terminal (clear signage, improved business lounges and even well presented artworks).

Over the long term, authorities should concern themselves not only with issues relating to airport expansion to meet the increase in air transport demand, but must strive to make airport facilities more resistant to major disasters (eg earthquake) by developing contingency plans to ensure proper functionality during an emergency.

Energy conservation, low-cost construction and maintenance

New airport construction will need to demonstrate innovative building and design elements to reduce costs and enable economical on-going maintenance. For example, the use of natural lighting, the reduction of floor level gap and the implementation of one-floor passenger processing are effective ways to conserve energy and to reduce maintenance costs.



Airport expansion works

Airport access

Highly efficient and useful means of airport access that exemplify airport functionality are necessary, and these must be strengthened and augmented as airport facilities expand. While it is important to evaluate specific access configurations based on interchange convenience and budgetary concerns, the desires of local residents must also be taken into consideration in planning airport access.

Airport development approaches

In light of projected increase in demand, airports are aiming to maximise the use of existing facilities by handling a greater number of aircraft and/or upgrading and lengthening runways.

When considering the construction of new airports, it is necessary to include their environmental impact in any economic feasibility evaluation. Airport authorities are striving for sound construction and operation to meet long term demand. It is important to plan for staged implementation of improvements proposed in airport access plans and airport development plans.

Airport project assessment must include financial soundness, organisational methods, national and community opinion, and financial support from the private sector, and should be carried out in a spirit of cooperation between the parties involved.

It seems that, as well as airport facility developments, a project approach must account for costs and impacts of site preparation. It should be remembered that costs associated with site preparation, particularly those on reclaimed land, are enormous and often do not attract any subsidy or income in the early stages.

2.3.7 Projects which respond to growth in traffic

In response to traffic growth, many airports have constructed new runways and terminals. For example, a new runway and terminal at both Madrid and Pusan, two new runways at Paris Roissy CDG, airport reconstruction at Tokyo-Haneda on land reclaimed from the sea, a second runway at Tokyo-Narita, a third at both Helsinki-Vantaa and Sydney, a fourth at Toronto, a new terminal at Zurich.

Other projects are planned in the short term: Jakarta (enlargement of the airport to 3000 hectares), Manchester (second runway), Melbourne (two new runways), Munich (second terminal), Rio-de Janeiro (third runway).

In many cities new airports are either proposed or under construction: Guangzhou, Nagoya, Omsk, Quito and Guayaquil. Tokyo proposes to consider the need for a third airport. The same applies to Paris. Sydney is proposing a new airport, but is having difficulties selecting a site. The previously preferred site (Badgerys Creek) is proving controversial as urban development has been encroaching; and options at regional centres (eg Goulburn, about 200km from Sydney) and even at Canberra have been mooted.

Many of these projects may be significantly delayed by the effects of the current global economic crises, previously unforeseen when the case studies were prepared.

TABLE 8: AIRPORT EMPLOYMENT DATA (1995 unless otherwise indicated)

	Total airport employees	Airport authority	Public services	Aviation companies	Traffic (mppa)	Employees per mppa	Airport area (hectares)	Employees per hectare
BARCELONA	4,900	26%	13%	60%	11.8	415	590	8.3
CASABLANCA	6,000		-		2.24	2,678	1,609	3.7
GLASGOW	4,650	12%	4.6 %	49 %	5.4	861	315	14.7
GOTHENBURG	-	-	-	-	-	-	-	-
GUANGZHOU	-	-	-	-	-	-	330	-
GUAYAQUIL	-	-	-	-	-	-	176	-
HELSINKI - <i>Vantaa</i>	8,500	8%			7.25	1,172	1,485	5.7
HONG KONG								
- <i>Kai Tak</i>							-	
- <i>Chek Lap Kok</i>							1,248	
JAKARTA	33,000	9%	6.7%	59.5 %	13.1	2,519	1,800	18.3
KUALA LUMPUR								
- SAAS	-	-	-	-	-	-	-	-
- <i>KLIA</i>	-	-	-	-	-	-	-	-
MADRID (1993)	9,000	8.3%	-	-	17.57	512	1,250	7.2
MANCHESTER (1993)	12,200	13%	-	30 %	13.38	912	600	20.3
MELBOURNE	10,000	-	-	-	12.2	820	2,353	4.25
MILAN (1994)								
- <i>Linate</i>	5,239	-	20.9%	-	10.13	517	360	14.5
- <i>Malpensa</i>	3,197	-	19.8%	-	3.68	868	1,220	2.6
MONTREAL								
- <i>Dorval</i>	13,200	1.5%	--	-	6.1	2,163	1,323	10.0
- <i>Mirabel</i>	5,200	3.8%	-	-	2.5	2,080	6,760	0.8
MOSCOW								
- <i>Sheremetievo</i>	-	-	-	-	-	-	800	-
- <i>Vnukovo (1994)</i>	14,000	-	-	-	2.36	5,932	980	14.2
- <i>Domodedovo</i>	-	-	-	-	-	-	1,600	-
MUNICH (1996)	16,000	22 %	-	-	15.7	1,020	1,500	10.7
NAGOYA								
- <i>Existing airport</i>	-	-	-	-	-	-	-	-
- <i>Chubu</i>	-	-	-	-	-	-	470	-
OMSK	-	-	-	-	-	-	622	-
PARIS Ile de France								
- <i>Orly (1996)</i>	29,262	13.3%	5.9%	54.4%	27.4	1,068	1,540	19
- <i>Roissy CDG (1996)</i>	49,463	7.5%	4.7%	47.8%	31.7	1,560	3,110	15.9
PUSAN	2,353	4%	13.3%	37.8%	8.57	274	506	4.6
QUITO	-	-	-	-	-	-	104	-
RIO DE JANEIRO								
- <i>Galeao</i>	22,800	-	-	-	6.07	3,756	1,860	12.2
- <i>Santos Dumont</i>	-	-	-	-	-	-	-	-
SYDNEY (1996)	20,000	1.7%	-	-	20	1,000	670	29.8
TOKYO								
- <i>Narita</i>	40,000	-	-	-	24.21	1,652	710	56.3
- <i>Haneda</i>	29,000	-	-	74%	45.82	633	1,100	26.36
TORONTO	49,500	-	-	-	20.55	2,408	1,795	27.5
WARSAW	2,000	-	-	-	2.73	732	833	2.4
ZURICH (1997)	17,195	3.5%	-	-	18.3	940	807	21.3

METROPOLIS - commission n° 1 - 1998 mppa - million passengers per annum

2.4 ECONOMIC AND FINANCIAL IMPACTS

All the cities participating in this study considered airport competitiveness to be an essential tool for their regional economies. Increasing globalisation of the economy allows cities to use their airports to access international networks and thus stimulate metropolitan growth. An airport can fulfil very diverse functions:

1. It is a point of distribution and transfer, facilitating the important flows of people and goods to the benefit of a region and its communities. For more remote, geographically isolated cities, it is critical to linking the city to the outside world.
2. It is an important gateway to a city's tourist attractions and a means of access to external markets.
3. It is a competitive factor in attracting increasingly mobile business activities and investment.
4. It gives a geographic focus to the aviation transport industry and development of related businesses.

For its region, the airport is a structural economic node and a focus for jobs and wealth. Its economic impact can be appreciated at different levels:

- as a powerful local economic node,
- as a tool for regional development, and
- as a node for metropolitan growth

2.4.1 The airport: a powerful local economic node

Employment on the airport

Airports are important economic nodes. At Paris-Roissy CDG more than 50,000 persons work at the airport. Melbourne Airport, representing a workforce of 10,000, is the largest employer in the north-west part of the metropolitan region.

These employment nodes have seen rapid growth, almost proportional to the growth in traffic. Each additional million passengers creates around 1,000 to 1,500 additional jobs in developed countries and even more in emerging or developing countries. Even where the traffic growth, productivity gains or saturation constraints have seen a drop in the number of additional jobs, airport nodes often appear amongst the principal employment creators in regional economies, particularly in low to medium qualification categories (goods handling, reception etc.). For the past ten years in Munich, since the construction of the airport and then with the jobs it generated, the unemployment rate in the region has consistently remained the lowest (2-3 points lower), not only in Bavaria but in Germany⁴. The same at Manchester, in 1994, where the unemployment rate for the airport sector was 25% lower than the national level.

⁴ This may be the reason for the local authorities' more positive attitude towards the airport.

In general, more than 50% of on-airport employment is provided by airlines, and a further 25% by services directly related with the functioning of the airport (airport authorities, public services). The rest are jobs in hotels, catering and retail services. Relatively few jobs are not directly related to aviation transport.

However, with a general fall in revenue from airport taxes, airport managing authorities are seeking sources of revenue by offering concessions for commercial activities (extensive boutique retailing at Tokyo-Haneda) or for service industry development (Munich Airport Centre comprising offices, retail outlets and conference facilities)

Factors which influence airport employment

The average employment on airports studied is about 1,500 employees per million passengers and the density of employment in the order of 15 employees per hectare.⁵ It should be noted that, as major international airports function around the clock, it is often necessary to have 3 or 4 employees per work station.

Each airport, with its background, location, importance and type of traffic, is unique. The number of employees depends on a complex set of interacting parameters that are not always easily identifiable. Airport authority staff can be either wholly or in part based at an airport. Airline companies can be based either at airports or have on-line links with flight crews and staff at the airport. Often industrial activities or important maintenance activities are located at the airport.

While it is usual for employment to be expressed in terms of number of employees per million passengers per annum, this does not allow for the often substantial employment attached to air freight⁶.

Despite the diversity of countries and airports and the difficulty in obtaining reliable, comparable data (eg. employment figures in the case studies varying between 274 employees per million passengers at Pusan and 5932 at Moscow-Vnukovo), it is possible to make some general observations. Employment figures for developed countries (Europe, Australia, Japan etc.) are in the range of 800 to 1,500 employees per mppa, with an average of 1,000. The figures are remarkably higher (more than 2,000 employees per mppa) in developing countries, and in Canada. Factors which influence airport employment include:

- **Airport traffic** - the number of employees per mppa tends to decrease with increasing airport traffic (Montreal-Dorval, 6.1 mppa, 2,163 employees per mppa; Paris Roissy-CDG, 31.7 mppa, 1,560 employees per mppa; Tokyo-Haneda, 45.8 mppa, 633 employees per mppa).
- **The type of traffic** - The number of employees per mppa increases with the importance of the international traffic component⁷ (Paris - Roissy CDG, 90% international traffic, 1,560 employees per mppa; Orly 33%, 1,068 employees; Tokyo-Narita, 97 %, 1,652 employees; and Haneda 2%, 633 employees).

⁵ Airports have become almost permanently, sites of important investment, adding many building and public work jobs.

⁶ In the case of Orly and of Charles de Gaulle an estimate would be 14 employees per 1,000 t of freight (1993).

⁷ In Europe, the removal of frontier barriers within the European Union, this notion changes: an important part of international traffic is becoming managed as if it were domestic traffic.

- Apart from international traffic, an airport which has a high level of **charter activity** has proportionately less employees ⁸.
- **Restricted airport site area** - On smaller airport sites, being either older airports close to the city centre or airports constructed recently on reclaimed land, only those functions essential to the airport are located on the site itself. Other functions linked to the airport are located outside the airport. For example, at Pusan, where the airport has an area of 506 ha, the number of employees is 274 per mppa; at Barcelona, 590 ha, 415 employees; and at Milan-Linate, 360 ha, 517 employees. These contrast with data for airports with large sites, such as Montreal- Mirabel, 6,760 ha, 2,080 employees per mppa, or Paris - Roissy CDG, 3,110 ha, 1,560 employees.
- **General productivity increases** - The decreasing number of employees per mppa as airports expand correspond not only to improved economies of scale, but increasingly to productivity gains, now essential across the aviation industry in a very competitive environment with relatively low fares. These are key elements in the employment chain. At Paris Roissy-CDG, the number of employees per mppa dropped from 2,320 in 1976 to 1,560 in 1996 as passenger volumes increased from 7.5 to 31.7 mppa over the same period.

During the last ten years productivity (expressed as the number of passengers per employee) has grown at about 3.4% a year at London-Heathrow, 2.2% at Paris-Orly, 1.8% at London-Gatwick, 1.1% at Paris-Roissy CDG. This indicates that growth is occurring most strongly at airports nearing saturation. The following table shows that productivity has quadrupled at Zurich Airport since 1960.

Table 9: Productivity improvement at Airports: ZURICH :

	1960	1970	1980	1990	1994
Traffic (mppa)	1.33	4.53	8	12.77	14.5
Employees per mppa (except for flight crew)	3,180	2,060	1,515	1,035	800
Airport authority employees per mppa	85	53	45	42	41
Productivity (passengers per employee)	314	485	660	966	1, 252

Source : Flughafen Zurich - Statistik 1994.

- **The age of the airport and its level of saturation.** Older airports which are slowly reaching their saturation levels no longer generate employment. Two examples are Tokyo-Haneda and Paris-Orly.

There appears to be a correlation between the level of saturation, productivity and average aircraft loading. A saturated airport (Haneda or Paris-Orly) out of necessity restricts movement numbers and accommodates larger and fuller aircraft. This translates to increased productivity not enjoyed by airports in the process of development (Paris Roissy-CDG or Tokyo-Narita for example).

⁸ London illustrates this point. Traffic at Heathrow is 86% international and 93 % at Gatwick. But Heathrow which has 0.2 % charter passengers has 1,100 employees per mppa and Gatwick, which has 45 % charter, has 960 (for overall traffic yet 2 times less than 'Heathrow).

	Paris - Roissy CDG	Paris - Orly	Tokyo - Narita	Tokyo - Haneda
Productivity (passengers per employee)	640	936	605	1580
Average loading	86	112	218	219

- **Diversification at an airport**

Where the land is readily available for diversification at an airport, provision has been made for tertiary or service industry, such as conference exhibition facilities. These activities represent diversification in budget terms, providing revenue not directly related to aviation. Examples of such diversification are: 50,000m² for the Frankfurt Airport Centre, 40,000m² and 60,000m² the for the “Triport” and World Trade Centre projects at Amsterdam-Schiphol and 100,000m² for Roissy-Pôle at Paris-Roissy CDG. These facilities are related to aviation transport with few employment opportunities outside this sector. Amongst the participating case studies, diversification projects include:

- Trade Centre project west of Milan-Malpensa Airport
- “Munich Airport Centre” (MAC) is being developed at the airport. With an area of 31,000 m², this multi-function communication and service centre, due to open in 1999, will provide offices, business and conference centres and create about 1,000 jobs.
- The terminals at Tokyo-Haneda Airport are really commercial centres, with employees linked directly to their employer (mostly retail outlets) rather than to the airport operator. The business just happens to be located at the airport.

Key employers

On any airport the key employers are the airline companies, often representing more than half of the workforce particularly if an airline is based at the airport: about 74% at Tokyo-Haneda, 70% at Zurich, 60% at Barcelona and Jakarta and about 50% at both airports in Paris. Case study data for airline employment are lower for airports where an airline is not based (Pusan, 37.8%; Manchester, 30%).

Such data represent diverse situations because not all the workforce is necessarily directly linked to airport activities. For example, it might be that an airline based at the airport also has its head offices there. At Paris-Roissy CDG nearly 10,000 employees comprise Air France flight crew and airport staff, of which 2,000 are head office staff recently relocated to the airport. On the other hand, the absence of an airline company based at the airport probably explains the relatively low employment ratios at regional airports like Milan-Linate (517 employees per mppa) or Barcelona (415).

Airport Authorities generally account for 7% to 13% airport site employees (7% to 9% at Paris-Roissy CDG, Helsinki, Madrid and Jakarta and 12% to 13% at Paris-Orly, Glasgow and Manchester). In regions with a single international airport, the majority of the airport authority workforce may be located at the airport, as at Munich where about 22% are airport authority employees. At Montreal-Dorval or Sydney, airport authority employees represent less than 2% of airport workforce.

Such extremes can be explained by the range of responsibilities undertaken by different airport authorities or the amount of contracted work undertaken on behalf of airport authorities. Responsibilities vary, particularly in relation to the more labour intensive

activities like baggage handling, refuelling and de-icing, runway maintenance, garden and landscaping and engineering design work, which are often contracted out, reducing the number of authority employees involved.

Public sector agencies and services such as air navigation, customs, immigration, police usually comprise 5% to 15% of employees: 4% to 7% at both Paris-Orly and Roissy CDG, at Glasgow and Jakarta; about 13% at Pusan and Barcelona and 20% for the airports in Milan

Other activities on average represent around 30% of the workforce: 23.5% at Orly, 38% at Charles-de-Gaulle, and an average of 29% for German airports. These activities include accommodation/catering/business which often employ 10% of total airport workforce. This is the case at Orly, Manchester, Munich and Zurich. At Paris Roissy-CDG it accounts for 15%.

Trends in Airport Employment⁹

Airport related development evolves differently according to the growth of different aviation transport markets and national economic characteristics. Despite the current economic difficulties, important developments in Asia, South America and Africa should be recognised.

In Europe or Australia, growth in the aviation industry is approaching gross national product (GNP), but, generally, employment growth on airports is proportionally weaker than that of aviation traffic. This reflects the issue, discussed previously, that economies of scale achieved with increasing aviation activity tend to be greater than growth in employment.

Increasing competition and deregulation are putting pressure on ticket price, the income base underpinning the whole aviation employment chain. Profit maintenance is increasingly subject to tight management and productivity gain scrutiny.

For **aviation companies**, which represent more than half airport employment, many costs are fixed (fuel, taxes etc.). Salaries, wages and, therefore, employment are areas of potential saving. Changing daily or seasonal traffic peaks has seen increased part-time or seasonal employment (eg cabin flight crew). Also, companies are tending to focus on their core business and to sub-contract certain services. Some sub-contractors, operating on particularly narrow margins, have failed to comply with contracts creating uncertainty for existing or potential employees.

Some **airport related activities** present on an airport, can be quite volatile. Aircraft maintenance, for example, can easily move away to cheaper sites. British Airways created such a specialist maintenance company at Cardiff rather than at London-Heathrow. On-board catering services can also be located away from airport sites. At Frankfurt, a new catering facility (400 employees) has been established 50km from the airport to service several large German airports (Frankfurt, Dusseldorf, Hamburg, Munich and Stuttgart).

For **airport concession businesses** (retail businesses, accommodation and catering) consumer spending is more variable than those activities linked to air tickets. A good commercial approach would therefore allow the market and thus employment to develop. In some places, local restrictive regulations concerning location or business operating hours (Germany, England) have favoured commercial centres developing on the airport where local restrictions may not apply.

⁹ Further analysis on this subject see "Flight path to prosperity?" Andrew & Bailey - SEEDS - February 1994.

At Tokyo-Haneda, the terminal is privately operated. It was conceived as a true commercial centre and the level of income from commercial activities will ensure its ongoing operation and development.

Duty-free shopping is a key commercial activity for airports. With the opening up of national frontiers the European Union hopes to abolish duty-free shopping for passengers on flights within and between its member States before 2002. This could lead to job and revenue losses and thus constitutes a difficult challenge for airport authorities and the retailing businesses. These activities usually account for about 10% of airport employees. They often raise more than a quarter of an airport authority's income. Many airport authorities are looking to further develop these business opportunities.

Clearly, airports will remain important regional employment nodes including opportunities for workers with low and medium qualification (handling, maintenance, accommodation, catering), even if productivity gains sought by the aviation industry result in fewer job numbers. In large metropolitan employment markets, particularly in developed countries the economy is very specialised and has become more demanding in the area of qualifications. Employment opportunities for the less qualified to work in airport related activities are of benefit to the region generally.

Employment linked to the construction and development of airports

Airports are almost permanent building sites. During the construction phase, then with its ongoing maintenance and development the airport is a strong source of employment for civil engineers and builders. There is little available data on this subject, but at Sydney, for example, it is estimated that construction of a new airport would provide work for between 8,400 and 9,500 building trade employees per year.

Areas in proximity to the airport

Ancillary airport activities out of necessity are found within a radius of 10 km of an airport. These activities require proximity to airports because they are functionally linked to aviation transport (air freight centres, in-flight catering, etc.), but cannot be accommodated on-site as at Orly or Sydney. Equally, other activities establish next to airport because of the nature of their products and/or services (eg. medical supplies, newspapers, hotel, conference and meeting facilities).

Airport environs are also attractive to very diverse activities which are independent of the airport, because of the airport location on main transport networks. This is particularly so when the airport is located on a metropolitan development axis. However, excessive development in the airport environs can increase saturation of roads and imperil access to the airport.

Activities near international airports

- **Activities directly related to aviation.**

When airport areas are limited, a number of airport and aviation related activities are forced to locate outside the airport boundary. At Helsinki-Vantaa, for example, the Finnair headquarters are located close to the airport.

- **Accommodation and basic consumer services**

These comprise small business activities, catering and accommodation. They are mainly located within the airport and their development is closely correlated to the level of aviation traffic. Nevertheless, they are also found on the periphery of airports where hotel precincts occur (for example, the village of Bajaras near Madrid Airport), and can serve markets other than air passenger traffic. An important part of hotel patronage in the vicinity of Paris-Roissy CDG is due to visitors to or exhibitors at the Parc des Expositions de Villepinte. Similarly, the Frankfurt airport commercial centre benefits from the unique operating hours (Saturday afternoon and nights) drawing on the entire metropolitan area, and at Helsinki, Vantaanportti, a commercial centre of 55,000 m², is under construction to the south of the airport.

- **Freight and distribution zones**

Lack of space has forced freight activities to the periphery of airports. This is so at Paris-Orly (the SILIC scheme) and at Frankfurt where a hundred air freight companies have located in the neighbouring town of Kelsterbach. Remarkably, the outward flow of freight had only a weak industrial impact locally. In the new “just in time” order most of the time large industrial clients shun those zones (for example, in Paris Ile-de-France, Renault’s after sales service, with four tonnes air freight daily, is based in the new town of Cergy-Pontoise and not near Roissy-CDG). Establishments close to the airport comprise transport agents, forwarding companies and a large number of small specialist service industries.

The globalisation of trade has progressively transformed production systems in large cities placing greater emphasis on broking and distribution activities. These have out of necessity located close to strategic land transport axes, which the airport has further reinforced (as in Frankfurt and Roissy). As a rule, airports are located in precincts that perform a strong strategic role. This is particularly so when the airport is located close to a port and together they form a major metropolitan intermodal complex, as at Tokyo-Haneda, Barcelona, Pusan and Sydney.

- **Training and commercial communication centres**

Activities in the surrounding zones usually are of a “face to face” character and include exhibition centres, training facilities, and conference centres. Some airports provide these activities on-site, but mostly they are located in activity zones outside the airport: the Parc des Expositions de Villepinte (near Paris-Roissy) with 164,000m² exhibition space, 1.3 million visitors; the “Juan Carlos I” exhibition park (at Madrid) with an area of 102,000m², 3km from the airport shortly to be linked to the city-airport metro line; and the National Exhibition Centre at Birmingham, not far from the airport with 2 million visitors.

The communication function can equally be present in enterprises located close to an airport. Thus the Hasbro company (US) is located in Stockley Park near London-Heathrow, and employs 240 persons in a permanent marketing, exhibition and conference centre.

- **Business parks**

Around international airports schemes for business parks exist which provide for an important proportion of higher level tertiary activities. In **Madrid**, “El campo de las naciones”, an up-market tertiary business activity precinct is headquarter to international companies and its services include congress, business, sporting and hotels facilities. In **Paris**, the Paris Nord II activity park close to Roissy, accommodates more than 400 companies (half of which are international) and employ 13,000 people. In **Helsinki**, the proposed Aviapolis Project will have a capacity of around 400,000m² for activities such as hotels and offices and other airport related uses. In **Warsaw**, the “Okecie Airport Economic Zone” is being developed and is expected to attract hi-tech activities, up-market offices, airport linked activities and strategic activities. In **Casablanca**, a hi-tech project on a 120 ha site close to the airport, is being considered.



Munich Airport Centre

Overall assessment of activities that have set up in areas surrounding airports enables the identification of two broad categories: activities that are directly linked to the functions of the airport (eg. freight) and those that stand to benefit most from close proximity to the airport (business parks, distribution centres, etc).

Management of areas surrounding airports

Authorities responsible for planning and economic development are usually very aware of the need to plan the areas surrounding airports and the activities which occur in those areas are largely dependent on management of the political process used by public agencies.

- In **Melbourne**, the airport is a powerful element in the economy. Areas around the airport have remained rural to the north and west. Areas to the east and south are occupied by urban development, including some residential areas, Essendon Airport (provides general and charter aviation, but its long term future is uncertain), the automobile industry, heavy industry, military sites, distribution, electronics, communication industries, paper and food processing. These zones are the result of a deliberate planning policy of the State and local planning authorities since the 1970s. The metropolitan strategy identified the key strategic Hume Industrial Corridor along the Hume Highway - the key national road linking Melbourne and Sydney.
- **Sydney Airport** is at the northern end of Botany Bay. Its surrounding zones include residential, commercial and industrial areas. Uses in the areas focus on financial, real estate and business services, military installations, distribution, manufacturing industry

(chemical and petroleum products in particular), printing and food processing. The Port of Botany, situated adjacent to the airport, is the busiest port in Australia (19 million tonnes in 1995 - 1,800 employees). The Central Industrial Area (CIA), to the north of the airport, is the key industrial area for Sydney. It services the needs of the port, airport (due to its limited site) and the CBD in the areas of transport, wholesale trade and office supplies. Even if manufacturing employment were to reduce, the area offers key redevelopment opportunities as more and more advanced technology and transport related industries locate in this area.

The City South Project, jointly undertaken by the Commonwealth, State of New South Wales and local Councils, focussed on the areas surrounding the airport. The study area comprises 41,000 habitants and 87,500 employees (of which 30,000 are linked to the airport and 10,000 to the Port of Botany). The study is expected to provide the blueprint for making the area one of Australia's key research and high technology precincts.

- In **Barcelona**, development of economic activity linked to the airport is favoured to consolidate the area's role as an employment node (based on existing key industrial and tertiary sector areas) and to allow to achieve a balance between the metropolitan area and the city centre (development of a multi-nodal structure).
- In **Glasgow**, the aim is to attract international activities into the area around the airport. The local authority, Renfrewshire Council, prepared a development plan for the areas around the airport in order to protect development possibilities as well as areas susceptible to accommodating induced development. One of the objectives is to minimise the possibility of real estate speculation which could prejudice airport development.
- In **Pusan**, planning in areas surrounding the airport is strictly controlled. The airport is surrounded by agricultural areas and the urban fringe is about 3km away, beyond the Nakdong River. The siting of the airport in a green belt limits urban growth and preserves open spaces. Because of the green belt, only activities directly linked to the airport can be developed. Other airport related activities, such as hotels, businesses or offices, are located beyond the Nakdong river, some 20 minutes from the airport. Urban development is managed by local government and is strictly regulated.

2.4.2 Impact on the wider metropolitan region

An international airport is an important factor in the attractiveness of a city and its economic effects can spread right across the region. It is the evidence of a fundamental economic advantage, even if, as with all major transport infrastructure, it is almost impossible to quantify the correlation between development of the facility and economic activity. Many attempts have been made to quantify these induced effects, ie. employment and financial flows generated by airport activity. It is estimated that for every job on the airport between 1-3 are created in the regional economy. In terms of financial benefits, the results are very diverse.

2.4.3 A tool for regional development

Many studies indicate that the existence of an airport greatly influences the location of a company. In some cases, the location effectively occurs in proximity to the airport and this is the case for a large number of research and development firms: distribution units, activity zones, business parks and, indeed, even new towns (for example, Hoofdoorp near Amsterdam-Schiphol). But it should be noted other factors such as proximity to the CBD,

good infrastructure network or buoyant economic and residential environments are also factors that influence such decisions.

The attractiveness of an airport and the surrounding areas to businesses, particularly for air freight activities, could be attributed to the fact that they act as a cross-road in the regional economy. The airport and easy access to its facilities play a key role in promoting and developing the region's economy. This is clearly so with the new airport development at Munich, to develop the north-eastern region and beyond the Munich-Deggendorf axis toward the Czech Republic. Similarly, investment in airport development served to revitalise the Eastern Corridor of the Greater London Region.

The boom at Roissy (Ile-de-France Region) could be attributed to the redevelopment of the problem-ridden northern suburbs and the peninsula to the north of Ile-de-France, from Cergy-Pontoise to Marne-la-Vallée new towns, and including the entire Paris Basin. In Kuala Lumpur, airport development had to incorporate a "multimedia super corridor" that include Putrajaya (a modern administrative city, characterised as "digital") and Cyberjaya (first "Intelligent" city of Malaysia), both situated about 20km from the airport.

However, a strategy to disseminate the airport's economic benefits to the entire region depends on many conditions:

- Control of research and technology development in and around the airport. This presupposes coordination of all development and implementation aspects between the key players, including task and resource sharing as well as financial responsibility (see approach adopted at Schiphol Airport).
- Ensure best possible access to the airport so that it can fully assume its role as a tool for the benefit of all regional enterprise (particularly avoiding "suffocating" the airport with excessive development which, although important, could threaten its accessibility at certain times).

2.4.4 Node for metropolitan growth

The presence of an international airport in a metropolitan region seems to be a fundamental economic advantage. But it is difficult to measure the impact and to compare various quantitative research results. They differ greatly in their objectives, their methodology, and the nature of the airport and their areas of influence.

In terms of employment, three categories are generally used: direct employment, which usually corresponds with on-airport employment; indirect employment, a notion which is slightly different depending on the different studies; and induced employment which is employment generated at the regional level by the multiplier effect, by both direct and indirect employment.

Direct employment often represents between 1%-2% of regional employment, but airports contributes to the creation of regional employment in higher proportions. For example, Charles-de-Gaulle in 1993 represented 0.8% of employment in the Ile-de-France region, but accounted for 7.6% regional employment growth between 1976 and 1993. According to the studies a multiplier coefficient of 2-4 is not unusual between direct employment and total employment (direct + indirect + induced). That is, for each job on an airport, between 1 and 3 others are generated in the regional economy (indirect + induced).

In terms of financial flows direct, indirect and induced impacts also appear. In the case of Ile-de-France, according to studies by Aéroports de Paris, the overall impact of the regional airport system was of the order of FF130 billion (1991, when regional GDP was FF2,000 billion). In other studies, the greatest reservations expressed concern the diversity of concepts used, and that we bring the estimated economic impacts (direct + indirect) back to either airport traffic or else employment. The values differ. Nevertheless, two studies prepared for airports of the Ile-de-France region and for Amsterdam-Schiphol ended up with very similar estimates of direct and indirect financial flows generated by those airports: FF800,000 per direct employee and FF1,400 per passenger.

- At **Barcelona**, airport activity generated a total of around 70,000 jobs in the whole region (4,900 direct, 45,000 indirect and 20,000 induced) 60% in tourism and catering. The overall economic impact of airport activity was estimated at US\$1.5 billion.
- In **Manchester**, studies on the economic impact of the airport were prepared in 1993/94 (York Consulting Limited) as part of the Second Runway Project. Employment generated by the airport was estimated in four categories:
 1. **Direct employment.** 19,100 employees (16,600 full time equivalent) were linked to the airport. 12,200 were located on site (13% airport authority and 30% airline companies), 6,900 were located off site within a radius of about 20 minutes of the airport. (The unemployment rate in this area is about 25% less than the national average).
 2. **Indirect employment.** 4,400 jobs, located generally across the region, in the construction industry and services dependent on airport activity.
 3. **Induced employment.** About 7,200 jobs were generated as a result of the incomes of direct and indirect employees.
 4. **“Spin off” activities.** The study estimated that for 15-25,000 other employees within a radius of one hour from the airport, the airport was an important location factor. Many of these jobs were as part of strategic functions of enterprises (head quarters, research). Amongst other spin offs, about 5,400 jobs were created in tourism owing to development of the airport.

In total, in 1993, the airport generated about £620 million in revenue (after tax) in the regional economy and was the generator of 53-64,000 jobs (46-55,000 full time equivalent), being about 3.5% of regional employment.

- In **Toronto**, the estimated number of jobs linked to the airport in 1994 was 96,500 (49,500 direct, 26,600 indirect and 20,400 induced), being about 4.2% of regional employment for Toronto. According to estimates until 2005, employment figures will exceed 160,600 (83,700 direct, 43,900 indirect and 33,000 induced).
- For **Sydney**, the economic impact of the airport has been the subject of many studies, most notably, for the Third Runway Project. According to the most recent of these prepared by the former Federal Airports Corporation, the airport annually injects AUD\$4 billion into the State economy of New South Wales. The Chamber of Commerce estimates that the

airport employees 33,000 persons directly (including employees off site) and 66,500 indirectly, contributing to the income of 14% of Sydney residents.

- For **Melbourne**, it is estimated that the airport contributes AUD\$1.2 billion to the Victorian State economy.

2.4.5 Factors which magnify the economic impact

It is the entire regional, indeed national, productive machinery which should be concerned with airport uses. Beyond being the means of moving people and goods, it has a prominent role in the life of the city. In the context of the global economy, airports are essential in attracting high level economic activities (eg multi-national head quarters, hi-tech and research centres, strategic and international industry) that are the subject of inter-city competition.

The importance of this metropolitan economic impact is linked to the quality of service delivered by the airport and its ability to act as an important “Hub”. The number of airports with the ability to provide high level services is limited by the presence of large aviation operators.

In order to fully develop these services airports should:

- be located in regions with undeniable economic development potential and demand;
- occupy a sphere of influence not over-shadowed by another similar facility;
- be able to expand in response to developing aviation traffic for at least the next ten years;
and
- at least in the case of Europe, develop as intermodal centres linking aircraft and high speed trains (although there is no sufficient data on this aspect, it seems to reinforce the main “Hub” role).

TABLE 10: CONTROL OF NOISE NUISANCE

	Curfew	Chapter 3 aircraft	Noise exposure plan	Noise and flight path monitoring systems	Insulation assistance in airport environs
BARCELONA	No	74%	Yes	Yes	No
CASABLANCA	No	40%	No	Currently being installed	-
GLASGOW	Yes <i>Chap 2 - 23:00 - 06:00</i>	55%	Yes	Yes	-
GOTHENBURG	-	-	-	-	-
GUANGZHOU	-	-	-	-	-
GUAYAQUIL	-	-	-	-	-
HELSINKI - <i>Vantaa</i>	No <i>Restricted night time flights</i>	-	Yes	Yes	-
HONG KONG					
- <i>Kai Tak</i>	-	-	-	-	-
- <i>Chek Lap Kok</i>	-	-	Yes	-	Yes
JAKARTA	No	-	-	-	-
KUALA LUMPUR					
- <i>SAAS</i>	-	-	-	-	-
- <i>KLIA</i>	-	-	-	-	-
MADRID	Yes <i>Chap 2 - 00:00 - 06:00</i>	80%	Yes	Yes (SIRMA)	Yes
MANCHESTER	Yes <i>Movement limitations.23:30 - 06:00</i>	85%	Yes	Yes <i>Penalties apply</i>	-
MELBOURNE	No	75%	Yes	Yes	-
MILAN					
- <i>Linate</i>	No	89%	Yes	Yes	-
- <i>Malpensa</i>	No	86%	Yes	Currently being installed	-
MONTREAL					
- <i>Dorval</i>	Yes <i>General 00:00 - 07:00 Chap 2 23:00 - 07:00</i>	-	Yes	Yes	-
- <i>Mirabel</i>	-	-	-	Yes	-
MOSCOW					
- <i>Sheremetievo</i>	-	-	-	-	-
- <i>Vnukovo</i>	-	-	-	-	-
- <i>Domodedovo</i>	-	-	-	-	-
MUNICH	Yes <i>General 00:00 - 05:00 Chap 2 22:00 - 06:00</i>	97%	Yes	Yes	Yes
NAGOYA					
- <i>Existing airport</i>	-	-	-	-	-
- <i>Chubu</i>	-	-	-	-	-
OMSK	-	-	-	-	-
PARIS Ile de France					
- <i>Orly</i>	Yes <i>General 23:15 - 06:30</i>		Yes	Yes (Sonate)	Yes
- <i>Roissy CDG</i>	Yes <i>Chap 2 23:15 - 06:00</i>	85% (1993)	Yes	Yes (Sonate)	Yes
PUSAN	Yes <i>23:00 - 06:00</i>	99.2%	-	-	-
QUITO	-	-	-	-	-
RIO DE JANEIRO					
- <i>Galeao</i>	No	67%	Yes	One-off measurements	-
- <i>Santos Dumont</i>	-	-	-	-	-
SYDNEY	Yes <i>23:00 - 06:00</i>	-	Yes	Yes	-
TOKYO					
- <i>Narita</i>	Yes <i>23:00 - 06:00</i>	-	-	-	-
- <i>Haneda</i>	No <i>After Runway C opens</i>	-	-	-	-
TORONTO	-	-	Yes	-	-
WARSAW	Yes <i>23:00 - 06:00</i>		Yes	Yes	-
ZURICH	Yes	-	Yes	Yes	-

2.5 CONTROL OF ENVIRONMENTAL IMPACTS

2.5.1 Noise

Progress on noise reduction

Noise and major environmental nuisances restrict airport development and constrain airport development close to metropolitan areas.

Increases in aircraft traffic lead to increased noise nuisance, which has been partly addressed through the upgrading of airline fleets using less noisy aircraft. International agreements under the auspices of the International Civil Aviation Organisation (ICAO) require the phasing out of older, noisier Chapter 2 aircraft by 2002 and replacement with newer complying “Chapter 3 aircraft”¹⁰.

Better management of flight paths, the use of preferential runways (PNR), take-off procedures addressing rapid ascent, increased engine power immediately after take-off and avoidance of urban zones are all operational noise abatement measures that assist in managing noise impacts. Aircraft noise during landing is very difficult to modify as landing procedures require a more gradual descent in very controlled approach flight paths. However, its impacts can also be managed by the aviation authorities by the use of preferred runways and flight path management.

Limiting noise impact and gaining the support of nearby residents are integral to the development of the airport which plays a vital role in the metropolitan economy.

Curfews

Late night noise is very distressing to the nearby residents. Increasingly curfews are being used at airports that are close to urban zones (about half the airports participating in this study). Some airports do not have night time curfews, but instead use a variety of restrictions, such as prohibiting Chapter 2 aircraft (Paris-Roissy, Madrid and Glasgow), limiting the number of flights (Manchester) and prohibiting the use of certain runways (Zurich). London has a maximum noise quota between 22:00 and 06:00. At Helsinki-Vantaa flights must comply with particular operational constraints.

Curfew hours vary according to function, season, aircraft category and type of traffic (passenger, freight). Airport licenses are designed to discourage night activity. The existence of a curfew is largely dependent on the airport siting within the metropolitan area and its distance from the city centre. For example, Sydney, located 8km from the city centre with high levels of residential development nearby, has a curfew, whilst Melbourne, 22km away from the CBD and having significant rural areas in its vicinity, does not. Barcelona Airport, only 10km from the city centre, does not have a curfew as its coastal location allows most aircraft to easily avoid urban zones during landing and take-off.

Cultural differences may also account for differences in approach to noise management. In Europe, curfews are more common in northern countries than in the south, but no curfew is imposed on the Milan-Linate Airport, which is only 7km from the city centre.

¹⁰ *But current technology has reached its limit in noise reduction. Reductions in engine thrust noise only highlight aerodynamic noise which is more difficult to control.*

Noise Exposure Forecasts

Noise exposure forecast plans have been prepared for most airports to guide authorities in prohibiting or restricting some land use activities (particularly residential). These plans sometimes incorporate special funding provisions for sound-proofing of existing development around the airport (Paris, Manchester, Munich, Madrid, Hong Kong - Chek Lap Kok).

The number of noise exposure zones varies, but mostly it is three. This is so with London-Heathrow, Manchester¹¹, Paris (IP78, 89 et 96), Zurich (45, 55 and 65 NNI¹²) and Helsinki (50-55 dB(A), 55-60 dB(A) and 60+ dB(A)). Melbourne and Sydney have five (20, 25, 30, 35 and 40 ANEF¹³) and Stockholm two (55 and 65 dB(A)).

Reducing ground level noise

Airport authorities are increasingly occupied with reducing ground level noise. They are responding by:

- limiting the impact of engine reverse thrust on landing
- regular Ground Running Noise testing of engines (at Melbourne)
- limiting or banning Auxiliary Power Units which are the main source of air and noise pollution. Instead aircraft on the ground are provided with power through the airport electricity supply.

In Manchester, a recently adopted regulatory measure to control ground level noise is part of a contractual agreement binding the airport, the County and the City. Zurich also has similar measures in place. In Melbourne, the airport has developed a policy which controls the hours for trial runs for engine testing.

Contractual or Regulatory obligations for limiting noise

The International Civil Aviation Organisation (ICAO) has developed a system for classifying aircraft based on their acoustic certification, and instituted a timetable for progressively removing Chapter 2 aircraft from circulation between now and 2002. Some airports, like Manchester Airport, have anticipated this timetable and at the Munich and Pusan airports, practically all the planes are Chapter 3 category.

In many cases, airport development is conditional upon limiting the noise impact. Airport authorities are now required to ensure that noise emissions do not exceed certain levels in spite of a 4-5% annual increase in traffic. Thus Aéroport de Paris must comply with a prescribed noise emission limit. Under an agreement drawn between the City of Manchester and the Cheshire County in 1994, Manchester Airport must ensure that noise levels do not go above those measured in 1992 at least until 2011. Compliance with this objective must be reviewed yearly.

Airport charges and taxes linked to noise

A number of airports have adopted a landing fee scale based on the type of aircraft, as a mechanism for their progressive removal and for compliance with statutory noise limits which are now being more universally accepted. Landing fees are also structured to discourage night time activity at the airport.

¹¹ In these airports the zone limits are 57, 66 and 72 Leq for day noise, 48, 57 and 66 for night noise.

¹² Noise Number Index

¹³ Australian Noise Exposure Forecast

To make airlines and pilots more responsible, a system of financial penalties has been developed as a disincentive fining both noisy aircraft and those pilots who do not observe flight paths. Some airports employ a specific noise levy system. Revenues obtained from this levy are used to fund sound-proofing of existing buildings in the nearby areas.

Monitoring systems

Monitoring systems ensure that aircraft comply with noise standards, flight paths and noise abatement procedures. Monitoring is crucial to maintaining good relations between the airport and abutting local communities.

Facilities are increasingly more sophisticated. They incorporate noise monitoring units (for example, 16 at Madrid, 12 at Sydney), radar and information on air safety (aircraft type and registration, use of runways etc). Monitoring systems in use include *Mantis* at Manchester, *NTK* at the London airports, *Fanomos* at Amsterdam-Schiphol and Zurich and *Sonate* at Paris. The existing systems, or those in the course of installation in most airports (at least in developed countries), are destined to become standard features.

Consultation, communication and managing complaints

The 'airport consultative committee' is a tool being used in a number of cities to establish communication between airport authorities, local municipalities and nearby residents (Zurich and Manchester). In Melbourne, a committee comprising representatives from the Commonwealth Government, the State of Victoria, local municipalities, airline companies and the civil aviation authority (Air Services Australia), meets every three months to consider aircraft noise issues. A similar committee exists in Sydney. In Paris, the State has decided to establish an independent commission which will be responsible for defining noise reduction policy objectives, and to oversee their implementation.

Airports are very involved in developing communication policies for liaison with nearby residential communities. Aéroport de Paris (ADF), the airport authority, has opened "environment houses" at the Roissy and Orly airports. Using the Sonate system (with its interactive display), the public can view the flight paths and can access information on aircraft noise levels, past and present. ADF also widely circulates a magazine, "*Entre voisins*" (Between Neighbours), outlining activities at the airports.

Many airports have set up services and specific procedures for managing complaints. Zurich and Manchester have established dedicated telephone lines for this purpose. The number of complaints varies and depends on the airport and the procedures for dealing with them. Sydney Airport received 32,000 noise complaints during 1995-96, whilst the Zurich Airport received about 300-400 complaints in the one year. In Manchester, 549 complaints from the same person were recorded over a one year period.

2.5.2 Other Environmental Policies

Environment Impact studies

All development works of airport infrastructure and new airport projects have been the subject of in-depth environment impact studies.

Environmental concerns were central to the development of the Chek Lap Kok Airport at **Hong Kong**. One of the priorities was the integration of the new airport within its surroundings, choosing a site with the least negative impact. The construction phase was subject to strict and constant environmental supervision. For contingency reasons associated with compensation policies, certain anticipated impacts of the airport were deliberately overestimated. To protect marine water quality all waste water generated by the airport will be recycled for irrigation purposes. Specific and innovative measures were undertaken during the construction phase to protect the indigenous Chinese white dolphin. As well, the Hong Kong government outlined very strict aviation noise levels and established a control mechanism to ensure compliance. A 25 NEF restriction is applicable in residential areas (ICAO recommends 30 NEF). The airport is also designed for lower energy consumption.



Measures for protecting the indigenous white dolphin

An impact study was undertaken in 1994 for the new **Kuala Lumpur Airport** (conceived in 1991 and opened in 1998), which examined noise, air and water pollution, waste water treatment, and other ecological and socio-economic issues. It recommended a number of measures for the airport construction, particularly landscaping and extensive tree planting around the airport, creating the concept of an “*airport in the forest*”.

The authorities at **Nagoya** are keen to ensure that the new airport (to be constructed on reclaimed land) is an exemplary model of sustainable development that is sensitive to the surrounding environment and marine activities. A number of studies are currently under way, mostly related to the airport impact on its environment. Weather conditions, air and water quality are continuously analysed. A monitoring station has been installed on the site of the future airport to take wind and tidal measurements. Analysis of fauna habitat, particularly migratory birds, is also being undertaken.

Research is being conducted regarding the airport’s impact on marine related activities including water characteristics (temperature, salinity, oxygenation necessary for marine life and plankton), tidal habitats and fish, shellfish and seaweed resources and harvesting (well known in Ise Bay).

Demonstration flights along the proposed runway alignments, close to Tokoname, give local populations an indication of expected noise levels.

Air pollution

Until now the focus was on reducing noise levels. But, increasingly, cities around the world are directing their attention to controlling air pollution and to developing specific policies for

this purpose. Improvement by the aviation industry and airports will be achieved partly through the upgrading of aircraft and partly through the implementation of policies related to ground activities, such as limiting use of auxiliary power units and encouraging use of electric vehicles.

Sydney, for example, adopted in 1994 an air quality management plan based on a two prong approach: monitoring the location and nature of emissions (type and level), and then developing a range of actions designed to reduce aviation and airport related pollutants.

Over-saturation at airports has become synonymous not only with delays and high costs, but with exacerbated levels of air pollution. British Airways has calculated the cost of airport congestion through its fuel consumption. The resulting delays and fuel overload account for more than 10% the company's total fuel consumption¹⁴.

Significant progress could be made towards air pollution control if, in improving public transport access to the airport, a reduction in car use can be achieved.

Policies developed by airports

Most airports now are guided by comprehensive policies designed to reduce nuisance and pollution and protect the environment. When implementing environmental management plans authorities should aim to meet accreditation criteria as in the internationally recognised *ISO Standard 14000*.

Manchester, for example, is guided by an exemplary environmental policy. The desire for sustainable development and for the control of nuisances was enshrined in a 1994 binding legal agreement between the relevant authorities, the Cheshire County Council and the City of Manchester. The official airport strategy "Towards a Better Environment" was prepared in 1990. The associated Environment Plan is reviewed regularly (last time in 1996) and deals with noise, air quality, energy consumption and waste issues which impact on neighbouring communities. As well as noise control measures, a wastes recycling policy is in place with a 15% waste reduction to be achieved by 2005 (the airport generates about 6,700 tonnes of wastes per annum). The airport authority invested £10 million in a drainage system to enable waste water treatment.

¹⁴ Source: Aéroport Magazine N° 289 - June 1998

TABLE 11: ACCESS TO AIRPORTS

	Private Vehicle	Taxi	Bus	Metropolitan Rail Network	National Rail Network	Car Parking Spaces	Proposed Rail
BARCELONA	41%	39.1%	12%	5.5%	-	4,500	Yes
CASABLANCA	90%	2%	4%	-	4%	3,000	-
GLASGOW	69 %	24%	5.5%	-	-	-	Yes
GOTHENBURG	-	-	-	-	-	-	Yes
GUANGZHOU	-	-	-	-	-	-	-
GUAYAQUIL	-	-	-	-	-	-	-
HELSINKI - <i>Vantaa</i>	34%	35%	31%	-	-	-	Yes
HONG KONG							
- <i>Kai Tak</i>	-	-	-	-	-	-	-
- <i>Chek Lap Kok</i>	-	-	-	-	-	-	-
JAKARTA	-	-	-	-	-	2,700	-
KUALA LUMPUR							
- SAAS	-	-	-	-	-	-	-
- <i>KLIA</i>	-	-	-	-	-	-	Yes
MADRID	27.8%	25%	47.2%	-	-	-	Yes
MANCHESTER	-	-	-	-	-	12,000	Yes
MELBOURNE						7,000	Yes
MILAN							
- <i>Linate</i>	-	-	-	-	-	-	-
- <i>Malpensa</i>	-	-	-	-	-	-	Yes
MONTREAL							
- <i>Dorval</i>	61%	29%	10%	-	-	3,340	-
- <i>Mirabel</i>	71%	7%	22%	-	-	4,100	-
MOSCOW							
- <i>Sheremetievo</i>	-	-	-	-	-	-	Yes
- <i>Vnukovo</i>	-	-	-	-	-	-	-
- <i>Domodedovo</i>	-	-	-	-	-	-	-
MUNICH	56%	9%	8%	27%	-	-	Yes
NAGOYA							
- <i>Existing airport</i>	-	-	-	-	-	-	-
- <i>Proposed Chubu Airport</i>	-	-	-	-	-	-	Yes
OMSK	-	-	-	-	-	-	-
PARIS Ile de France							
- Orly	46%	28%	14%	10%	-	17,643	-
- Roissy CDG	38%	31%	16%	15%	TGV - 1 mppa	12,375	-
PUSAN	34%	7%	59%	-	-	3,700	-
QUITO	-	-	-	-	-	-	-
RIO DE JANEIRO							
- <i>Galeao</i>	-	-	-	-	-	-	-
- <i>Santos Dumont</i>	-	-	-	-	-	-	-
SYDNEY	-	-	-	-	-	-	-
TOKYO							
- <i>Narita</i>	21% - including taxis	**	18%	54%	-	-	-
- <i>Haneda</i>	7.4%	5.8%	13.6%	70% - including national network	**	4,700	-
TORONTO	-	-	-	-	-	-	-
WARSAW	48%	27%	15%	-	-	-	-
ZURICH	44.4%	9.5%	3.8%	41% - including national network	**	-	-

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2.6 ACCESSIBILITY BY LAND BASED INFRASTRUCTURE

2.6.1 Airport access and transport mode choice of users

Airports are generally very well served by road infrastructure with the majority of users usually travelling by private vehicle, taxi or bus. Sometimes they are served by metropolitan rail transport (Paris, Manchester, Munich, Tokyo and Zurich) or by national rail networks (Casablanca, Paris (Train à Grande Vitesse) and Munich). But generally, public transport is not a popular means of travel to the airport. In Casablanca 90% of airport users (despite accessibility by train) travel by private car and about 70% at both Glasgow and Montreal-Mirabel. The low level of public transport usage is often due to the lack of direct rail services to the city centre or to competition with taxi and private vehicles when the airport is close to the city centre. In Paris, despite the appropriate metropolitan rail connections, bus services are used more to travel to the airport.

In **Tokyo** rail public transport is the most used mode to travel to the airport¹⁵. Tokyo-Haneda is served by 2 rail connections (to be extended to the new off-shore terminal developments), the Japan Rail-East monorail, used by 70.5% of airport users, and the private Keihin-Kyuko service (1.7%). The minimum travel time from Tokyo is about 22 minutes. 13.6% of travellers use numerous bus services and less than 15% use taxi or private vehicles to get to the airport.

At Tokyo-Narita, 54% of passengers travel to the airport by train (Narita Express, Japan Rail-East, serving Tokyo, Shinjuku, Yokohama, and the Keisei Skyliner to Tokyo-Ueno Station). 18% use bus services and 21% taxis or private vehicles.

In **Zurich**, public transport is very well patronised. Since 1980, the airport has been served by the national rail network and 41% of users use the service for access to the airport (1995). There are direct links to the centre of Zurich (one train each 10 minutes, one express every hour) and many other cities (intercity trains). It is possible to check airline baggage in at railway stations.

Airport employees tend to use public transport less than airport users, particularly in developed countries which have a high level of vehicle ownership. There are a number of reasons for this:

- The employees reside in areas with poor public transport access to the airport.
- The spread of employment locations on the airport itself, particularly on large sites, where employment activities (aircraft maintenance and associated activities) may be remote from the terminal areas or public transport access.
- Most airport employees work staggered hours (80% at Paris-Roissy) and shift work when the frequency of public transport services is often very low.
- Availability of parking facilities at the airport.

¹⁵ It must be remembered that, in Tokyo, the major urban motorways are subject to tolls.

Sometimes assistance is given to airport employee to access the airport. This is the case at Paris-Roissy, an airport with 550 businesses and a total workforce of 50,000. The “Allots Roissy”, an on demand minibus service, operates 24 hours a day all year round.

2.6.2 Good public transport access

In Europe, many airports are planning links to national and international rail networks, notably to very fast train services (eg. TGV), giving each mode complementary rather than competing roles and allowing them to seek a wider user catchment.

Because of frequent congestion on roads serving airports and growing concerns regarding atmospheric pollution authorities are being forced to either improve the existing level of rail services or develop new infrastructure where none previously existed:

- In **Barcelona**, the existing rail service is limited to a single track only and is used by 5% of air passengers, but it is to be improved. It is expected that the airport will link to the proposed high speed rail (TGV) network.
- In **Manchester**, most airport users travel by private car. By 2005, the objective is to reach 25% public transport utilisation. Improvement of public transport services to the airport (new bus station - Airport Metrolink train connection) is expected to cost in the order of £60 million.
- In **Melbourne**, a rail link is proposed between the airport and the city centre as well as links to the national rail network.
- A good rail service is essential for **Milan-Malpensa Airport** as it is remote from the metropolitan centre. There is commitment to a rail service between the airport and the centre of Milan. The link will be integrated into the regional rail service (FS) and requires the construction of a 7km branch line to the Ferrovie Nord Milano (FNM) line. It will connect on the “Passante Ferroviario”, an underground link currently being developed and allow interconnection with the FNM and FS. The new link will be able to be extended beyond the airport to join to the north-east with the FS line to Gallarate.
- The airport in **Madrid** will be served by the metropolitan rail network.
- In **Munich**, the airport is served by the regional underground rail service S8 (S-Bahn). A second link will be finished in 1999 (S1). It is expected that ultimately the airport will be linked directly to the national rail network rather than via the city centre.
- The airport in **Glasgow** is not served by a rail network. Bus services link the airport to the nearby Paisley Station or directly to the centre of Glasgow. In either case, the travel time to the city centre is about 20-25 minutes. The roads are often congested and a plan to upgrade public transport services is being prepared. It is expected that a link to the rail network, some 1.5 km to the south of the airport, would allow direct access to the centre of Glasgow (Airport Link). But this project has been complicated by the recent privatisation of the rail network.

- In **Helsinki**, the airport is not linked to the rail network. A rail link (Marja Line) to the main railway line (about 4 km to the east of airport) will hopefully be in place by 2010. The project is funded jointly by State Railways, the City of Vantaa and the airport authority (CAA). In the very long term a link to the Martinlaakso line (6km south-west of the airport) is also being planned.
- In **Pusan**, a light rail service to the airport is envisaged. At present, 60% of users travel to the airport by bus.
- In **Sydney**, airport access between the terminals and the city centre will be vastly improved by the development of the rail link (New Southern Railway), currently under construction.

Practically all new airport projects¹⁶ include provision for future rail links.

- At **Hong Kong**, the new airport is served by a new express rail link as well as new motorway.
- At **Guangzhou**, a special 30km long motorway will link the airport to national routes 105, 106 and 107, and a 23km long light rail will connect to Metro line 2 (feasibility study under way).



Tsing Ma Bridge, part of the Lantau Link

- In **Nagoya**, a basic service will be in place for the opening of the airport, with subsequent higher level services following in response to demand and regional development. Feasibility studies are now under way in liaison with the government, rail companies and relevant local authorities.

Clearly, the case studies demonstrate that the mere existence of often costly infrastructure does not guarantee its utilisation by airport users. In addition to airport location in the metropolitan area and congestion on access routes, there are other key factors that influence the levels of public transport use like fare price, quality and regularity of service, and the policies adopted to promote its use.

2.6.3 Intermodal developments

Airports as gateways to regions and countries are usually well situated on main road and rail networks, playing key roles as strategic transport nodes in the integration of regional economies. This is particularly true when the airport is also close to a port (Barcelona, Tokyo-Haneda, Sydney, Rio de Janeiro and Pusan¹⁷).

¹⁶ But in Jakarta, for example, only a motorway with tolls is foreseen at present.

¹⁷ The fifth ranked port in the world

For example, **Melbourne** is the freight hub for south-eastern Australia and while the majority of the AUD\$14 billion (by value) of exports pass through the Port of Melbourne, the airport is playing a growing role. It handles about a quarter (by value) of these exports. The State of Victoria has completed very proactive policies and strategies, “*Freightway Melbourne*” (1995) and, more recently, “*Transport Melbourne - Melbourne the Transport Network Hub*” (1998) to ensure national and international markets can be served by integrating freight delivery functions and locations for Melbourne (road, rail, sea, air, telecommunication and electronic communication networks).

In Europe, the integration of airport location with the very fast train networks (TGV at Paris-Roissy) allows the airport and the rail network to expand its area of influence.

2.7 CO-ORDINATION ACROSS AND WITHIN GOVERNMENT

The development and management of airports, the provision of associated infrastructure and the planning of surrounding areas involve many players, each with different interests. Coordination between these players is not always easy. Where central governments historically had a key role in developing airport infrastructure, they are now tending to pull back and allow the responsibility to be taken up by metropolitan authorities. Partnerships with the private sector are emerging to finance investment or provide management of the airports. For airport development to be accepted the expectations and interests of the local communities must be taken into account.

2.7.1 The role of national governments

Globally, national governments maintain a key responsibility for aviation policy and regulation extending from provision (and privatisation) of major airport and transport infrastructure to negotiating international airline access agreements.

National governments use their broad policy responsibilities to influence regional and metropolitan planning processes. In some countries this includes preparation of regional master plans (France¹⁸) or national framework plans (Spain). Elsewhere, the influence can be exercised in issues which can transcend the various levels of government, such as aircraft noise, road investment and the environment. Usually the higher levels of government resolve the broader policy issues (Australia, Indonesia).

In the case of all participating cities, the national government maintains responsibility for air traffic management¹⁹ and regulation of airport infrastructure development. In many cases, this extends also to management of existing airports²⁰ as in Barcelona, Casablanca, Guangzhou, Helsinki, Jakarta, Kuala Lumpur, Madrid, Paris, Pusan, Quito, Guayaquil, Rio-de-Janeiro, Sydney²¹ and Warsaw. Sometimes, a number of public authorities are jointly responsible, as

¹⁸ Although for Ile de France future regional master plans will be prepared at the regional level.

¹⁹ In Switzerland, air traffic control is undertaken by Swisscontrol, an autonomous national company charged with undertaking control for all of the Swiss Federation.

²⁰ Sometimes, as in the case of Helsinki or Paris, through public organisations which have total management autonomy and are able to finance their investments themselves.

²¹ As long as the problem of the third airport is not resolved.

in Munich where the German and Bavarian Governments and the City of Munich have formed a partnership. Similar arrangements apply at Moscow and Omsk. The airport at Zurich is owned and managed by the Canton. At Montreal and Toronto, the airports are managed by private non-profit companies representing many public and private organisations. Melbourne and Glasgow have privatised the management of their airports, whilst at Tokyo only the terminals have been privatised.

In countries with centralised governments, like France or Spain, national strategies for airport development are partly motivated by concerns to maintain the competitive edge of national airlines (Iberia at Madrid and Air France at Paris-Roissy). Regional or metropolitan authorities are not very involved in these processes. Decisions to favour a particular airport provide a challenge for those cities where the airlines are not based (eg. Barcelona).

In countries with a federal structure, on the other hand, regional authorities have a more important role in defining airport strategies (Germany, Australia, Canada and Switzerland).

2.7.2 Role of regional or metropolitan authorities

Generally, regional or metropolitan authorities fulfil many functions:

1. They act as sponsor, coordinator and decision maker for the numerous regional strategies which complement the role and function of the airport (employment, training, economic actions, tourism etc.). It is important that such policies, even if not well stated or explicit, have the active support of a regional authority. Indeed, the absence of political authority at this level can be a handicap, not only for the airport, but also for regional development.
2. They are usually responsible for land use planning and environmental policy.
3. They partly fund airport access networks, and sometimes also the airport infrastructure itself.
4. They provide the link between the national government and local communities. This is politically difficult as it involves balancing the needs and aspirations of the aviation industry, air transport, regional development and local communities.

Usually, airport land use planning is defined in the context of metropolitan planning policies and structure plans prepared by the central government (as is the case for Paris, and the existing “Schéma Directeur de l’Ile-de France”²²), by a Federal State (State of Victoria for Melbourne) or by authorities at the regional or metropolitan level (Glasgow, Madrid, Manchester, Guangzhou, Jakarta, Quito). The general directions in such documents are often refined planning strategies and planning controls prepared by local authorities²³, by airport authorities (airport master plans) or by a combination of both.

2.7.3 Examples of how responsibilities are shared

²² But the next will be prepared by the Region

²³ Notably, these documents can integrate regulatory constraints linked to noise zones where they exist

The administrative organisation and the hierarchy between different levels of government in the division of responsibilities varies from country to country. The case studies have provided several examples of the division of responsibilities applying in different cities.

Melbourne

Australia has three levels of government, Federal, State and local. The Commonwealth (Federal) Government's constitutional responsibilities include most aviation matters and major transport infrastructure. State Governments control land use planning and state infrastructure. Local (municipal) government is responsible for local roads and infrastructure. Aircraft noise, environment and road investments issues transcend the three levels of Government, although each level focuses on particular aspects.

In Melbourne and Victoria, generally, the role of integration and coordination occurs at within the Department of Infrastructure. The Department replaced 5-6 former government departments and agencies and enables the linking of infrastructure investment with land use planning and local government reforms.

Prior to the formation of the Department of Infrastructure and as far back as 1989 the Commonwealth, the State and local government bodies were collaborating with the then airport authority, Federal Airports Corporation, on the development and preparation of the “*Melbourne Airport Strategy*”. Upon completion, the Strategy and its associated Environmental Impact Statement were released for public and industry comment and review and were approved by the Commonwealth and State Governments in 1990.

By 1998 Melbourne Airport had a new Airport Master Plan which went beyond merely on-airport development, as has been the case with Master Plans elsewhere. The collaborative effort between Commonwealth, State and local government, the airport and its users, and the local community has resulted in provisions inserted into relevant planning schemes which help implement the Airport Master Plan and minimise the effect of the airport’s operations on the area surrounding the airport.

The municipalities most affected by Melbourne Airport (the Cities of Brimbank and Hume) have developed strategies and planning controls which recognise both the airport’s impact and the benefits for their communities: the councils take into account the approved Australian Noise Exposure Forecast when considering development proposals in the airport environs, but at the same time they work collaboratively with the airport to ensure on-going benefit to their communities.

In October 1998, the State Government of Victoria introduced legislation, with the support of Opposition parties, to enable the preparation of a Melbourne Airport Environs Strategy Plan. The Strategy Plan will not only deal with the restrictions which may be necessary in the affected area, but also look at opportunities to assist landowners in appropriate development of their property.

Sydney

A changing political situation has resulted in different levels of cooperation. Whilst there was good cooperation between the federal and state governments during the of the third Runway EIS and construction process, local government was excluded. Consequently, the

construction of the third runway became political particularly when noise predictions proved to have been vastly underestimated.

Similarly, there was initial good cooperation between the three levels of government when considering plans for a second airport for Sydney. The three levels of government had addressed land use planning, road and rail access and conflicting land use. But in 1996, following federal government elections the new government somewhat unilaterally changed the criteria for air traffic management at Sydney Airport.

Cooperation worked well when there were common goals, such as improving development in Sydney's west and protecting land. Difficulties arose when one party changed important key criteria.

Permissible land uses are usually expressed in municipal Local Environment Plans (LEP), and in sometimes in the State's Regional Environment Plan. The areas around the existing airport are the subject of a specific project, "City South Project", which aims to attract investment in a new centre for research and technology enterprises. The project is being undertaken in partnership with the Commonwealth, the State of New South Wales and local councils. The study area contains 41,000 inhabitants and 87,500 employees (of which 30,000 are linked to the airport and 10,000 to the Port of Botany).

Jakarta

With the three levels of government influencing the planning process, linkages and references are always upwards with the higher level resolving the broader issues. Local government prepares the "Special Plans" which assess land priority in terms of physical characteristics, support of the development sector and maximising production. Consistency and commitment to the plan process are very important. Difficulties arise when representatives change, or when lack of commitment to the whole process causes tensions. Final acceptance depends on the ability to compromise and to involve all key players (eg. Ministries of Finance, Transport, Public Works and Agrarian Affairs).

Land acquisition processes have often been very contentious, requiring consensus between owner and acquiring authority. Local Government has had a key role in the consensus process balancing the need for development and community cultural values.

Tokyo and Osaka

In Japan, the location and the scale of airport infrastructure is decided by the national government. The national government promotes the development of large scale airports and local government those of small scale airports. The airport development plan follows a five year plan policy. Related projects, like road and rail networks, are progressed at the same time. In these cases, the national government considers local government requirements when making decisions.

In large scale airport development, local government acts as a mediator between the national government and local residents.

Kansai International airport in Osaka is an example of a successful process of coordination between the national government and local government. The former Osaka Airport was an inner urban location and not suited for expansion due to noise pollution. The national

government and local government worked together to address the increase in air traffic. As a result, a new national policy requires that new airports be built on reclaimed, offshore land to minimise aircraft impacts - a new site was selected 5km offshore.

A private company was established and contracted to develop and manage the airport. The total cost of development is amount to 1.5 trillion yen, 30% of which was raised by the national government, local government and the private sector as an investment. The balance, 70%, was appropriated as a debt. It is forecast to give an economic return for the total cost in 30 years.

In addition to Haneda and Narita Airports, it is anticipated a third airport for Tokyo will be required. In accordance with a national direction, an investigation into off-shore sites will be undertaken.

Paris

There are four levels of government in France: the national, regional, sub-regional, and municipal. Paris is located in Île de France Region, which comprises eight sub-regions.

The national government retains responsibilities which concern airports. To date, regional structure plans (“Schémas Directeurs Régionaux”) have been prepared by the national government²⁴, but future ones will be prepared by the regional government (Conseil Régional) in consultation with the national government. The financing of major regional development projects and infrastructure is subject to a “Plan Contract” signed each four years between the national and regional governments. It includes, for example, financing arrangement for improved airport access infrastructure.



There are also lower level town planning documents: local structure plans, prepared by groupings of municipalities, and land use plans (“Plans d’occupation des sols”), which are prepared at the municipal level. One of the difficulties in planning the airports’ surrounding areas is due to the fact that they straddle several sub-regions (two around Orly, three around Roissy-CDG) and they affect numerous municipalities. In the case of Roissy, the national government has created a special committee (“Roissy Mission”) to coordinate planning in the area.

²⁴ The last plan dates from 1994

Barcelona

In Spain, airport activities are coordinated by a single national body based in Madrid, but increasingly local authorities are seeking greater involvement, similar to their role with respect to ports.

Large scale strategic planning is the responsibility of central government, whilst the regional government (State of Catalonia) is responsible for the development of urban configuration, within a national framework. The three levels of administration and community representation (National, State, City) agree on a logistic metropolitan master plan model which meets the objectives of the city, the region and the nation in terms of spatial infrastructure, including airport, port, road and high speed railway (new). High level infrastructure (airport, port, rail and highway) development is a State responsibility, but construction is undertaken by private enterprise. Funding of infrastructure development is from either private or joint public/private sources.

Co-operation between different levels of government and institutions has seen the signing of an agreement for construction of the third runway at the airport²⁵.



Port at Barcelona

²⁵ Agreement signed between the mayors of Barcelona and 'El Prat', the President of Catalonia and the Spanish Minister of Public Works



Integration of airport and port facilities at Barcelona

2.8 WORKING WITH LOCAL COMMUNITIES

The construction of a new airport or further development of an existing airport invariably are met with resistance from local communities. In some cases, protracted and complex consultation proceedings may lead to direct confrontation, as was the case with construction of the third runway at Frankfurt Airport.

In Tokyo, the national government started to investigate the construction of a second airport in 1962. The site at Narita was selected in 1966. The local community strongly opposed the decision and sometimes violently. Nevertheless, after compulsory acquisition, the first stage of construction was completed and the airport opened in 1978. Protests against the airport continued. In 1988, it became evident that the airport would not be able to satisfy demand and the second stage of the plan (construction of Terminal 2) should be developed (opening 1992). In 1990, the opposing groups met at a symposium on the airport to debate the problems. Discussions continued in 1993, and in 1995 the “regional Co-existence Committee” was created. The farming groups withdrew their blanket opposition to the sale of agricultural land, and the search for a common understanding between the community and development of the airport could move forward on this new basis.

This is a good example of how authorities try to move from confrontation, legal impositions towards consultation and partnership. Airports are more and more open to their human, social and economic environment. That is the case at Paris, for example, where the airport authority developed numerous actions with local communities and economic groups, as well as an important communication policy aimed at neighbouring communities. In Jakarta, the airport authority has involved itself heavily in cultural, social and economic activities to the benefit of the airport’s neighbouring communities.

It is important that neighbouring communities are aware of the positive impact of the airport. Economic benefits such as employment generation may encourage residents to feel that they have a direct interest in the development of airport activities, and not perceive it only as a source of nuisance.

What actually happened around Orly Airport, near Paris, is an interesting example. As a result of pressure from neighbouring communities the government limited air traffic activity to 250,000 movements a year. In addition, the national government wished to limit the number of long-haul international flights at Orly. In 1997, the airport began to lose traffic. Relocation of Air France employees from Orly to Roissy-CDG is envisaged, as well as the airline's freight activities. The reduction of activity at Orly has caused local communities action to ensure airport activity, a key element for their local regional economy, is maintained. There are opportunities to promote synergies between air freight activity and a nearby major food produce market (Les Halles de Rungis) and university courses linked to aviation and transport.

3. ISSUES FOR METROPOLITAN DEVELOPMENT

3.1 THE CITY AND THE AIRPORT IN THE GLOBAL CONTEXT

3.1.1 Cities in the Global context

The globalisation of the world economy and rapid growth in communications, air transport and services has shifted the focus of competition. What was previously competition between countries is now competition between cities. Increasingly, it is cities with effective and well-integrated infrastructure that will be able to secure investment and sustain and enhance local economic activity.

The 19th Century metropolis was structured as a giant mechanism to serve the needs of its nation state. The city evolved as a national gateway, a centre for communications, culture and commerce. Access by sea was a critical economic advantage and inland cities required rail access. Now the picture has changed.

Cities have evolved to take on the form of a single system. While every city once had its own railway terminus, newspapers, opera house and stock exchange, today these functions have become very concentrated, often in separate cities - even defining the character of those cities.

The rush from the countryside that was experienced by European cities in the 19th Century is seeing its 20th Century reflection in the cities of the developing world. The urban growth occurring in metropolitan centres of China, Indonesia and Thailand will be definitive of the cities of the 21st Century, cities with a truly international focus.

How do cities compare their performance?

The participating cities have recognised that they need to position themselves in ways to be able to offer unique advantages to investors and economic development.

In **Melbourne**, the State Government of Victoria and the City of Melbourne produced two reports²⁶ designed to assist in evaluating the performance of the city in terms of its competitiveness and liveability relative to successful and competing cities. The evaluation helps to highlight those things that a city does well and areas where improvement is needed. The process can identify not only areas where initiatives are required, but also successful cities from whose policies, programs and institutions lessons can be drawn and adapted.

Melbourne's performance over time was compared with other Australian and overseas metropolises, including Hong Kong, Kuala Lumpur and Jakarta.

The indicators covered a range of matters including:

- employment costs for executive, professional and process workers
- communications costs for telephone calls and lease of fibre circuit international data lines
- frequency of international passenger airline flights, travel time between city and the airport and air freight prices
- hotel room rates

²⁶ State Government of Victoria, *Advantage Melbourne*, June 1997
City of Melbourne, *Benchmarking Melbourne: Urban Indicators*, July 1998

- cost of industrial and commercial land and floor space
- timing and costs of construction
- travel time for international container traffic, cost of sea freight and port efficiency
- provision and cost of services such as electricity, industrial gas, water, waste disposal, solid waste disposal.

3.1.2 Role of the airport

Airports, as national gateways, are fundamental to the participation of cities and regions in the global economy. They play a major role in export oriented economies through freight and business transport and for multinational businesses. They are essential to tourism, particularly in countries such as Australia, an island continent, which are principally accessible only by air.

In recent times, there has been a change in the way airports measure their performance and position themselves in the wider global aviation networks. The focus has changed from the quantitative measure of number of passengers or tonnes of freight to a qualitative assessment of achieving a world standard of service delivery.

The airport has had to identify and build on its role in the aviation network, whether it be as a key global hub or a “boutique” style airport positioning itself to meet specific markets.

Airport and aviation networks

Almost without exception, case studies have recognised the role of the airport in the global competitiveness of their respective regions and of the cities to their nation. Key roles included:

- key regional freight and business centre (Melbourne ²⁷, Toronto)
- national political hub (Tokyo, Pusan)
- precinct for high technology and research (Nagoya, Munich, Kuala Lumpur)
- part of an integrated transport hub (Guangzhou)
- nucleus for a larger infrastructure investment programme (Hong Kong)
- tourism gateway (Jakarta, Omsk, Kuala Lumpur for 16th Commonwealth Games)
- catalyst for economic rejuvenation (Manchester).

Cities have a powerful economic interest in linking themselves into the worldwide airport networks. Cities like **Manchester** have found that no modern regional economy can play a full part at European or global level without an airport of appropriate stature.

The role of airports in isolated areas with low population is different again, providing important communication links. In the case of the relatively isolated **Omsk**, the airport is seen as critical to its international and national connections.

Many airports are looking to become a key network “gateway” at a continental level (London, Paris, Frankfurt, Amsterdam for Europe), within a region beyond international boundaries

²⁷ Melbourne is the key freight hub for south eastern Australia. It exports \$14 billion worth of goods annually and approximately a quarter by value leave from Melbourne Airport.

(for example Barcelona for the western Mediterranean) or at a national level. Both Osaka and Tokyo, as well as Melbourne and Sydney seem to be capable of acting as complementary gateways.

Core Business

A new trend in the management of airports is emerging. Just how those airports view the services they provide is changing the definition of "Airport Core Business".

The traditional view of airport core business would have been "servicing aircraft and facilitating the movement of passengers (or freight) through terminals". All other services (eg. retail, car rentals), whilst of benefit to passengers, were not considered, strictly speaking, to be core business, but, rather, ancillary activities.

With privatisation, many airports have become concerned with making a profitable return on their investment. Airports, keen to attract more flights, find themselves in a position needing to be competitive, not only with cost effective facilities and services that they provide to airlines, but also with the range of facilities they provide to the passengers and visitors. Consequently, retail facilities, restaurants and entertainment are seen as absolutely essential to the health of the airport. So it seems the traditional distinction between core business and ancillary services is becoming less defined.

A new definition of core business will need to emerge. In examining this issue, the commission started with the following definition:

"A very efficient intermodal transport hub".

We have already seen that the definition of an "airport" is blurring both in a spatial and a business sense. The core business at an airport is really service delivery - whether it is an airline or a freight forwarder. As airports become increasingly privatised or expected to operate as a business, it would be interesting to see some economic analyses of the likely mix of revenue generation. This may indeed show that the aviation transport component could deliver only 20% of gross revenue as opposed to 80% from retail, property and other business.

If this is the case, then the emphasis of core business will certainly move away from being an intermodal transport hub. The idea of community integration may indeed be a reality in 15-20 years time where an airport is visited more often for reasons other than travel or cargo movement. An intermodal transport network will become a key attribute which assists integration with the airport's community, both local and regional.

Key airports make a significant contribution to the economic health of their city and/or region. As well, they can affect the physical environment as a result of being the destination and origin of physical movements and potential generators of noise and air pollution in their own right. It therefore seems that the definition should be augmented by a statement to the effect that the airport "adds net value to the prosperity and sustainable development of the airport, its host city, local community and region."

Optimising airport infrastructure investment

We have seen that to minimise investment costs, it is important to make best use of the existing capacity and improve the effective use of airports.

To undertake airport extensions or, when necessary, the development of a new airport, it is necessary to have a flexible programme which is able to be adapted and staged according to changing circumstances.

To avoid over-investment, it is increasingly necessary to move away from considering nearby airports as competitors, and viewing them as complementary within the network²⁸. There are cases of large Western European airports (London, Paris, Frankfurt, Amsterdam) which are often congested and are located at a relatively short distance from a potentially complementary airport. On the Pearl River delta, in China, several key airport investments have occurred or are being developed in close proximity (Hong Kong, Macau, Zhuhai, Shenzhen, Guangzhou²⁹). This level of investment in so many projects may lead to an over-supply of capacity.

One way to reduce the pressure on large airports and to avoid over-investment is to unload some capacity to alternative, secondary airports which are able to accommodate, for example, charter flights or “no frills” companies. Developing use of the high speed rail network for short distances, especially if it were a very fast train, could provide effective competition to short-haul flights and free up demand on the number of slots in any hour.

For best consultation between airports and cities

Generally, issues such as growing airline alliances and the desire by national governments to protect their own objectives are forcing airports and cities to work together in addressing their common interests. Cities and airports need to develop a clear understanding of their objectives and the opportunities that may be attractive to potential airlines. The number of airports having significant development potential is not large. Therefore, cities and airports will need to collaborate to offer the range of facilities demanded by airlines.

3.2 THE AIRPORT AS A TOOL FOR ECONOMIC DEVELOPMENT

3.2.1 To establish the role of the airport in integrating its city with the changing global economy.

Impact on the regional production base

All participants believe that their airports provide a significant economic contribution to their cities and regions. The airport is seen as the nucleus for attracting growth and infrastructure investment, strengthening the metropolitan area and enhancing the city's global competitiveness. It links regions to the world rather than just to other parts of the country. The airport is the national and international gateway for tourism and commerce to key strategic nodes (including the city centre) within a region.

The economic flow-on effect in terms of jobs has been explored and most case studies identified and provided details of the economic impact in terms of wages and spending power in the community.

²⁸ The current establishment of broad alliances between companies can favour this change

²⁹ This particularly poses the problem for positioning the future airport at Guangzhou compared with Hong Kong, as the existing airport has overall a domestic role.

It is the entire regional (indeed, national) production base, in its many varied ways which can be concerned with the airport. Beyond the movement of people and goods, the airport becomes the symbol of a city's influence. In the context of economic globalisation, its presence is necessary for the location of higher level economic functions and activities that cities compete for, such as headquarters, decision centres, strategic functions and international activities.

The airport and its metropolitan economic impact

The importance of metropolitan economic impact is linked to the quality of service provided by the airport and its ability to act as a hub. Globally, the number of "key hub" airports is limited and they have the tendency to consolidate the role by the presence of several key airlines.

To be a "key hub" an airport ought to have:

- a geographic location in a region with an indisputable economic development potential and sufficient demand.
- a capacity for external influence unequalled by a competing airport
- a physical capacity for expansion over the next ten years at least to meet aviation traffic demand.
- intermodal links between plane and high speed train as in Europe.³⁰

Increasing globalisation will see an increase in Hub airports and competition between airports is now common in Europe and Asia (eg. Hong Kong, Singapore, Kuala Lumpur and Guangzhou).

The "hub airport" function in Asia is seen as important to serve passenger and cargo services. (eg. Hong Kong, Singapore, Kuala Lumpur and Guangzhou). Such airports grow by strengthening those hub functions, as Singapore is trying to do, and this inevitably leads to city growth.

The increasing importance of Hub airports will determine the role, size and development process of any new airports. Careful attention will need to be given to assessment of airport development projects and their cost effectiveness.

When airports become congested, it can be difficult balancing the role of hub, which takes up arrival and departure slots for short and medium distance flights³¹, and the handling of long distance international flights which benefit the regional economy.

Airport growth - constraints and opportunities for city development.

While city growth and airport growth are linked, one is not a pre-condition for the other.

Sometimes an airport cannot grow because it is constrained by the city's development.

Osaka's inland airport was originally in a rural area remote from the city, but urban development encroached upon the airport. The impact of noise became such an important an

³⁰ Although there is insufficient data on the real impact, it would seem to reinforce the position of key hub.

³¹ In the case of large Western European airport, often at the limit of saturation, it is interesting that a part of the feeder journeys around the hub are made by high speed train which is competing with the plane, in travel time, for journeys of several hundred kilometres.

issue it was not possible to increase the number of services despite demand. Osaka felt that its economic development would fall behind Tokyo as a result. This was the trigger for the new Kansai International Airport, to be constructed on reclaimed land.

For airports to grow there must be a demand for increased flights, therefore airports must address the requirements of airlines, of central government strategy and of city planning strategy. Milan is planning to link its future development with the airport development. While it is the third largest city economically, its airport is 11th or 12th in Europe. This is a dampener on economic growth.

In Guangzhou, the central location of the existing airport restricts future development of the whole city. This needed to be resolved. The needs of development in surrounding areas led to the shift to a new airport site. The new Guangzhou airport provides advantages for developing all of the city. The City's growth strategy addresses amenity for residents in the vicinity of the new airport; and the existing airport site, being close to the CBD, allows opportunities for commercial development associated with the city centre.

It seems that the relationship between the airport growth and city growth may vary according to the "hub" or "final destination" role of the airport. A "hub" airport is convenient for airlines. However, cities would prefer their airports to be "final destinations" for long haul flights. In hub airports, the number of slots available may have a high proportion of short haul flights.

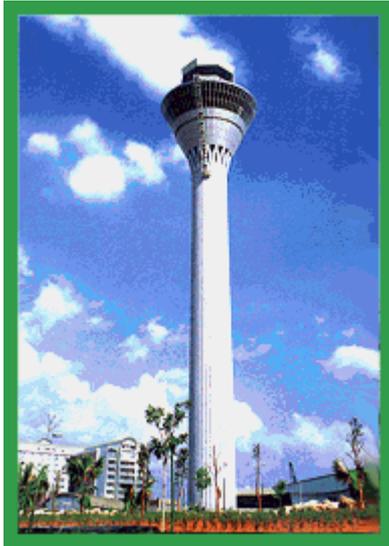
While airlines prefer hubs, for local communities long haul services would be preferable, if there is to be an economic benefit. In Europe, many airports are close to saturation. Many cities would prefer increased use of high speed railway (eg. France's TGV) rather than use up the slots for trips between 800-1,000 kilometres.

Nevertheless, it should be remembered that the "hub" or "final destination" role for an airport may apply differently at different levels in the aviation network. Melbourne may be a "final destination" at the international level, but it also considers itself a "hub" for south-eastern Australia.

It is said that once an airport reaches capacity a new one will be planned. However, it is important that the airport should not impede the growth of the city. The trigger for a new airport should lead to co-ordination and consultation with residents and the city. It is difficult to say which is the "chicken" and which is the "egg".

3.2.2 To define the qualities of an airport as a landmark for its metropolis

The airport has become the modern city national gateway - the seaport or railway terminal of the 20th Century. The economic health of a city is measured, in part, by the number of flights its airport attracts and its links with the airport. Civic prestige can be measured by the architectural splendour of the airport itself - just as the railway station was. The airport's gateway role is seen as needing to reflect the cultural values of the city (eg. Kuala Lumpur's "airport in the forest").



The new Kuala Lumpur Airport

These vital components of modern cities combine employment and economic and political influence. They seem to change as fast as the city itself. They are vital to a city's economic and urban armoury.

While many airports tend to have a fairly drab and utilitarian appearance, there are some which make a very strong architectural statement. The late 1950's saw the spectacular work of Eero Saarinen (Washington-Dulles Airport and TWA terminal at New York-JFK Airport). Other airports have provided much excellent architecture. Most recently, these have included Hong Kong-Chep Lap Kok (Norman Foster, terminal architect), Osaka-Kansai (Paul Andreu, terminal concept and Renzo Piano, architect) and the latest terminal (CDG 2 F) at Paris - Roissy CDG (Paul Andreu, architect).

Some cities (Jakarta or Casablanca for example) believe their airports should reflect the cultural and architectural values of their countries.

When Melbourne Airport sought to develop a logo which would encapsulate its corporate image, it undertook analysis across a range of stakeholders from airport staff, business, airlines, passengers and "meeter and greeter" visitors. These stakeholders consistently identified four key roles for the airport, namely, being a "Gateway", "family friendly", "business friendly" and "tourist friendly". It is probably the case that these roles are generic for most international airports, but some interesting observations can be made.

We have already noted that airport business is shifting from a purely aviation focus to one that incorporates a wider sense of "service delivery". It seems also that perceptions of an airport are focussing less on the traditional measures of being able to deal with large volumes of traffic and more on the qualities of being successful and professional in the conduct of its organisation, business and of providing efficient, clean, comfortable and quality services and facilities.

Values often expressed in corporate visions of being "modern" and "international" were considered to be "givens" - perceived baseline expectations of a major airport at any major city in an industrialised country. It could be that if an airport were to start marketing these

attributes, key stakeholders would start to question the presumptions that the airport was both international and modern, possibly leading them and others to question other attributes.

In the absence of any unique characteristic or combination of characteristics that could be pinpointed as defining the character of the airport itself, it seems that perceptions will then focus on those qualities which reflect the stakeholders' pride in and good perceptions of the city. Terms such as "refined", "quality", "successful" and "cosmopolitan" were associated with a number of key qualities which seemed to represent different facets of Melbourne and, hence, Melbourne Airport.

It is interesting to note the perceptions of Melbourne Airport itself, such as being "casually elegant", "sophisticated", "fun, vibrant, yet restrained" and "individual" were seen as very positive and user-friendly. This might suggest that a city or an airport exuding overbearing qualities such as "dominance", "rigidity", "authority", "competition" or "aggression" might be at a distinct disadvantage.

3.2.3 The airport as a catalyst for the local economy.

City authorities are now recognising:

- the need for expansion in communication infrastructure and integration with wider regional interests, such as the European Union.
- the need to reach consensus on a strategic/integrated approach to airport and metropolitan development.
- the importance of the airport as an industrial strategic centre, for tourism and to local government.
- the need to involve private businesses and other stakeholders in consultation.

Increasing globalisation has forced cities to become more international in their outlook. Accordingly, there was a need for cultural change within city administrations to allow for this broader perspective. The combined infrastructure projects in Barcelona should strengthen the economic competitiveness of its region, as well as links to Europe, especially the high speed railway. Currently, Barcelona is remote from European network due to differences in railway gauge.

Nexus between economic growth and airport expansion

Growth strategies are required for future development of cities as well as for airports to ensure that both operate together and in harmony. Advantage must be taken of the opportunities given in the existing infrastructure. If this is not possible, experiences suggest the tendency is to build a new more remote airport.

Consideration of an individual city's economic structures and activities must include the economics of location. Barcelona has achieved economies of scale by concentration of activities and infrastructures (small and medium industries). Physical distance in modern cities is not necessarily important with increased population and goods in the market, particularly, if served by quick transport services. Harbours and ports were important in the last centuries, but land based infrastructure became more important, first rail then airports.

The economics of markets, structure of cities and location affect the provision of facilities and infrastructure networks.

Not all industrial/commercial sectors benefit from close proximity to airports. Supporting facilities can create traffic congestion in the immediate area. Airport related activities seem to prefer to locate a little further away from this congestion. Corporations may prefer a rail/road integrated site. If an airport is part of an integrated transport network, this is just as preferable, particularly as regards commuting and distribution.

Expansions of airports and their facilities are not necessarily translated into an increase in the number of flights. The facilities are part of an economic and infrastructure network. Get both right and the airport and the city function best.

Economic benefits are seen to be reliant on the airport's ability to deliver a range of competitive advantages compared to other airports. As with Melbourne, the most commonly identified advantages are:

- 24-hour curfew free operation
- integrated domestic and international terminals
- ample areas for airport expansion
- large areas of surrounding rural land or, increasingly, water (oceans, lakes) which with appropriate land use controls, will enable the airport to reach its full potential with minimal impact due to aircraft noise.

However, the case studies are not always very clear on the strategies to be used to encourage the types of activities necessary to support the "niche" vision for airport related development. Certainly, the cities have allocated appropriate land and even provided the infrastructure (road, rail, telecommunications and physical services). It is probably necessary to further explore marketing strategies the participating cities have employed to encourage the development to occur so the resulting benefits can be felt by their communities and regions.

3.2.4 The key role of airline companies

Today, the global airline network is dominated by airline companies and their preferred hub sites. A decision to withdraw could lead to the eventual closure of the airport, as happened several years ago at Los Angeles. The big American airline hubs for American Airlines or Delta, at Dallas or Atlanta, for example, have seen their airports develop at a scale vastly out of proportion to the importance of their cities.

Airline preferences, rather than the wishes of airport authorities or neighbouring communities have meant that the greater part of traffic in London is handled through congested Heathrow Airport, despite the presence of five regional airports. It is difficult to shift airline operators to a new airport contrary to their wishes (London-Stansted, Montreal-Mirabel or Milan-Malpensa). They will always favour an airport which offers a large choice of connections, even if congested.

DEPARTURES				✓	DEPARTS				
FLIGHT VOL	DESTINATION	SCHEDULE HOUR	REVISED REVISE	GATE	FLIGHT VOL	DESTINATION	SCHEDULE HOUR	REVISED REVISE	GATE
PEN 715	PENBROKE	17:00		07	DEPARTED	RAI 181	CHICAGO	07:10	012
CON1995	LONDON	19:55		07			LOS ANGELES		
PEN 721	PENBROKE	20:00		07	CON1002	KINGSTON	07:15		07
RAI 32	LONDON HEATHROW	20:00		C33	RAI 148	MIAMI ST. THOMAS	07:19		014
RAI 457	CHICAGO	20:02		012	CON 880	MONTREAL	07:20		C26
	SAN FRANCISCO				CON1074	TIMING	07:25		07
CON 878	OTTAWA	21:00		C25	CON1980	SUDBURY	07:29		07
CON 890	MONTREAL	21:50		C24	CON 340	HALIFAX ST. JOHN'S	07:30		010
CON 102	BUENOS AIRES	22:00		C50	RAI 1373	DALLAS/FT. WORTH	07:45		011
	SANTIAGO					TUCSON			
CON1988	LONDON	22:25		07	CON 882	MONTREAL	07:50		022
CON 892	OTTAWA	22:30		C25	CON 802	OTTAWA	08:00		
CON 992	MONTREAL	22:30		022	CON1000	SARNIA	08:43		07
CON 280	ORLANDO	08:30		015	CON1910	KINGSTON	08:45		07
RAI 129	NASHVILLE HOUSTON	08:45		013	CON1921	KINROSS	08:45		07
RAI 129	LAGUARDIA	08:45		010	CON1937	LONDON	08:45		07
CON 898	MONTREAL	08:50		C28	CON1940	SAULT STE MARIE	08:45		07
CON 294	FT. LAUDERDALE	08:55		08	CON 001	THUNDER BAY	08:45		017
CON1900	PITTSBURGH	07:00		08	CON 884	MONTREAL	08:50		C24
CON1938	SAULT STE MARIE	07:00		07	CON 951	EDMONTON	08:50		019
	THUNDER BAY				CON 981	CALGARY	08:50		020
CON 800	OTTAWA	07:00		C24	RAI 1048	LAGUARDIA	05:00		010

Nevertheless, with difficulties in obtaining access to some facilities, key hub by-pass strategies can favour regional airports offering alternative capacity by:

- Development of regional services and creation of regional hubs.
- Development of low cost, “no frills” airlines using “alternative airports”. For example, a small Irish company, Ryanair, proposes daily flights between Paris and Dublin, not using Paris - Roissy CDG but a secondary airport situated nearby at Beauvais, just outside the Ile-de-France Region.
- Alliances between airline companies and development of new hubs for second level companies. For example, Finnair at Helsinki-Vantaa, Austrian Airlines at Vienna, Swissair at Zurich.

Expectations of airlines

To be an attractive airport that meets the needs of the airline operators, it is necessary for airports and cities to address market needs and accommodate the functioning requirements of airlines.

- **The market:**

Airlines are seeking markets associated with very large cities with dynamic economic development (Barcelona, Manchester). For airlines, it is business travel which is the key to profitable returns rather than tourist traffic. To establish a new service the minimum market size appears to be around one million population. It is also important that the city is not subject to competition from nearby airports.

The city's market can be more appealing when it is at the heart of land transport networks (motorway and rail) which allows access to an enlarged catchment.

- **Airport facilities:**

In addition to a city's geographic position, the size of its market and the number of connections its airport offers, airline companies seek a particular quality of accommodation and services, notably:

- Sufficient airport capacity to avoid ground and air space restrictions and to ensure that timetables can be met.
- Well-designed facilities and ground processing capacity to guarantee minimum arrival and departure delays (check-in counters, baggage handling systems, terminal air bridges, formality checks) and a good level of passenger and visitor comfort (car parking capacity, internal signage, business facilities, catering and other passenger services).
- Good safety systems and procedures.
- Satisfactory links to the city centre.
- Good quality stopover technical assistance and competitive airport charges.

The airlines and other transportation links

It is not only relationships between airlines themselves, but also between airlines and other transportation companies (for example, with rail companies and bus companies) which have implications for cities and regions. Some literature from Switzerland has proved interesting. Relationships between airlines and rail companies have enabled, for example, airport check-in processes to be undertaken at several railway stations. It seems that cities and their communities (residential and business) could make use of opportunities provided by these liaisons.

The emergence of such links raises very interesting questions regarding airports and cities.

- Where exactly is the airport boundary and are all airport employees at the airport?
- Perhaps it is the integration of well-delivered aviation and on-airport services with the regional transportation network that is the most critical factor for cities and metropolitan regions.

The physical relationship between the airport and the city and particularly the reliability of land based transport, to go from one to the other, seems to confirm the role of the airport as a "broadcaster" of growth without it necessarily happening at or in the immediate proximity of the airport. The city is in the position of facilitating this role in the overall metropolitan planning perspective.

3.3 AIRPORTS AND LONG TERM METROPOLITAN PLANNING.

3.3.1 An airport well integrated into its region

Airport location

It is difficult to find an ideal location for an airport in a city. Airports close to city centres which are easily accessible are favoured by both airlines and passengers, but not by neighbouring communities faced with noise and safety problems. Distant and poorly serviced airports (Milan-Malpensa, Montreal-Mirabel) are not readily accepted by the airlines and passengers, particularly business travellers.

The central locations of many existing airports within urban areas have had negative impacts which have led to the development of new airports, as is the experiences of Guangzhou, Sydney, Omsk, Quito and Guayaquil.



Landing at the former Kai Tak Airport

The development of airports along the coast or on reclaimed land (Tokyo, Osaka, Hong Kong, Macau, Barcelona) reduces flights over urban areas.

Overall, regardless of distance, the airport should be well linked to the city centre and to key strategic metropolitan economic nodes. The induced effects in terms of employment and new activity areas generated by a new airport can be used to re-balance regional planning, by creating a new strategic node.

City size and the airport

Very generally, the size and role of airports depends very much on the urban hierarchy and national structure of a country. For example, in northern Italy or Germany, where the city network is relatively dense but even, the airport network is also relatively balanced. While in centralised countries like France there is a large gap between the principal airport (Paris: 60 mppa) and the rest (Nice: 7.3 mppa, Marseille: 5.5).

There is not always a direct link between the size of a city and the importance of its airport. Amsterdam-Schiphol Airport has a role which is more important than would be suggested by the size of the city, because it is seeking to specialise in transit traffic.

Conversely, in Europe, Lombardy is the second largest economic region (after Ile de France) and Milan its third most important city (after Paris and London), but Milan's airport ranking is only 10. This is an acknowledged handicap in the development of Malpensa Airport, which is remote from the city centre and is not served by a railway. For the present, airline traffic is remaining at the older, but better located Linate Airport.

Integration of the airport into metropolitan transport and communication networks

The airport should not be considered in isolation. There is a need to integrate the promotion and management of key port, airport and regional hub zones with transport corridors and link them to major production centres for maximum trade productivity.

All cities recognise that airports are part of overall transport planning and should be integrated with road and rail development. While we recognise this for passengers, the dramatic growth in air cargo, particularly for high value and time-sensitive products (eg ranging from specialised electronics to fresh seafood and expensive farm produce), is sometimes ignored in freight planning.

Both Sydney and Melbourne and their State Governments recognise the importance of addressing the bigger picture and the importance of air, road and rail freight strategies. Connectivity between the port and airport is also important for cities like Guangzhou, Pusan and Barcelona.

Access to the airport by public transport

Airport accessibility contributes to the quality of air service. A strong message from the case studies is that public transport access to airports is often insufficient. Even where there is a good service, the car remains dominant for passengers, and even more so for employees. It is important to seek a higher rate of public transport usage to the airport, not only because of frequent road congestion, but also because of concerns for public health due to increased air pollution in large cities.³²

There are many projects to develop or upgrade rail services to airports provided and funded by public authorities (national or regional), operators (airports, railway companies) or the private sector. In Europe, many authorities established objectives for public transport patronage, usually 30-50% for airline passengers and 30-40% for employees. These are not achieved simply by developing the infrastructure, but by a range of policies addressing service quality³³, regularity, safety, information and fares. For employees, who work outside normal working hours (nights, weekends), specific solutions need to be found. For example, in Ile-de-France, an on-demand transport system operating from key points was introduced for employees at Paris-Roissy CDG (Allobus Roissy).

Beyond the provision and maintenance of good quality metropolitan services there are plans to link airports with national and international rail networks (eg. the very fast train) not only in Europe and Japan, but also elsewhere around the world.³⁴

³² *The theme of Commission 2*

³³ *For example, dedicated trains direct to the city centre, the possibility of checking-in baggage at railway stations*

³⁴ *USA (Washington-Boston and others), Canada (Toronto-Quebec), China (Beijing-Shanghai), Taiwan, Korea (Seoul-Pusan), Australia (Sydney-Canberra)*

Urban development areas around airports

Residential areas linked to airport development

Cities are well aware of the impacts of aircraft noise, which extend beyond areas defined as unsuitable in Noise Exposure Plans. In these areas the management of development is a careful balancing act between the level of noise impact and the need for residential land. Once a new or expanded airport is announced or completed, planning authorities must restrict any housing proposals which will import future objectors (Melbourne is a good example).

As with any activity, employment on airports generates a need for housing. Noise contour “footprints” in Noise Exposure Plans can designate very large areas as unsuitable for residential development. In many cases existing land supply is sufficient to satisfy the residential demands of the airport, but sometimes new towns or residential precincts are planned. Residential development for airport employees be located on public transport routes serving the airport.

In Jakarta, an 8,000ha site is planned to be developed north of the airport facing the sea by 2000 (Kapuk Raya Indah). In Hong Kong, a new town, Tung Chung, will be developed on Lantau Island to accommodate 200,000 inhabitants many of whom will work at the airport. In Helsinki, a number of residential projects are planned for employees at the airport and in related activities. At Pakkala-Tammisto to the south of the airport, it is proposed to house 10,000 inhabitants.

Impact of urban development close to airports

Many cities have proactive policies for establishing a satisfactory framework for urban development around airports. Development of areas near the airport ought to be reserved for those activities which have a functional need to establish there to assist in easing congestion for access to the airport.

Few businesses really need to be located immediately adjacent to an airport. But the airport precinct is often attractive for establishing activities, not so much because of the airport, but because of the good access infrastructure serving it. Thus, there is a risk that too many activities will develop around the airport, generating significant road traffic, aggravating access to the airport and therefore harming its effective operation. For this reason sometimes it is necessary to be selective in activities allowed to establish around an airport.

In Ile-de-France, for example, the airport is considered to have a strong driving effect on the regional economy. Related activities are encouraged to establish across the region (the airport’s metropolis), rather than being part of a vast concentration of activities centred on the airport (the airport research and technology precinct).

Redevelopment of former airport sites: opportunities for regional planning

Opening a new airport can be the trigger for redeveloping an old site, often close enough to the city centre, for new urban purposes.

At Munich, the 550ha site of the former Riem Airport, 7km from the city centre, is to be redeveloped as the new Munich Trade Fair with quality residential areas and a park (Messerstadt Riem). The project has been subject to several international competitions. It will accommodate about 16,000 inhabitants and 13,000 employees. Moreover, redevelopment

of the old Trade Fair site will, in turn, offer another opportunity for revitalisation of the city centre.

In Hong Kong, a significant property redevelopment is planned for the former Kai Tak Airport incorporating residential, commercial and industrial areas.

3.3.2 An airport respecting its environmental constraints

Notwithstanding their importance, airports are places which are seen by many as a necessary evil, much as the railway was during the 19th Century. They are invariably noisy, windy, polluting and consume vast tracts of land. These negative impacts are felt far beyond the immediate vicinity of the airport. Measures adopted by some cities to constrain development in areas of impact both for the amenity of the affected community and to ensure the effective operation of the airport have not always been welcomed by those communities. By the same token, where such measures have not been implemented or the impacts have not been part of the airport planning process affected communities have been outraged by the intrusion on their lifestyle expectations.

We can learn from both best practice and failures (others' mistakes) in environment performance.

Airports (eg. Melbourne) are raising their standards to achieve ISO 14000 accreditation. More and more they are integrating environmental concerns. Toronto has developed a comprehensive range of management programmes and policies to address air and water quality, fuel spillages, ozone depleting substances and polychlorinated biphenyls (PCBs). In Manchester, the Airport Environment Plan begins with the aim "to be the best world airport" and a commitment that, "as the airport grows, we will remain environmentally responsible in all that we do".

Environmental policies developed by airports pursue a number of objectives. In 1994, Manchester Airport's Environmental Plan identified a number of key principles addressing:

- sustainable development to achieve sustainability for the long term benefit of the north of England;
- freedom of information providing access to data on the environmental effects of the airport and the effectiveness of strategies to address these;
- an environmental business code which gives preference to markets and developments with low environmental impacts;
- the community by listening to local people and offering support to lessen the airport's impact on their lives;
- relationships with tenants, concessionaires and airlines to reach agreed environmental standards; and
- finance to assess the value of investment in environmental measures.

From the key principles goals were set in respect to community relations, noise, air quality, energy, landscape and nature conservation, waste and water quality.

An airport integrated with its environment

Often airports can be located on sensitive sites, in pristine areas, by the sea or beside a stream or river. It is important to recognise those environmental qualities and to ensure that airport development is integrated in appropriate ways.

In many instances landscaping and tree planting is undertaken. Aéroports de Paris is implementing an important staged programme to “reconquer the landscape” at Paris-CDG. The regional Council of Ile-de-France is committed to a land acquisition policy to create a green belt to the south of the airport. At the new Kuala Lumpur Airport there is a special landscaping and tree planting programme to develop the concept of an “airport in the forest”.

Minimising airport nuisance

- **Noise:**

The reduction of aircraft noise impacts is a common goal of airports around the world. New offshore airport construction may also be a feasible long term possibility, but is not appropriate nor applicable in every instance. More and more the principle of airports developing without increase in noise nuisance is being applied (Manchester and Paris).

It is not sufficient to rely on the progressive upgrading of aircraft fleets alone. Measures also need to be taken on the airport and in the air including relocating runways, limiting operating hours³⁵, and restricting runway usage. Flight tracking and aircraft noise monitoring systems are used increasingly, as are systems for imposing penalties for contravention. More use could be made of sliding scales of landing fees which are tied to levels of noise generated.

The management of noise generated at ground level is also becoming increasingly important (restricting engine testing, avoiding use of auxiliary power units³⁶) as the community becomes more aware of environmental standards in relation to industrial noise impacts generally.

It is important that the local population should have access to clear information on the problems of aircraft related noise and that ongoing consultative processes are established to address the issue.

It is common practice to require airport authorities or public agencies to contribute to the costs of noise amelioration measures in dwellings affected by airport related noise. The measures are often funded by charges levied against tickets for flights using the airport. Several countries have legislation specifically addressing the issues of noise attenuation (Australia for Sydney Airport)

- **Air pollution:**

It has been estimated that air transport contributes some 3% of carbon dioxide emissions globally and 4% of nitrogen oxides. These emissions contribute to the greenhouse effect and have an even more damaging role in ozone depletion at high altitudes.

³⁵ Noise is no longer only a matter for airport management but for the affected communities – curfews are economically and operationally significant.

³⁶ Auxiliary Power Unit - an automatic system for delivering power to aircraft while on the ground

The reduction of aircraft pollution is partly the responsibility of manufacturers in the progress made in aircraft design to reduce fuel consumption, and partly the good design of airports and their effective operation minimising on-ground and in air delays which increase consumption of fuel. On the tarmac and near terminal apron areas, measures such as reducing use of auxiliary power units or use of low polluting service vehicles³⁷ have a positive effect on reducing emissions.

Metropolitan initiatives to improve public transport access to the airport may reduce the demand for vehicle based trips and achieve reductions in automobile related air emissions.

- **Water treatment:**

Cities and airports need to improve their understanding of the environmental effects of stormwater and wastewater discharges, both on the airport and in surrounding areas. The quantitative and qualitative impacts of discharges contaminated by traces of aircraft lubricants and chemicals used to prevent freezing or to thaw snow must be addressed in airport environmental plans.

An ecologically sensitive airport

- **Maintaining bio-diversity:**

The universally recognised need to maintain bio-diversity and ecological balance is as important for an airport and its environs as it is regionally or globally.

Nagoya is monitoring water quality and tidal wetland habitat before construction of its new airport commences. Melbourne Airport is maintaining a unique stand of Grey Box eucalypt forest by collecting seed and nurturing new growth. During construction of the Chep Lap Kok Airport in Hong Kong, specific and innovative measures were developed to minimise the impacts on indigenous dolphins and their habitat, particularly managing transmission of construction vibrations and noise frequencies through water.

- **Waste recycling and energy efficiency:**

Recognising the need to carefully manage waste recycling and energy consumption a number of airports are now promoting treated wastewater reuse for general purpose and fuselage cleaning and designing solutions to minimise energy consumption. Waste reduction policies³⁸ are even extending to reuse of landscape waste materials (eg. making fodder of mowed lawn).

Contract goals and means of independent control

Regional or metropolitan authorities are moving increasingly to contracts with airport operators addressing the full range of airport related environmental nuisances.

In Manchester, for development of the second runway, a legal agreement was signed in August 1994 between the airport, the County of Cheshire and the City of Manchester. The

³⁷ Example: 10 % about 700 vehicles of all sorts managed by Aéroport de Paris at Paris -CDG are changed over each year. The airport authority is rapidly changing over almost all of its fleet to "clean" vehicles (electric or running on natural gas or LPG)

³⁸ For example, Manchester Airport, which produced 6,700 tonnes of waste annually, has determined an objective a reduction of 15% before 2005. Zurich Airport produced 22,000 tonnes (1993) and aims to recycle 60 - 70%

agreement addresses noise control, night flights, maximum capacity of the airport, environmental actions, financial contribution (noise insulation in dwellings etc), availability of information and review by independent bodies. This last point is particularly important as it is increasingly common to establish independent bodies to give an objective overview of airport environmental strategies and review compliance with defined objectives. In Paris, the creation of such a body was one of the conditions imposed by the government in approving the construction of two additional runways at Paris-CDG.

Balancing methods and regulations

There is a need for universal consistency in management of environmental issues linked to airports and aviation. A number of different methods are used in calculating the noise impact generated by an airport. The measures applied to define noise contours such as average noise levels, peak levels, frequency of exposure or the weighting of daytime and night-time noise levels vary appreciably between one country and another. The European Union³⁹ is seeking to create consistency in methods, standards and controls and, ultimately, in rules and legislation.

Preservation of the environment - a good investment

To think that preservation of the environment is prejudicial to competitiveness is very short-sighted. To the contrary, rigorous ecological environmental management requirements can stimulate progress and innovation and, consequently, competitiveness.

Environmental problems have a cost. The cost in congestion time and energy, acoustic and air pollution causes has been estimated at 5% of gross domestic product (GDP)⁴⁰. These are shared across all levels of society. Degradation of the urban environment has repercussions on the cost of living or real estate values. However, the costs of corrective measures are concentrated on the public sector.

Strategies to reduce negative impacts of airport development represent investment in the future and in opportunities for employment creation⁴¹. While there would seem to be a lack of investment and innovation in this area, projects addressing solutions to particular environmental problems, such as the dolphin habitat in Hong Kong, demonstrate that innovative practices are emerging which can be applied and marketed elsewhere.

Safety

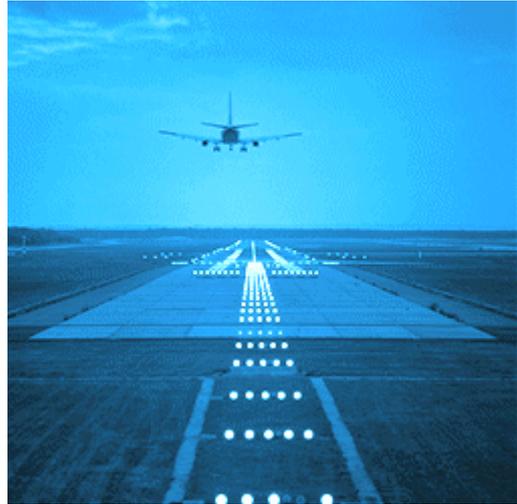
The aircraft is the most reliable means of transport, but its safety is always of concern. Significant risks can result from adverse climatic conditions (wind, snow or frequent fogs), airport geography (sea-based location, proximity of mountains and hills), presence of birds or dangerous over-flight of urban areas (one of the reasons for development of the new airport at Hong Kong and for projects at Guangzhou and Omsk).

³⁹ The European Union is pursuing the problem of airport charges in order that they respect three key principles, to be linked to the cost of services offered, to be transparent and non-discriminatory.

⁴⁰ Source: *Politiques novatrices pour un développement urbain - La ville écologique - OECD 1996 - Paris*

⁴¹ OECD estimated in 1992 that "the production of goods and services with a view to cleaning and preserving the environment" represents a market valued at US\$200 billion at a global level of which 85% in OECD countries and 1,700,000 employees.

Growing air space congestion in certain parts of the world, such as Western Europe, is increasing accident risks. All these risks, as well as those linked to terrorism (aircraft hijacking, attacks⁴²) require specific policies and procedures. Given that absolute safety does not exist, each airport and each city ought to be on permanent readiness to confront these sometimes dramatic crises. The development of risk management policies and co-ordinated special disaster plans require the input of many agencies, including police and emergency services, on and off the airport.



3.3.3 Strategic Planning Relationships

Government Planning - tiers of responsibility and ownership of the process

Most airports, at least in the past, have been 100% owned and operated by their national governments. Only in few cases did the national government also have a key role in a city's strategic planning: more typically a role for regional, metropolitan or municipal governments. Where a national government controls the airport, there has been some reluctance for it to allow a lower tier of government to have the ultimate control over the airport's development.

However, in many cases, airport ownership is changing and it is not surprising to see metropolitan governments taking a far more proactive role in owning and running airports. The City of Manchester owns 55% of the Airport and nine other Greater Manchester District councils each own 5%. In this way, the Greater Manchester District has the key interest in one of its region's most strategically important assets and the means to manage the airport as part of the overall economic rejuvenation of the region.

National governments are now tending to seriously assess whether they wish to be involved in owning and operating infrastructure assets generally, and airports, in particular. Some Governments are entering into joint venture arrangements with lower tiers of government to own and operate airports (Munich is an example) and are able to liaise across those tiers to protect the operation of the airport and to advise on associated infrastructure. Other Governments are maintaining ownership of key metropolitan airports, but are leasing the right to operate and develop the airports to private companies (Melbourne).

In other instances, regional Governments own and develop the airport (often with national Government financial assistance and subsidies) and the airport is operated by a government owned or non-profit corporation (Toronto, Zurich).

⁴² 567 acts of terrorism linked to air transport, causing the death of 920 persons, were listed during the decade 1988/1997, of which 189 were aircraft hijacks and 112 attacks or criminal acts at airports. Source Airports Magazine n° 290 - July/August 1998

Central Government aviation strategies

National Government strategies aimed at supporting national “flag carrier” airlines appear to conflict with the broader objectives of deregulation and liberalisation of the aviation industry and consequently the objectives and strategies of regional development.

Airline companies asked the European Union to arbitrate on perceived restrictive competition practices at Milan-Malpensa and Paris-Orly. In Milan, the authorities were requiring foreign airlines to use the distant and poorly served Malpensa Airport, reserving the better located Linate Airport for Alitalia. An agreement was reached in October 1998 allowing all airlines to have 34% of their flights leaving from Linate and 66% from Malpensa. In Paris, the Government wished to prohibit long haul flights (more than 5,000kms) at Orly Airport, which would have penalised some airlines to the benefit of Air France has its hub at Paris-CDG.

Cities must become more involved in management policies for airports, even in those areas which initially appear technical, to ensure that the opportunities and benefits of regional economic development strategies can be realised. We have already found that international long haul flights to a “final destination” contribute more to the regional economy than short haul flights to a “hub”.

Policies for slot allocation also have an important effect on the economic impact generated by an airport. Slot allocation can sometimes disproportionately favour small companies and short-haul feeder links, reducing available allocation for foreign airlines with long distance international links, which, in turn, would be able to bring much more benefit to the regional economy.

Collaborative relationships of airports with their stakeholders including their communities.

A number of airports have over time learned to develop on-going relationships with their various stakeholders and local communities. Collaborations which include all the key stakeholders together have been found to be invaluable and beneficial to both the airport and the city.

It is clear that communities have become:

- far more aware of the impacts of aircraft noise and airport operations than they were even 10 years ago
- more circumspect about and even critical of the role of a private company in operating and developing an airport
- more assertive in exploring the full impacts of particularly new airport development on the economics of other activities they replace.

It seems that communities will be more supportive of a project if they can see and understand the bigger picture rather than disjointed parts.

Commitments to such collaborative arrangements are sometimes less clear. In Melbourne, there was a strong relationship between the airport and its broader community (including the operator, regional and municipal governments, employers, the airlines and the local community). The airport was seen as "belonging" to the local community as well as to metropolitan Melbourne and Victoria. In 1997/98, the first year of privatisation, there was a perception of a shift from the previous collaborative approach to a more individual one-on-one consultation. The local community's need for reassurance is being addressed partly by

commitments in the approved airport master plan and partly by the preparation in 1999 by the Victorian Government of a Melbourne Airport Environs Area Strategy Plan. The Plan will examine and develop strategies to identify opportunities and benefits for those areas affected by airport related activities, while recognising the need to ensure the effective operation of the airport.

The bigger picture - triggers, co-ordination and implementation

Generally, airport expansion or redevelopment has been triggered by achieving targets which relate to the capacity of existing runways, terminal and freight handling facilities. However, in today's environment of privatised operation of and investment in airports, an operator is unlikely to wish to be bound by particular targets and even less likely to publish targets or timelines which might act as "triggers" for particular development.

This is a problem for cities as major investment in airport facilities will probably require major investment in associated infrastructure as well. The city, as much as the airport operator or any other affected party, needs some mechanism which will trigger its own infrastructure planning and investment processes. The reverse is equally true of city investment in, say, a new rail connection to the airport and the airport's need to plan to accommodate it.

Perhaps the "trigger" should not be for the development itself, but, rather, for the commencement of its forward planning and consultative processes.

There are a number of aspects relating to airport development which can transcend several levels of Government, for example, aircraft noise issues, environment, road investments. Each level tends to focus on particular aspects. Most cities are recognising the need for integration and liaison amongst and between the various players to enable investment in infrastructure to be linked to land use planning, to account for economic, environmental, social, infrastructure and political elements and to provide a holistic approach to regional or metropolitan strategic planning.

3.4 EMERGING ISSUES

The need to monitor and respond to changing economic circumstances

The global economic context has radically changed since the work of the commission began in 1997. This poses the problem of the risks of economic modelling and what happens if the situation changes or anticipated targets are not met.

Most of the case studies were written over 12 months ago. Since that time, economic circumstances have certainly changed with an effect on many aspects of airport and city development targets.

For airport development, it can be said that a downturn in economic influences will result in the likely capacities not being met in the predicted time frames due to reduced passenger movements, freight tonnages etc.

Many cities, particularly in South East Asia had undertaken many very ambitious airport developments. The region has been strongly affected by the recession and airports and their

cities are going to have to revise downwards or postpone their anticipated infrastructure investments.

The history of airport planning shows how aviation transport has always been extremely sensitive and reactive to economic circumstances and just how difficult the future is to foretell. At the end of the 1960's, it was believed that by 1985 Paris-CDG would handle 50 million passengers a year. There was to have been 70,000 airport employees, requiring 65,000 dwellings to be constructed within a half hour radius of the airport. Regional planners of the day examined different scenarios for developing new urban development zones to accommodate residential and economic activity generated by the airport. The 1973 petroleum crisis hit particularly strongly in Europe and other countries strongly dependent on imported fuel, considerably slowing air traffic growth. In 1985, air traffic (14.6 million passengers) and airport employment at Paris-CDG were a third of that predicted at the outset.

Clearly, there is a need to be prudent in programming new airport infrastructure in the current uncertain global economic circumstances. Key players need to evolve particular strategies to deal with the uncertainty.

In the past, Governments, as airport operators, would probably have noted the change and revised their development and financial borrowing programmes. However, in today's environment of privatised operation of and investment in airports, airport operators, and, indeed, cities are examining their exposure to markets most affected by the economic situation, particularly in South East Asia. They are implementing strategies to broaden their own markets and to diversify airport development opportunities. The airport performance and city benchmarking studies are important tools in understanding the global picture, allowing cities and airports develop new strategies and monitor outcomes of existing strategies.

Future metropolitan and airport strategic plans

As with successful city strategies, airport master plans will need to ensure consistency with city, regional and national forward planning documents and statements.

At a minimum, they should:

- Be a clear, concise statement of the key land use development issues and directions for the airport and its environs.
- Provide the rationale for land use planning controls.
- Involve the community in its development.

At a broader level, the preparation of such plans offers unique opportunities to develop strategy plans which are development facilitation tools, rather than simply development control documents.

There seem to be certain elements that should be included:

- A ***profile*** which addresses the key characteristics of the airport and its regional and national contexts.
- A ***vision statement*** which identifies development objectives leading to specific strategies.
- ***Clear policy links*** to the operator's corporate objectives and regional and national policies.

- ***Strategic statements and policies about key issues***, including consideration of their social, environmental and economic aspects. It is important to address why an issue is important, what is to be achieved, how it will be achieved, where it will be achieved and who will need to be involved.
- A ***future land use framework*** (including maps) that illustrates the future strategic direction of the airport.
- A ***program for implementation, monitoring and review***.

To ensure an Airport Master Plan is a truly integrated statement, it should also:

- Refer to other relevant airport policies or strategies and the corporate objectives.
- Clarify any external policy context from Federal, State and regional sources. It is important that the Master Plan not only demonstrate its compliance with its State, regional and local policy context, but that it also assist in identifying "gaps" which the operator would need to pursue in order to ensure the continuing effective operation of the airport.
- Identify opportunities that the airport might provide for the region and that key sites and development in the region might provide for the airport. This concept is emerging from the collaborations that Councils are forming to establish a regional context and respond to issues of regional concern. The airport is more than just a business, it has a complexity that matches major metropolitan activity centres. It is a mix of airport, industrial, commercial and recreational uses that need to be managed in terms of and take advantage of its regional context and opportunities.
- Address the implications of strategic planning by others, municipal and regional authorities, on the airport and vice versa.