Ute Knippenberger, Alex Wall (eds.)

Airports in Cities and Regions

Research and Practise

KIT Scientific Publishing

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Foreword

The economic impact of airports as providers of regional and national prosperity is often juxtaposed to the negative externalities such as noise emissions and ecological impacts. New aspects may extend this dichotomy: airports have undergone a development from pure infrastructural nodes to multifunctional service locations. Using concepts such as “Airport City” or “Aerotropolis”, airport management companies have fostered this development for different reasons. At the same time the agglomeration patterns of certain industries have changed through the relative success of air freight. Airports as nodes to the global economy can therefore be seen as users and producers of new forms of spatial centralities. In contrast, this functional and urban evolution is often not reflected in planning procedures.

The consequences of this development with respect to regional and urban structures near airports were the focus of the colloquium “From Airport City to Airport Region? - 1st International Colloquium on Airports and Spatial Development” held in July 2009 at the University of Karlsruhe. In a time of continued development and transformation of transportation infrastructure, the colloquium set the focus on the interrelation between airports and their region. In four thematic blocks, papers and presentations addressed questions such as: how can airports be perceived as part of the urban structure, which economic effects foster spatial development, and which policy approaches exist to tackle the various conflicts in the airport-region relationship.

The present publication contains written elaborations of most presentations and additional contributions of researchers who could not attend the event, but have kindly agreed to contribute. Since the colloquium was in English, this publication is English based. However the possibility was given for participants to deliver their contribution in German.

We would like to thank Alva Huffer, student assistant, who put everything together, the KIT publishers for their support, and of course all contributors for submiting their research to this first compilation of research and practise questioning the relationship between airports, regional development and urban planning.

Ute Knippenberger, Alex Wall

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Prelude

Airport and City: An ambiguous relationship

Thomas Sieverts

1 The fundamental dilemma: Will air-traffic shrink or will it grow?

Thinking about the relation between airport and city, one immediately falls into a fundamental dilemma: Will air-traffic drastically shrink in future, because of possible damages of the atmosphere, rising prizes and shortage of fuel? Or will air-traffic, on the contrary, drastically grow because of new inventions in the field of emission free-air-technology? This fundamental uncertainty cannot be avoided. Under this condition I shall try to develop two contrasting perspectives. In the first perspective – assuming drastic shrinkage of air-traffic – I shall try to compare the history of the infrastructure 'airport' with historically older infrastructure-systems, like the water-transport, the highway-system and the railways, looking for a basic pattern of comparable development. In the second perspective – assuming a new emission free-air-technology leading to a drastic growth of air-traffic – I shall try to speculate about a new, futuristic conception of an airport-city-system, which could open promising new potentials concerning global development and global government. In the conclusions I shall accept the fundamental uncertainty. Under this condition I shall try to formulate general recommendations for the small slice of time between the facts of history and the futuristic speculation over a time to come.

2 The typical process in the development of transport-infrastructure from servant to master

Cities have always developed in a mutual interplay with their infrastructures: We speak of port-cities, highway-cities, railway-cities and now airport-cities. In each of these cases the development of the specific traffic-infrastructures over time proves a comparative pattern: They all transformed from a modest, but crucial servant to the city to become a dominant master of city-development, contributing to the city's wealth, but also accompanied with many negative side-effects. In other words: They transformed from a 'maker' to a 'breaker' of the city. Just a few illustrative examples:

The simple 'landing' at the shore of sea or river became the monster of the big (container) port, which separates the city from the water. The multi-functional highway, serving the marketplace, became the mono-functional freeway, forming a big barrier in the city and separating the parts of the city from each other.

The railways, starting as a kind of 'street-car', became the space-consuming, impenetrable system, occupying with its rail-fields huge monofunctional areas in the city, breaking it into pieces. The airport, starting as an open meadow and a lightly constructed hangar, developed to the huge "machineries" we have today, in form of self-isolating systems, confronting the city and dominating it not only with large fenced-in areas, but also with heavy noise.

3 The basic paradox of decay, opening up unique new potentials

But this typical transformation from a modest servant and maker to an imperial master and breaker of the city is not the end of the story: each of these infrastructures of the city had a 'peak' and then lost in meaning. The port left the city and moved to the sea, the freeway in the city and its functions have been translocated to the edge, the railways drastically reduced the rail fields in the city and moved them outside. Inner-city airports like Berlin-Tempelhof closed down. But what will happen to the present airports outside the city?

History proved: The process of servant and maker to master and breaker and eventual loss of meaning in the city with a translocation to other locations had generally paradox consequences: The heavy burden became a unique potential! Just a few examples:

The Hafen-City in Hamburg on a former port-area, the inner-city development in Ulm on a given-up highway, the Europa-City in Frankfurt on a former rail-field, the new city- and park-development on the area of the former airport "Tempelhof" in Berlin. Due to their very nature, each of these areas has an excellent accessibility and a big centrality. This is also applicable to big airports: Especially the large "Hubs" have at present the highest national, even continent-wide centrality. Take Frankfurt-airport: ICE- IC- and Regional-Trains in combination with a Freeway-junction of European importance forms a point of extremely high centrality in addition to its high accessibilities. It has the highest number of public parking spaces in the region. Its 'technical' centrality is higher than the city of Frankfurt.

So the prospects for city-development after the era of aviation, seen exclusively in spatial dimensions, seem not to be bad at all!

4 A speculation about potential spatial consequences of an emission-free air-traffic

In the contrasting perspective I assume a new, emission-free air-technology. I shall not try to speculate about its probability, but at least yesterday there was a short notice in the papers, that within this year there will be an airplane with 'Brennstoffzellen'. Instead I shall use this perhaps futuristic assumption as a basis for a contrasting scenario of a global city-network, consisting of extended airports, connected by frequent airlines

An emission-free air-technology would lead most probably to a new enormous growth of air-traffic and more frequent air-connections. This could lead to a general 'shrinking' of the globe, measured in travel-time, which in turn would unify the globe economically and culturally. The simple basic idea behind the conception of a new global-city-network would induce the shift of the respective national borders to the outer edges of the extended airport and give the extended airport itself the status of nationally independent global unit, connected to other airports of the same status, administered i.e. by the United Nations. The extended airport would be a kind of 'township' of a legally and politically unified global city. The global centrality of this global-city-network would reach the whole globe: It would be the natural site for global players, even for a global government. There might be ca. seven to ten 'hubs' on the globe, reachable for the population by air-traffic in up to two hours. The virtual population of that 'global-agglo' would comprise several hundred million people!

If this kind of an economically and culturally unified, globally decentralised global city would be realised, than the different time-zones in the different 'townships' in different continents, leading to severe jet-lags, would be become a serious problem. Former students of mine proposed in a design for a new airport a new type of building 'containing' the local time of other parts of the globe, so that one could gradually adapt to one's own bio rhythm. This is just an example of how such a new kind of global city might lead to new problems but also to new solutions. At any rate, an emission-free air-traffic would start a new Kondratieff-circle, and nobody can know what this will mean for the future.

5 Final remarks

If we accept the uncertainty of the present situation concerning the future of air-transportation, we should try to keep open both options – shrinking and growth of air-traffic. As I have tried to line out, both options promise a profitable and interesting future for the city.

The options of a radical shrinking of air-traffic should motivate us to transform the present airport gradually into a normal part of the city's fabric. This could mean: Gradually building up a truly urban context, connecting the airport also with pedestrian- and bicycle-connections and finding a new balance with the historic town-centre.

The option of growth of an emission-free air-traffic opens up fantastic new perspectives of a truly global city-network. I reckon we should think about this supposed futuristic option in more depth and we should develop it in detail. This option is less a question of urban form but a matter of imagination, politics and courage!

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Research and Case Studies

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Looking in all the wrong places?

Catalytic effects in the context of product cycle theory

Stephen J. Appold and John D. Kasarda

The costs and benefits of commercial aviation have become a central focus of public and policy concern. Environmentalists have long maintained that economic externalities such as noise and greenhouse gas impacts are insufficiently incorporated into policy decisions. Consequently, refined measures of such costs have been developed. The measurement of benefits has not improved. In this chapter, we maintain that the economic benefit of aviation is incorrectly measured; the net gains from aviation-enabled trade are the proper measure. These benefits are more easily visible in selected non-core urban regions than in the largest world cities. Further, airport cities have their strongest economic benefit when they facilitate regional, rather than global, economic linkages.

1 Introduction

The economic impact of airports and airport cities on regions is of increasing public and policy interest due to the large capital investments entailed in airport construction and expansion, the possibly inadequately costly **environmental** impact, and the negative externalities surrounding airports. Policy decisions require that investments meet basic benefit-cost criteria. While prior experience with airports suggests that, on average, these criteria so far likely have been met, other types of infrastructure investments appear to systematically not meet such criteria (Flyvbjerg, Bruzelius, and Rothengatter, 2003). The increasing volume of air traffic, rising construction costs, the possibility of diminishing returns from additional airport capacity, and the increasing concern over climate change and oil conservation all contribute to the demand for valid and reliable measures of economic impact.

In this chapter, we maintain that researchers and policy makers have been looking for the economic impact of commercial aviation, airports, and airport cities in all the wrong places. We outline three areas in which current practice is often misplaced. First, the economic impact of aviation is often measured by its costs, rather than its

benefits. Second, the economic impact of aviation is often thought to be concentrated in the largest and most important world cities. Third, global linkages are often thought to be the primary drivers of airport cities. We contend that each of those points needs correction or qualification, advance alternative arguments, and present evidence that support our arguments.

We contend that the root of the measurement problems in an inadequate link between airport studies and mainstream social science, especially economic trade theory and urban and regional development theory. Policy makers, in Germany and elsewhere, have asked that the theory and measurement gap be narrowed (Pfähler, 2001). In debates surrounding the possible expansion of Heathrow and of Schiphol, critics and some policy makers have stated that several of the commonly used measures of economic impact are inadequate to support public decision-making (Boon, Davidson, Faber, Nelissen, and van de Vreede, 2008; Boon and Wit, 2005). We hope to narrow that gap.

2 Measuring the economic impact of commercial aviation

Trade economists build on Paul Samuelson's "iceberg" analogy to capture the total effects of transportation and other logistics costs. Products being shipped are like icebergs that melt in transit. Some products melt more quickly than others and some forms of transportation are associated with greater melting. Much potentially rewarding trade does not occur because the entire product melts in transit.

Ironically, in aviation impact studies, the metaphorical melting is counted as a gain. The greater the melting – that is, the greater the loss of product value – the higher the measured economic impact in terms of airline and airport employees, payroll, consumer spending, and related measures. These costs are schematized in Figure 1. The positive impacts of trade are hidden in the "catalytic effects" at the bottom of the figure.

Catalytic effects form the bridge between aviation studies and economic theory. The catalytic effects of commercial aviation are the net gains from trade, which are facilitated by aviation. The gains are connected to the products shipped by air, the products shipped by surface but coordinated, in part, via air, the services shipped by air, including tourism and many forms of business services, and possibly visits to friends and family. Catalytic effects are usually given short shrift in aviation literature but these are the impacts that regional and national governments should and do care about. Unfortunately, they are poorly measured. Often, they are not even discussed.

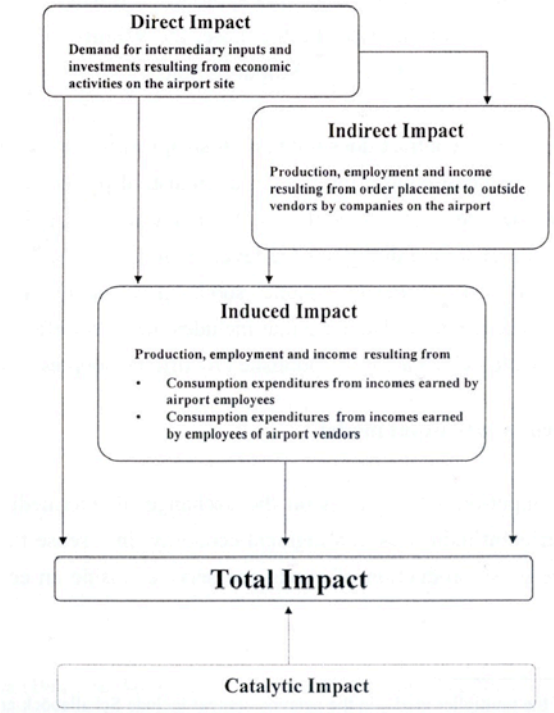

Fig. 1: Schematic view of the economic impacts of commercial aviation

Air transport increases value by effectively bringing regions closer together. Building on the iceberg analogy, for some types of products, surface transportation entails a large loss of value because, while the per kilometre costs may be low, the travel and processing time can be slow resulting in high inventory costs and other types of wastage. These include decreased value during transit and missed sales opportunities caused by late arrival.

The large advantage of aviation is that it saves on time. In the course of the ongoing logistics revolution, the costs of carrying inventory have dropped from about half of total U.S. logistics costs to about one-third even as total logistics costs have decreased from about 15 percent of GDP to about 10 percent. Despite falling over the past several decades, the per kilometre direct cost of air transport is still relatively high. However, air transport can be cost-effective when the speed sufficiently reduces inventory and wastage costs.

The costs of transport become less important as value-to-weight rises while inventory costs increase in importance as the value of that inventory increases. Perishability of various types also increases the value of air transport, as does the

impact of an "outage" on other costs. For example, a missing component can hold up a complex production process, so replacement parts may be flown to their destinations despite a seemingly prohibitive cost.

Analogous arguments apply to humans. Even though the large majority of personal travel, like cargo shipments, is via surface modes, under some circumstances, air travel is money saving, due to largely the time savings. One aspect of the value of air transportation is that it makes international meetings, such as the one producing this volume, feasible.

Airport efficiency, local land use, and ground transportation arrangements can have a significant impact on overall transport costs because the journeys of goods and people rarely begin or end on the tarmac. Sometimes the costs are in the form of ticket price, sometimes in the form of frequency of service (and therefore waiting costs), and sometimes in the form of lengthy ground travel and congestion. For example, a trip from downtown Chicago to downtown New York entails more time on the ground than in the air. It follows that efficient airport access allows greater gains from trade. Similarly, locating initial origins and final destinations closer to airports, whether in the form of rapid ground transport or an airport city or in the form of more rapid on-airport processing, decreases overall costs and increases the potential gains from trade.

Reducing the overall costs of producing, transporting, and consuming, increases overall welfare because more needs can be satisfied. The value of aviation lies in reducing those costs by contributing to a system that decreases the overall door-to-door costs of transportation (reducing the melting) giving least-cost producers greater market access, thereby increasing the overall value of trade. Despite the large concentrations of employment at airports –Frankfurt Airport is reportedly the largest employment location in all Germany while in the U.S. many airports have sufficient employment to qualify as the central county of a metropolitan area – the economic advantage of aviation is in the money saved, not the money spent. Those savings catalyze increased welfare.

The gains from trade have costs. Introductory economics remind us that the gains from trade result in economic restructuring, which, in turn, imposes costs on some. These are often ignored in studies of economic impact. It is ironic that one of the clearest statements of the gains from trade, with a very clear and detailed accounting of the benefits of aviation-enabled trade, set out to document its costs (Froebel, Heinrichs, and Krey, 1980). Even in the few cases when the gains from trade are considered by airport economic impact studies, the costs are ignored. In addition, inappropriate baselines for comparison may be used. Valid measures of economic benefit can improve investment decision-making.

3 The market geography of the new service sector

By bringing places closer together through reducing overall transportation and logistics costs, aviation has enlarged the geographic scope of markets firms can serve. One consequence of the enlargement of market areas has been the rise of producer services to coordinate and support production. Figure 2 summarizes that restructuring over the 1947-2006 period for the U.S. economy. As a result, contemporary knowledge-based firms, particularly those engaged in producer services and in advanced manufacturing, with a broad spatial reach but narrow market niches are replacing local spatial (near) monopolies with broad functional ranges to produce larger, inter-penetrating market areas of specialized firms. At the extreme, every firm could have a global monopoly on the sale of a very narrowly defined product (Dixit and Stiglitz, 1977). Further specialization will likely continue as long as the revenue gains outweigh the additional costs of travel.

A basic prediction of urban theory is that the reduction in effective transportation costs brought about by air service would lead to the concentration of economic activity and employment in the largest markets. Accordingly, some urban researchers have predicted an economy with low transportation costs to create a system of dominating world cities. Yet a decline in transportation costs can also lead to selective geographic dispersion with an interaction between regional resources, including labour supply, amenities, and transport costs determining location patterns.

Economic activity consumes land. Accordingly, economic activity moves to the urban periphery – to places such as Tysons Corners near Washington D.C. and then farther and farther out in the fringe areas of the largest metropolitan areas resulting in the formation of edge (Garreau, 1991) and edgeless (Lang, 2003) cities. Table 1 shows that over the past 25 years, the most prominent spatial redistribution of economic activity in the U.S. has been to the periphery of the largest metropolitan areas. Large cities expand to the point that further additions are no longer cost-effective. For historical reasons, many large cities have a mix of sectors, which has been favoured by developments in the global economy over the past several decades, sometimes generating a resurgence of centre city employment growth. At the same time, those cities have unfavourable cost structures, increasing housing (and thus labour) costs. As the white collar and professional work forces have grown with the restructuring shown in Figure 2, those costs have become increasingly salient, prompting firms to consider relocating to less costly areas.

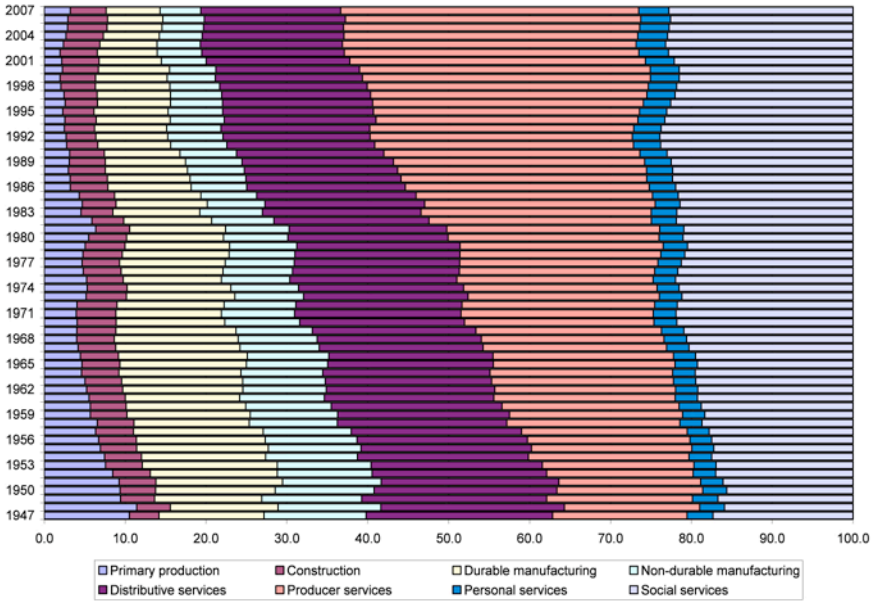

Fig. 2: Sectoral distribution of value-added in the U.S. economy, 1947-2006

Organizational design as well as transport costs impact geographic redistribution. As work processes become routinised and institutionalized, a geographical spin-off may become feasible. Locations distant from the largest cities may offer sufficient labour cost advantages to justify the increased travel required for coordination and management. Low-skill economic activities were among the first to relocate from core regions. Rail, road, and water were critical catalysts for the peripheralisation of goods production (Hoover and Vernon, 1959; Vernon, 1966).

As progressively more highly-skilled activities have been routinised and the work processes institutionalized, air transport has become central in the movement of high-skill office functions, such as research and development, and headquarters away from the largest cities leading to cost savings without sacrificing communication and contact. Today, a manager from, IBM's New York headquarters can catch a morning flight to Raleigh-Durham, meet with executives, and then return to New York for an early afternoon meeting. Initial investigations suggest that someone who only needed to meet with his or her New York-based superior every two weeks or so, might prefer living in a less-costly, amenity-rich area many hundred miles away and flying in for an occasional day trip to living in New York. Of course, while affordable air fare is a key aspect of such decisions, so are other factors, such as the depth of the local labour market, the cost of living, and amenities.

Type of county	# of counties	Personal income 1969-1970	Personal income 2005-2006	Population 1969	Population 2006	Relative income growth	Relative population growth	Income growth / population growth
All	3,068	797,104,387	10,553,267,107	200,221,967	296,715,625	1.0000	1.0000	1.0000
Large metropolitan	181	391,352,311	4,959,477,311	83,967,730	118,263,909	0.9572	0.9504	1.0071
Central large metro	49	274,503,706	3,040,389,970	59,441,795	74,940,790	0.8366	0.8507	0.9834
Fringe large metro	132	116,848,605	1,919,087,341	24,525,935	43,323,119	1.2405	1.1920	1.0407
Medium metro	260	177,601,173	2,526,175,073	45,285,068	72,224,939	1.0744	1.0762	0.9983
Small metro	185	60,918,317	888,814,246	17,166,316	28,251,351	1.1020	1.1105	0.9923
Large rural, adjacent	172	43,481,541	594,956,865	12,509,025	19,682,739	1.0335	1.0618	0.9734
Large rural, non-adjacent	147	26,580,543	333,378,748	8,211,408	11,514,282	0.9473	0.9462	1.0012
Medium rural, adjacent	553	39,457,205	544,759,298	12,986,616	19,976,172	1.0428	1.0380	1.0047
Medium rural, non-adjacent	722	39,758,385	454,056,232	13,520,754	17,270,967	0.8626	0.8620	1.0007
Small rural, adjacent	240	6,275,586	103,625,662	2,263,033	3,848,783	1.2472	1.1476	1.0868
Small rural, non-adjacent	608	11,679,329	148,023,675	4,312,017	5,682,483	0.9573	0.8893	1.0765
Metro-non-metro								
non-metro	2,442	167,232,587	2,178,800,478	53,802,853	77,975,426	0.9841	0.9780	1.0062
metro	626	629,871,800	8,374,466,629	146,419,114	218,740,199	1.0042	1.0081	0.9962
All	100.00%	100.00%	100.00%	100.00%	100.00%			
Large metropolitan	5.90%	49.10%	46.99%	41.94%	39.86%			
Central large metro	1.60%	34.44%	28.81%	29.69%	25.26%			
Fringe large metro	4.30%	14.66%	18.18%	12.25%	14.60%			
Medium metro	8.47%	22.28%	23.94%	22.62%	24.34%			
Small metro	6.03%	7.64%	8.42%	8.57%	9.52%			
Large rural, adjacent	5.61%	5.45%	5.64%	6.25%	6.63%			
Large rural, non-adjacent	4.79%	3.33%	3.16%	4.10%	3.88%			
Medium rural, adjacent	18.02%	4.95%	5.16%	6.49%	6.73%			
Medium rural, non-adjacent	23.53%	4.99%	4.30%	6.75%	5.82%			
Small rural, adjacent	7.82%	0.79%	0.98%	1.13%	1.30%			
Small rural, non-adjacent	19.82%	1.47%	1.40%	2.15%	1.92%			
Metro-non-metro								
non-metro	79.60%	20.98%	20.65%	26.87%	26.28%			
metro	20.40%	79.02%	79.35%	73.13%	73.72%			

Counties classified according to Calvin Beale's (U.S. DoA ERS) categorization
Some independent cities combined with their adjacent county

Tab 1: Income and population growth 1969-70 to 2005-06 by county type

Commercial aviation reduces the advantages of a central location while, in combination with local resources and the accidents of history, decreasing the penalties of a peripheral location to the point that even headquarters functions can function effectively away from large cities. Accordingly, as air travel has become increasingly integrated into the business process over the past half century, New York City, Los Angeles, and Chicago have declined in importance as locations for large corporate headquarters. Table 2 shows that Fortune 500 headquarters have become less concentrated in the very largest cities and less concentrated overall. Some of the most innovative and information-intensive international firms, such as WalMart and SAP, are headquartered far from gateway airports.

	1955		1970		1980		1990		2000		2007	
		#		#		#		#		#		#
1	New York	142	New York	117	New York	81	New York	43	New York	41	New York	45
2	Chicago	50	Chicago	39	Chicago	25	Chicago	22	Houston	20	Houston	22
3	Pittsburgh	25	Cleveland	15	Pittsburgh	16	Dallas	15	Chicago	13	Atlanta	12
4	Philadelphia	20	Pittsburgh	15	Stamford, CT	15	Houston	14	Atlanta	12	Chicago	11
5	Detroit	20	Los Angeles	13	Los Angeles	12	Cleveland	13	Pittsburgh	8	Dallas	11
6	Cleveland	16	Philadelphia	11	Houston	12	Pittsburgh	12	San Francisco	8	Philadelphia	8
7	Los Angeles	14	Milwaukee	9	St. Louis	11	Atlanta	9	Cleveland	7	Minneapolis	8
8	St. Louis	12	St. Louis	9	Dallas	11	Los Angeles	9	St. Louis	7	Pittsburgh	7
9	San Francisco	11	Detroit	8	Cleveland	9	St. Louis	9	Los Angeles	7	St. Louis	7
10	Minneapolis	8	Minneapolis	8	Minneapolis	8	Minneapolis	7	Dallas	6	Charlotte	7
in Top Ten:		318		244		200		153		129 (self compliled)		138

Tab 2: Geographic distribution of U.S. fortune 500 headquarters

A comparison of the geography of two sub-sectors of producer services illustrates the diversity of redistribution. New York (Manhattan) County's earnings in finance, insurance, and real estate (FIRE) grew faster than the national average between 1969-1970 and 1999-2000, supporting the global cities hypothesis. However, Table 3 shows that twelve counties, which were prominent centres of FIRE activity, (as defined by earnings in 1969-1970) grew even faster, leading to a net redistribution of the sector. Earnings in one county grew at more than three times the national average and at more than twice in another two. In 1969-1970, Dallas County, which was the largest of the rapidly growing counties in 1969-1970, could claim earnings of only one-tenth that of New York. Dallas' share of the sector grew disproportionately.

Table 4 displays similar information for the more diverse residual category of business services. Based on total earnings, New York (Manhattan) County was dominant in this sector in 1969-1070. Based on total earnings, it was nearly twice as important as the next most-important county in 1969-1970, Los Angeles. By 1999-2000, New York was still the most important but several other counties, including Los Angeles, Santa Clara (Silicon Valley), and King (Seattle area), were nearly as large. Cook (Chicago) and Dallas Counties followed closely.

The growth of business services outside New York began from a low base. Moreover, the redistribution of headquarters, FIRE earnings, and business service income was from a very large dominant city to somewhat smaller, but still large, cities. It might be tempting to claim that the highest skill work remains in New York – and much of it may be – but, until very recently, Charlotte, North Carolina was ranked as the second-largest centre of banking deposits.

Rank in 1969-1970	County Name	F.I.R.E. Earnings 1969-1970	1999-2000	Growth relative to base year	Growth relative to average
1	New York, New York	4,813,474	95,403,756	19.8201	1.1430
2	Los Angeles, California	1,810,337	22,148,590	12.2345	0.7056
3	Cook, Illinois	1,692,124	23,329,522	13.7871	0.7951
4	San Francisco, California	735,362	11,383,985	15.4808	0.8928
5	Suffolk, Massachusetts	678,930	12,328,276	18.1584	1.0472
6	Philadelphia, Pennsylvania	658,522	3,918,134	5.9499	0.3431
7	Wayne, Michigan	598,608	2,780,539	4.6450	0.2679
8	Dallas, Texas	478,921	11,208,542	23.4037	1.3497
9	Essex, New Jersey	413,126	3,491,181	8.4507	0.4874
10	Hartford, Connecticut	411,198	6,055,533	14.7266	0.8493
11	Harris, Texas	410,330	10,538,838	25.6838	1.4812
12	Cuyahoga, Ohio	392,675	4,411,260	11.2339	0.6479
13	Fulton, Georgia	345,302	6,346,328	18.3791	1.0599
14	Miami-Dade, Florida	334,165	5,489,341	16.4270	0.9473
15	King, Washington	333,019	5,893,635	17.6976	1.0206
16	Hennepin, Minnesota	318,507	7,273,871	22.8374	1.3170
17	Allegheny, Pennsylvania	309,384	3,979,471	12.8626	0.7418
18	Baltimore (City), Maryland	297,136	2,904,741	9.7758	0.5638
19	District of Columbia	296,494	2,967,720	10.0094	0.5772
20	Nassau, New York	278,732	5,501,192	19.7365	1.1382
21	Marion, Indiana	253,984	2,775,206	10.9267	0.6301
22	Milwaukee, Wisconsin	246,805	2,675,902	10.8422	0.6253
23	Kings, New York	245,006	3,260,511	13.3079	0.7675
24	Orange, California	243,706	10,074,264	41.3378	2.3839
25	Jackson, Missouri	234,332	2,498,582	10.6626	0.6149
26	Hamilton, Ohio	219,174	2,563,356	11.6955	0.6745
27	St. Louis (City), Missouri	215,174	1,418,192	6.5909	0.3801
28	Franklin, Ohio	213,554	4,041,473	18.9248	1.0914
29	Denver, Colorado	213,069	3,759,325	17.6437	1.0175
30	Maricopa, Arizona	204,534	8,412,113	41.1282	2.3718
31	Queens, New York	202,304	2,258,802	11.1654	0.6439
32	San Diego, California	200,376	5,925,351	29.5712	1.7054
33	Westchester, New York	198,464	4,519,026	22.7701	1.3131
34	Multnomah, Oregon	187,768	2,212,603	11.7837	0.6796
35	Orleans, Louisiana	185,510	896,192	4.8310	0.2786
36	Alameda, California	185,147	2,053,881	11.0933	0.6397
37	Erie, New York	162,514	1,830,122	11.2614	0.6494
38	Richmond (City), Virginia	160,447	2,734,679	17.0442	0.9829
39	St. Louis, Missouri	156,004	3,867,722	24.7925	1.4298
40	Middlesex, Massachusetts	155,769	3,044,013	19.5418	1.1270
41	Davidson, Tennessee	152,329	2,056,861	13.5028	0.7787
42	Duval, Florida	151,839	3,341,574	22.0074	1.2692
43	Santa Clara, California	146,612	3,359,432	22.9138	1.3214
44	Jefferson, Kentucky	143,431	1,751,629	12.2123	0.7043
45	Fairfield, Connecticut	141,380	7,970,560	56.3771	3.2512
46	Bexar, Texas	140,705	3,344,782	23.7716	1.3709
47	Ramsey, Minnesota	132,999	1,556,172	11.7006	0.6748
48	Jefferson, Alabama	132,564	1,898,301	14.3199	0.8258
49	Broward, Florida	130,940	3,384,292	25.8461	1.4905
50	Polk, Iowa	130,880	2,344,490	17.9133	1.0331

Tab 3: Largest 50 counties by 1969-1970 earnings in finance, insurance and real estate

Specialization requires frequent contact across long distances, whether engineers are being ferried aboard the "nerd birds" that connect distant high technology clusters or investment bankers are speeding between appointments in far-flung financial centres or IT consultants are commuting on early Monday and late Thursday flights. In the process, cities shift from being central places to being open spaces. The restructured economy has undoubtedly benefited the largest cities but selected second-tier cities and high-amenity areas have benefitted more.

4 Regionalization and the rise of airport cities

Airport cities are sometimes seen as a product of globalization. Commercial aviation certainly has been a tremendous aid to the globalization process. Conversely, globalization may be responsible for the rise of airport cities in greenfield development. However, it is not clear that immediate airport proximity is a salient factor in firm location decisions in mature cities when inter-continental trips are common. Japanese firms and seconded Japanese nationals in New York, concentrating in the area of the metropolitan region farthest from JFK Airport, have generally let residential amenities outweigh airport access in making location decisions.

Direct access may be a salient location factor when an airport area location has a significant impact on the length of a trip by eliminating or reducing the need for overnight stays. Consequently, airport cities may offer their most significant competitive advantages in Europe and North America when business flights average an hour or two in length. Simulations of market reachability on single-day trips, shown in Figure 3, suggest that airport cities can amplify the impact of the benefit of commercial aviation in such cases. Naturally, the costs of reaching customers increase with distance, so only some of the non-local business opportunities are viable but, at moderate flight distances, a location near an airport can significantly increase a firm's market size

Rank in 1969-1970	County Name	F.I.R.E. Earnings 1969-1970	1999-2000	Growth relative to base year	Growth relative to average
1	New York, New York	4,813,474	95,403,756	19.8201	1.1430
2	Los Angeles, California	1,810,337	22,148,590	12.2345	0.7056
3	Cook, Illinois	1,692,124	23,329,522	13.7871	0.7951
4	San Francisco, California	735,362	11,383,985	15.4808	0.8928
5	Suffolk, Massachusetts	678,930	12,328,276	18.1584	1.0472
6	Philadelphia, Pennsylvania	658,522	3,918,134	5.9499	0.3431
7	Wayne, Michigan	598,608	2,780,539	4.6450	0.2679
8	Dallas, Texas	478,921	11,208,542	23.4037	1.3497
9	Essex, New Jersey	413,126	3,491,181	8.4507	0.4874
10	Hartford, Connecticut	411,198	6,055,533	14.7266	0.8493
11	Harris, Texas	410,330	10,538,838	25.6838	1.4812
12	Cuyahoga, Ohio	392,675	4,411,260	11.2339	0.6479
13	Fulton, Georgia	345,302	6,346,328	18.3791	1.0599
14	Miami-Dade, Florida	334,165	5,489,341	16.4270	0.9473
15	King, Washington	333,019	5,893,635	17.6976	1.0206
16	Hennepin, Minnesota	318,507	7,273,871	22.8374	1.3170
17	Allegheny, Pennsylvania	309,384	3,979,471	12.8626	0.7418
18	Baltimore (City), Maryland	297,136	2,904,741	9.7758	0.5638
19	District of Columbia	296,494	2,967,720	10.0094	0.5772
20	Nassau, New York	278,732	5,501,192	19.7365	1.1382
21	Marion, Indiana	253,984	2,775,206	10.9267	0.6301
22	Milwaukee, Wisconsin	246,805	2,675,902	10.8422	0.6253
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49	Broward, Florida	130,940	3,384,292	25.8461	1.4905
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Tab 4: Largest 50 counties by 1969-1970 earnings in business services

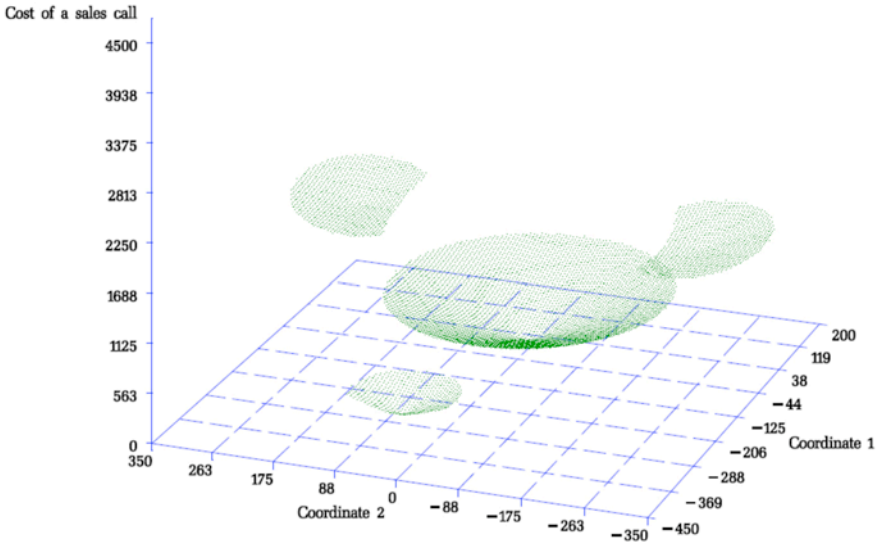

Fig. 3: Simulation of potential costs of a sales call using automobile and air transport

The simulations also suggest that the benefit of an airport city location to a small number of firms is low. The market access benefit increases markedly when distant customers are located near their respective airports. Ironically, the benefit of locating in a particular airport city depends critically on the growth of distant airport cities, as central places become open spaces.

A comparison of the local point of origin of frequent fliers for two airports in the San Francisco region corroborates the role of regional, rather than global, air linkages in creating dense agglomerations around airports. Figure 4 shows the regional geographic origins of frequent fliers at San Francisco International Airport (SFO). The larger the circle, the more frequently the respondent had used SFO over the previous year. SFO serves many distant, often international, destinations and draws frequent fliers from a large geographic catchment area. Corresponding data for San Jose Airport (SJC), which serves mainly regional destinations, is shown in Figure 5. Fliers, especially frequent fliers, are so tightly packed around SJC that they obscure its location. Airport cities matter more for shorter trips than longer trips because the ground portion of the trip is a greater proportion of the total travel, as suggested by the New York-Chicago example above.

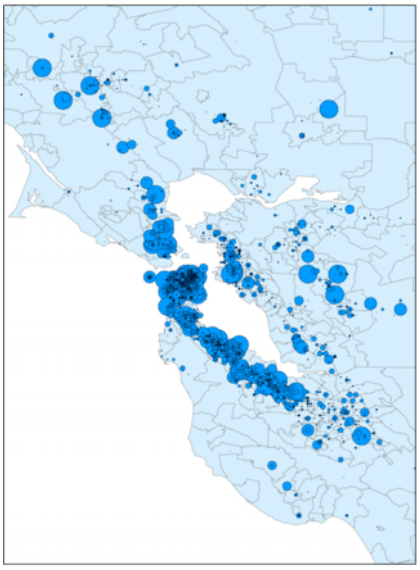

Fig. 4: Origins of passengers flying through SFO

Fig. 5: Origins of passengers flying through SJC

5 Conclusion

In summary, aviation researchers have been looking in all the wrong places in attempting to measure the economic impact of commercial aviation and of airports. First, commonly used indicators of economic impact measure the costs of trade rather than net gains from trade. These could match if economies of scale and the nature of competition were simpler but it is likely that much of the benefit of airports is hidden in what economists term a “consumer surplus.” The size of the consumer surplus is unknown but probably significant. This implies that the long-run demand for aviation may be less price sensitive than the short-run effects.

Second, aviation researchers look to global cities, rather than further down the urban hierarchy, possibly even at selected “spokes” in aviation network instead of at core hub cities to see the strongest effect of aviation. To be sure, air transport has benefited some large core cities but it has advantaged some formerly remote cities even more. Amsterdam, London, and New York were centres of the world system before air travel was prevalent, or even possible (Wallerstein, 1974). Air transport has a “flattening” effect.

Third, aviation researchers look at globalization rather than regionalization. Globalization and global air flows are clearly important, yet most air-enabled trade and travel is within intra-continental regions. The growth of mega-regions, linked in part by air throughout a continent, appears to be much more important in the growth of airport cities in Europe and North America than globalization. While there are some who might fly from Asia for a brief few-hour meeting in Europe before flying on to North America, even for most frequent fliers, the extra hour or so to reach a downtown hotel after a long flight is not especially salient. On the other hand, if there is a chance to make it back home in the evening, then the time savings could be critical.

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Feeder airport city

A spatial model to foster equitable regional planning

Vasanth K. Bhat

1 Introduction

Over the last decade there has been a substantial rise in air traffic in India. With the growth of the proverbial "Middle Class" in India, and also with the entry of the private sector into aviation, there is a huge potential to provide air accessibility, to tier II and tier III cities in India. Hitherto most of the airports were planned and executed in Metropolitan cities and tier I cities, and people living in tier II and tier III cities had to commute to the nearest Metro or tier I city to take a flight to their destination.

On the other hand there is an imbalance in the regional planning scenario in India. Most of the tier II and tier III cities are devoid of proper social infrastructure, which makes them less attractive to the middle class. Consequently there is a constant out-migration of young ambitious educated professionals from tier II and tier III cities into Metro and tier I cities, which provide them with means to enrich their living comforts. In addition immigration of population from the rural areas into the large urban conglomerates deteriorate the situation in Indian Metros.

To curb the tendency of out-migration from tier II and tier III cities into Metros, it is imperative that these cities be made as attractive as metros for the ambitious upwardly mobile youth of today. In this regard this paper proposes the setting up of "Feeder Airport Cities" in the vicinity of tier II and tier III cities. The setting up of "Feeder Airport Cities" to acquire equitable regional planning, will in turn induce equitable economic growth in all the regions of India, and act as counter magnets to arrest the uncontrolled growth of Metros and tier I cities in the Indian context.

A gaze into the crystal ball says that just as seaports in the 18th century, railroads in the 19th century and highways in the 20th century spawned the growth of cities and towns, airports will spawn urban growth in the 21st century. Once the air connectivity through India's 1800 odd tier II and tier III cities becomes reality, it would lay the foundation of truly inclusive growth, rendering geographical distances meaningless and making the tier II and tier III cities equally attractive for the young and the ambitious.

1.1 Definition

By "Feeder Airport City", I mean airport cities set up in tier II & tier III cities which act as feeder airports for the use of low cost airlines and budget airlines, which cater to the travel demands of the middle class in tier II and tier III cities in India. The Feeder Airport Cities could be self contained entities which bear all the basic Infrastructure and conveniences that are essential for the independent economic survival and prosperity of an Airport City, but in a much smaller economic scale, just enough to cater to the demands of a localized population.

The Feeder Airports could serve as a feeder to the main airports located in metros and tier I cities on a "Hub & Spoke" concept. The advantage of this setup is that the congregation of traffic, cargo and passenger, into the hub airport justifies the huge investment made into it, while the feeder airports, which are much smaller (with lower investment), handle the secondary traffic. Financially, this has turned out to be the most viable model.

1.2 Proposed model

The setting up of "Feeder Airport Cities", in the outskirts of tier II cities, with their own social and physical infrastructure, employment opportunities, business centres etc. would act as catalysts of change. Besides reducing passenger and freight travel time, the economic benefits of the aviation industry's ability to move inland, and take advantage of lower land cost and labour would not only ensure higher profitability return on capital, but also ensure equitable regional planning in terms of increasing the attractiveness of small towns. Such counter-magnets would divert the attraction of metros and tier I cities, thus helping to decongest the metros and tier I cities.

2 Growth pole concept as applied to "Mini-Aerotropolis"

The concept of Mini-Aerotropolis is very well corroborated by the growth poles theory, which propounds that economic development, or growth, is not uniform over an entire region, but instead takes place around a specific pole. This pole is often characterized by a key industry around which linked industries develop, mainly through direct and indirect effects. In the case of the Mini-Aerotropolis, the key Feeder Airport along with its peripheral activities in itself acts as the "Key industry" which spawns economic growth in the region surrounding it. The creation of this key industry implies the expansion of output, employment, related investments, as well as new technologies and new industrial sectors. Because of scale and agglomeration

economies near the growth pole, regional development is unbalanced. Transportation, especially transport terminals, can play a significant role in such a process. The more dependent or related an activity is to transportation, the more likely it is for a relationship to be established and to thrive.

Perroux[1] and other writers on Growth Pole tried to base the concept on the notion of external economies, agglomeration and linkages. It was believed that beneficial "spread effects" from growth poles would eventually induce development in the remaining peripheral areas, and that they would have a significant relay function in the process of innovation diffusion through the urban hierarchy. The neoclassical regional growth model primarily focuses on the long-run potential growth path of the economies. Corresponding to this is the 'Circular and Cumulative Growth Model' enunciated by Gunnar Myrdal and expanded by Allen Prede. This model advocates a regional growth approach, which is sought to be "self equilibrating". It is envisaged to be applied in proposing the "Mini-Aerotropolis" in which the Feeder Airport forms the fulcrum or pole, which facilitates economic growth in a region. Furthermore, it is assumed that a system of interconnected Aerotropolises, with varied means of basic economic activity, like agriculture, fisheries, tourism, etc. would be interdependent on each other and thereby help in expansion of their economic activities, thus creating a multiplier effect, which would lead to equitable growth of the economy throughout the length and breadth of the country.

3 Feeder airport city as a Mini-Aerotropolis: The new paradigm

Picture a dot and four circles around it, each larger than the preceding one. The dot is the Feeder airport, the innermost circle, within 0 to 4.0 km from the airport, will house businesses and facilities that feed the airport and feed off it—like trade zones, warehouses and logistics hubs. The middle circle, 4.0 to 6.0 km in radius will have residential quarters for people who work in the two inner and outer circles, including civic amenities, like educational institutions, places of worship, etc. for additional necessities. The next outer circle from 6.0 to 8.0 km radius will house companies, medium scale industries like the agro-based industry, which are in consonance with activates in the region surrounding the Feeder Airport, like the food processing industry, canning industry, etc. The outer Circle with a diameter of up to 225 km forms the hinterland to the Feeder Airport. These hinterlands could be predominantly agricultural, fisheries (as in coastal areas), tourism based as in regions with heritage buildings, religious/pilgrimage centres, nature endowed

[1] http://www.siliconindia.com/magazine

regions etc. These outer circles are tangential to each other and hence cover the entire geographical area of India.

Citing an example of Karnataka, a Federal state in south India, Hassan a tier II city is close to the world heritage sites of Belur, Halebid, Bellary, also a tier II city close to the heritage sites of Hampi, Ihole, Pattadkal, which attract international tourists. Mangalore a tier II City is close to the fishing harbour of Malpe and also is an educational and pilgrimage centre. This model applied to the country as a whole would further stimulate economic growth across the country, especially in the traditionally backward areas of the states of Bihar and Uttar Pradesh in North-India.

Given the huge land requirement and project cost, it is imperative to locate the Feeder Airports in the outskirts of non-metro cities and towns, preferably in wastelands or unfertile lands not fit for cultivation. The Feeder Airports thus located will trigger a reverse flow of businesses from cities to towns, and spread the fruits of economic success, across regions and people.

Hence, it is proposed that the "Dot" – the centre of this circle, where the Feeder Airport is located will be situated at least about 10 km away from the tier II city/town. This distance is important in order to preserve the original identity of the city/town, its cultural heritage, its existing land-use patterns, property ownership patterns, etc.

In terms of size, the airport is dwarfed by everything around it. Yet, it is the primary reason the three circles along with the fourth outer circle being the hinterland, can create a bustling, self-contained ecosystem. The essence of this thought is to place the airport in the middle and build everything around it rather than shunt an airport to the periphery of the city.

The Feeder Airport City – or the "Mini- Aerotropolis" is a concept the makers or renovators of Airports in tier II towns in India can resort to in order to fulfil the Government's stated objective of "equitable distribution of wealth" in all regions of India. This could be the guiding principle in the location of airports in Tier II cities like Mangalore, Hubli, Nagpur, Durgapur, Kochi, Hassan, etc.

Based on my above arguments, I coin the term "MINI-AEROTROPOLIS" for the Feeder Airport City, which besides the three outer circles, comprises the fourth extreme circle, with a wide radius of say 225 km. Encompassing the entire region benefiting from the Feeder Airport, i.e. the Hinterland. This is envisaged to be multiplied many times over in the perspective of a large country like India, so as to achieve equitable economic growth of the regions covered by the Feeder Airports.

INDEX	DISTANCE FROM AIRPORT IN KM	FUNCTIONAL ZONE	REMARKS
1.	0	FEEDER AIRPORT IN TIER II CITY	<2.0 KM FROM EXISTING TIER II CITY
2.	0-4	SERVICE ZONE – WAREHOUSES, AIRPORT LOGISTICS, SURFACE TRANSPORT TERMINALS, ETC.	NON POLLUTING ACTIVITIES
3.	4 - 6	RESIDENTIAL ZONE WITH EDUCATIONAL & RECREATIONAL FACILITIES+ OTHER CIVIC AMENITIES	
4.	6 – 8	INDUSTRIAL ZONE – SMALL SCALE INDUSTRIES, MEDIUM SCALE INDUSTRIES, FOOD PROCESSING, PACKAGING, ETC.	AGRO-BASED INDUSTRIES. HINTERLAND SPECIFIC
5.	8-225	HINTERLAND – VILLAGES WITH AGRICULTURE DAIRY FARMING ACTIVITIES	

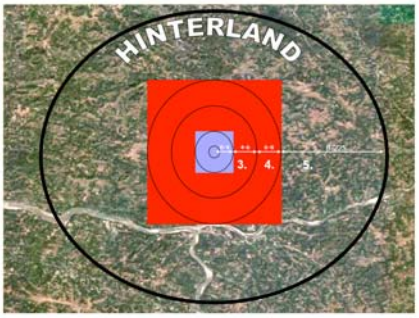

Fig. 1: Concept of Mini-Aeroptropolis showing the various components

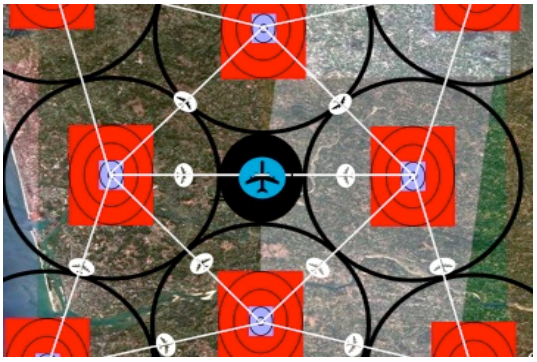

Fig. 2: Conglomeration of Mini-Aeroptropolis in a region of South India. The fulcrum here is the international airport in the metropolis.

The Mini-Aerotropolis is conceived not only as a junction for flights to take off and land. They are being designed to shape and drive economic activity in a region. The distribution of such Mini-Aerotropolises across the country with distances not less than 450 km (the lower limit assumed as 30 minutes flight time from any two adjacent Feeder airports) will have a great impact in facilitating equitable regional planning.

4 Advantages of the creation of a Mini-Aerotropolis

The concept of Mini-Aerotropolis facilitates the connection of the tier II city with its surrounding countryside (hinterland), which in turn establishes air-connectivity to the major Metropolises (by means of Hub & Spoke system) and thereby to the rest of the world. Subsequently there would be equitable growth in the entire region covered by the matrix of the Mini-Aerotropolis. The Indian Diaspora would actually

be extending its own, seemingly unrelated goals for the region. It would improve opportunities for women (by bringing in manufacturing jobs), help farmers and fishermen sell their produces overseas (by connecting them to foreign markets), give an impetus to the tourism industry and stem the migration of villagers into overcrowded cities such as Mumbai and Kolkota by creating new growth centres.

If the feeder-airport is the mechanism to realise the concept, everything else - factories, offices, homes, schools - will be built in relation. Thus it can be proved that the union of equitable regional planning, airport planning, and business strategy can generate a whole new set of values through which the effects of globalisation can trickle down to the common man. As Kasarda says: "And the whole will be something altogether different than the sum of its parts."

5 Policies & conflicts involving financing of feeder airports

For a very long time our airports have been deliberately planned outside city limits. One can't say they have been neglected, but surely they were never top priority. In India, 35 % of the country's trade by value goes by air. The private economy has begun to evince keen interest in building airports, as it has been witnessed in the last few years. The Aerotropolis concept is still a new one, and with Indian industry taking cognizance of their use as drivers of growth, it may be possible to leverage them to build the infrastructure our cities - and not just the airports.

Governments across the developing world have so far played the part of “Providers of Infrastructure”. Their willingness to break with the past in pursuit of something truly new stems largely from having so little to protect. Over the last decade, the Indian government has realised the potential of the Private economy in the provision of infrastructure and hence, the pressure on Private-Public-Participation in building huge Infrastructure projects grows.

Airport	Class of city	Region	Population (2001)	Per Week (DGCA 2004)			AS/week 2004	Weekly LF	
				Pax embarked	Pax dis embarked	Number of flights		emb	demb
Mumbai	A:MM	W	16,368,084	76352	76081	956	125214	0.61	0.61
Kolkata	A:MM	E	13,216,546	23946	23996	308	38578	0.62	0.62
Delhi	A:MM	N	12,791,458	58360	58026	560	96216	0.61	0.60
Bangalore	A:Metro	S	5,686,844	25792	26058	340	40012	0.64	0.65
Hyderabad	A:Metro	S	5,533,640	15015	16079	214	26200	0.57	0.61
Chennai	A:MM	S	5,421,985	24848	23132	245	43160	0.58	0.54
Ahmedabad	A:Metro	W	4,519,278	6986	7094	105	14222	0.49	0.50
Pune	A:Metro	W	3,755,525	4462	4468	70	10416	0.43	0.43
Imphal	A:Metro	NE	2,459,967	1250	1146	18	1946	0.64	0.59
Jaipur	A:Metro	N	2,324,319	2440	2309	74	7448	0.33	0.31
Lucknow	A:Metro	N	2,266,933	3101	3140	77	8734	0.36	0.36
Nagpur	A:Metro	W	2,122,965	2234	2193	42	5036	0.44	0.44
Patna	A:Metro	E	1,707,429	1453	1555	42	5642	0.26	0.28
Indore	A:Metro	W	1,639,044	2144	2208	42	4386	0.49	0.50
Vadodara	A:Metro	W	1,492,398	3042	2970	53	4448	0.68	0.67
Bhopal	A:Metro	W	1,454,830	1076	1021	28	3084	0.35	0.33
Coimbatore	A:Metro	S	1,446,034	2570	2527	46	6444	0.40	0.39
Cochin(Kochi)	A:Metro	S	1,355,406	4571	4473	74	11254	0.41	0.40
Vizac	A:Metro	S	1,329,472	1479	1498	25	2646	0.56	0.57
Agra	A:Metro	N	1,321,410	183	150	11	378	0.48	0.40
Varanasi	A:Metro	N	1,211,749	1542	1691	28	4624	0.33	0.37
Allahabad	A:Metro	N	1,049,579	NA	NA	NA	756	NA	NA
Amritsar	A:Metro	N	1,011,327	54	66	1	320	0.17	0.21
Rajkot	A:Metro	W	1,002,160	1215	1213	25	3528	0.34	0.34
Srinagar	B	N	971,357	2448	2433	28	3010	0.81	0.81
Aurangabad	B	W	891,841	1095	1027	32	2044	0.54	0.50
Trivandrum	B	S	889,191	2396	2373	32	4882	0.49	0.49
Calicut	B	S	880,168	1403	1392	39	6602	0.21	0.21
Ranchi	B	E	862,850	621	656	21	2002	0.31	0.33
Jodhpur	B	N	856,034	846	893		1344	0.63	0.66
Trichy	B	S	847,131	112	145	11	800	0.14	0.18
Trichy	B	S	847,131	112	145	11	800	0.14	0.18
Guwahati	B	NE	814,575	5194	5102	81	10438	0.50	0.49
Chandigarh	B	N	783,875	728	730	21	1708	0.43	0.43
Raipur	B	E	699,264	719	738	25	2104	0.34	0.35
Bhubaneshwar	B	E	657,477	1655	1701	39	5380	0.31	0.32
Jammu	B	N	607,642	2067	2092	32	3034	0.68	0.69
Jamnagar	B	W	558,462	424	446	18	882	0.48	0.51
Mangalore	B	S	538,560	1982	2121	35	3108	0.64	0.68
Bhavnagar	B	W	517,578	526	482	11	1102	0.48	0.44
Gaya	C	E	394,185	NA	NA	NA	160	NA	NA
Udaipur	C	N	389,317	1753	1686	46	1740	1.01	0.97
Tirupati	C	S	302,678	132	193	7	320	0.41	0.60
Shillong	C	NE	267,881	NA	NA	NA	144	NA	NA
Aijwal	C	NE	229,714	515	488	7	1236	0.42	0.40
Bhuj	C	W	209,190	555	610	14	882	0.63	0.69
Porbandar	C	W	197,414	129	154	11	396	0.33	0.39
Agartala	C	NE	189,327	2016	2010	39	2318	0.87	0.87
Silchar	C	NE	184,285	841	825	21	1512	0.56	0.55
Dibrugarh	C	NE	137,879	759	756	42	1512	0.50	0.50
Jorhat	C	NE	135,091	257	273	7	504	0.51	0.54
Dimapur	C	NE	107,382	278	255	4	588	0.47	0.43
Goa	D	W	98,915	6787	6820	84	11870	0.57	0.57
Portblair	D	S	93,510	1942	1784	28	2016	0.96	0.89
Madurai	D	S	90,073	1127	1236	25	2044	0.55	0.60
Tezpur	D	NE	83,028	50	66	2	252	0.20	0.26
Diu	D	W	53,135	99	125	7	396	0.25	0.31
Leh	E	N	27,513	1272	1282	18	1890	0.67	0.68
Khajuraho	F	W	19,282	453	314	7	1638	0.28	0.19
Baghdogra	F	E	15,722	1447	1383	25	3218	0.45	0.43
Agatti	G	S	7,007	102	100	18	108	0.94	0.93
Lilabari		NE	NA	33	26	4	144	0.23	0.18
Puttaparthy		S	NA	NA	NA	NA	320	NA	NA
Belgaum		S	506,235	101	82	4	NA	NA	NA
Gorakhpur		N	NA	85	93	7	1008	0.08	0.09
Hubli		S	NA	99	89	4	NA	NA	NA
				307167			549348		

Note : * Region (E = East, W = west, N = North, S = South, NE = North East), ELF = embarked load factor, MM = Major Metro, AS = Available Seats, LF = Load Facor, Pax = Passengers, emb = embarked, demb = disembarked

Tab. 1: Cities connected by air performance indicators

The state and federal parties bring infrastructure and regulatory resources to the table, clearing the way for speedier development. "If western federal and state governments took the Indian model, there would be a substantial improvement in the quality of both the aeronautical and non-aeronautical services provided," says Kasarda, "And there would be a greater economic stimulus for their regions and their states".

The private-sector model generates the greatest returns not only to the travelling public and the cargo businesses, but it generates the highest quality services with an emphasis on the non-aeronautical. To quote a few examples of the intense interest shown by private investors in investing in Feeder Airport projects, real estate and infrastructure firms like Super Airport Infrastructure, General Aviation Airfield and Infrastructure, Anant Raj Industries, Adarsh Prime Projects and Aero Ports and Infrastructure Projects Pvt. Ltd. have submitted proposals to the government to build airports at various remote parts of the country. These include Karaikal in Puducherry, Paladi Ramsinghpur in Rajasthan, Banaswad in Pune and Pernem in Goa.

State	City
Madhya Pradesh, Uttar Pradesh, Uttaranchal	Jabalpur
	Gwallar
	Allahabad
	Kanpur
	Dehradun
	Nainital/Moradabad
Jammu and Kashmir, Himachal Pradesh, Punjab	Udhampur
	Shimla
	Patiala
	Ludhiana
	Jallandar
Maharastra	Nasik
	Kolhapur
	Ahmednagar
Gujarat, Rajasthan	Surat
	Kesod
	Kota
	Jaisalmer
	Ajmir
	Bikaner
Kerala, Tamil Nadu	Salem
	Pondichery/Tuticorin

State	City
Andhra Pradesh, Karnataka	Mysore
	Hassan
	Bekgaum
	Hubli
	Gulbarga
	Bellary
	Shimoga
	Vijayawada
	Puttaparthy
	Rajahmundry
	Kadapa
West Bengal, Orissa, Bihar, Jharkhand, Chattishgarh	Darjiling
	Rourkela
	Jaypur/Koraput
	Gaya
	Dhanbad
	Jemshedpur
North East	Shillong
	Gangtok
	Itanagar
	Pasighat

Tab. 2: Potential cities for feeder air connectivity

Low cost air travel has acquired great demand, percolating to non-metro towns and tier II cities as well. There has been a spate of private airline operators in the country, that have pried open the interiors of the country, creating an exhaustive network of vast and varied destinations. Low cost connectivity will extend from transporting people to cargo, and from short-sector to long-haul flights. As a progressive observation, we can assume that the future of air transport in India is low cost connectivity.

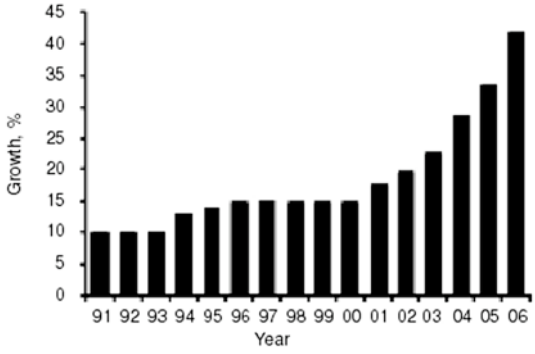

Fig. 3: Trends in growth of air passengers

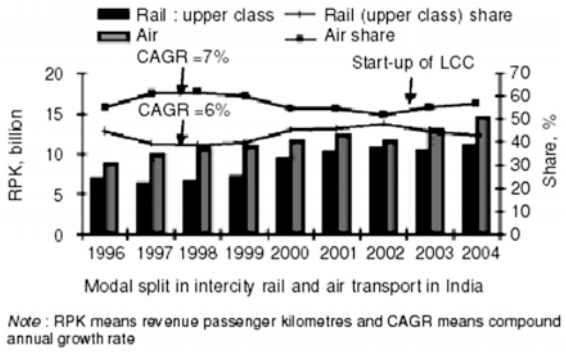

Fig. 4: Passenger traffic carried by upper class rail and air transport

Considering the forecast made by "Foundation for Aviation and Sustainable Tourism"[2], and the Airports Authority of India, the expected growth rate is at 6% per annum till 2017. This is a very conservative estimate. Such forecasts, pose a great challenge for the developers of airport infrastructure who could capitalise on the same issue to focus on building a better infrastructure in our country. The way forward for the development of airport infrastructure is very important and has to be visionary. Worldwide privatisation of airports has created further employment and has been a net contributor to the GDP.

[2] http://www.screenindia.com/news/provide-airport-capacity-ahead-of-demand/130935/

6 Low-cost air travel: A direct beneficiary of the concept of feeder airports

The first decade of the 21st century could well go down in history as the changing point for the Indian aviation sector. The launch of India's first low-cost airline, Air Deccan, in 2003, was a trailblazer in many ways, paving the way for an increase in the number of domestically operating airlines in India from three in the start of the century to over 10 today. In addition the burgeoning traffic volumes registered a 25-30 % growth last year in the country. This growth is expected to continue at a similar rate for the next five years. With 8.3 % of annual average growth rate (AAGR) in 2007, as per IATA, India has also fared well in the international freight category by securing the second position next to China (10.8 per cent AAGR). The business model of low-cost airlines has been tailored to target the large Indian middle-class. This burgeoning section of the economy will ensure the sustenance of this low-cost model even though many players are entering this section. India’s middle class, already bigger than the population of the United States, is expected to grow to 445 million by 2006.

7 Inference

- Mini-Aerotropolis would serve as a commercial hub for an agro-based economy of the surrounding areas (Hinterland), thus serving as an intermediary between the urban and rural areas. Associated with the philosophy of Mahatma Gandhi’s vision of bringing the city to the villages as propounded by him in “Gram-Swaraj”, the comforts of city life would be brought into the small towns and villages. This would help curb the out-migration of youth from the small towns and villages into the metros.
- Mini-Aerotropolises evolve naturally around Feeder airports and hence it can be argued that if this spatial model of Feeder Airport cities is to be induced into the development planning agenda of developing nations, the developing nations would forcefully and purposely design and develop Feeder Airport Cities simply because such developments provide an economic engine, and a highly attractive proposition for the equitable development of regions within the country.
- In the business world those countries that provide the most highly desirable environment along with the best infrastructure win. For a developing nation providing unique opportunities that are not available anywhere else in the world is the most important thing. This would attract Foreign Direct Investments (FDI) from private enterprises in the developed countries, in terms of Private-Public-Participation.

- Once the air connectivity through India's Aerotropolises becomes reality, it would lay the foundation for a truly inclusive economic growth along the length and breadth of the country, rendering geographical distances meaningless.
- Besides reducing passenger and freight travel times, the economic benefits of the spatial distribution of airport infrastructure would leverage lower land costs and labour. This would not only ensure higher profitability and return of capital for the private investor, but also ensure that the benefits of industrialisation pass down to every region of India.
- The information technology and bio-technology industry would not need to hinge their businesses around metros any more, and would have better access to the intellectual capital in and around the tier II and tier III towns of India.
- Due to the emergence of Mini-Aerotropolises, India's manufacturing and farming sectors, outsourcing and tourism sectors, export markets, etc. would have multiple benefits as goods and services would move faster via the cargo and logistic hubs to domestic and international destinations.

List of figures

List of tables

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Forecasting night flight movements at airports

A methodological approach

Christian Blank and Tina Wagner

Air traffic forecasts are a crucial part of the approval procedures for airport extensions. Opponents often contest them, mainly because no different development scenarios are considered. The recent airport extension procedures in Germany revealed a growing concern over health impacts of flights during night time. This is reflected in a trend towards night flight restrictions at airports between 10 pm and 6 am. In this context a methodology for the estimation of future night flight movements at a specific airport has been developed. It builds on a detailed analysis of past and current patterns of night activities in relevant air traffic segments (such as cargo, mail, charter, low cost or long-haul routes) and on the general air traffic forecast.

1 Introduction

In case of airport extensions in Germany the state departments are responsible for the statutory approval-procedures. These procedures always contain an air traffic forecast, provided by the airports' operator. The forecast horizon is at least 15 years. The opponents of airport extensions mostly criticize the forecasts results as well as its methodology and bring it to court. Main critics are dealing with the fact, that these forecasts do not consider scenarios of potential developments such as higher fuel rates. For the approval-procedures only "one" estimation for the total number of flight movements at the forecast horizon is required. This is mainly due to the fact that all impact studies are based on the expected number of flight movements. Preparing court hearings and justifying the planning approval notice, the state departments often assign an independent institute with the quality assurance of these forecasts. Having experience in this field we strongly recommend using the scenario technique for air traffic forecasts because it leads to a better acceptance of the forecast itself and the planning procedures. In consequence, the necessity of further forecasts will be less likely.

The recent airport extension procedures in Germany, particularly in Berlin, Leipzig, Frankfurt and Munich, revealed a growing concern over the health impacts of night flight movements and in consequence a trend towards a strict regulation of night flights. Flight restrictions during night time target the reduction of noise impact of taking off and landing aircrafts. There is a variety of such night flight restrictions, which is illustrated for some significant European airports in Figure 1. The overview points out that in Germany as well as in Europe there is no common standard of night flight restrictions. Between 10 pm and 6 am the restrictions at the selected airports differ in takeoff- and landing-time regulations. In dependency of considered time slices there are curfews and / or movement quotas.

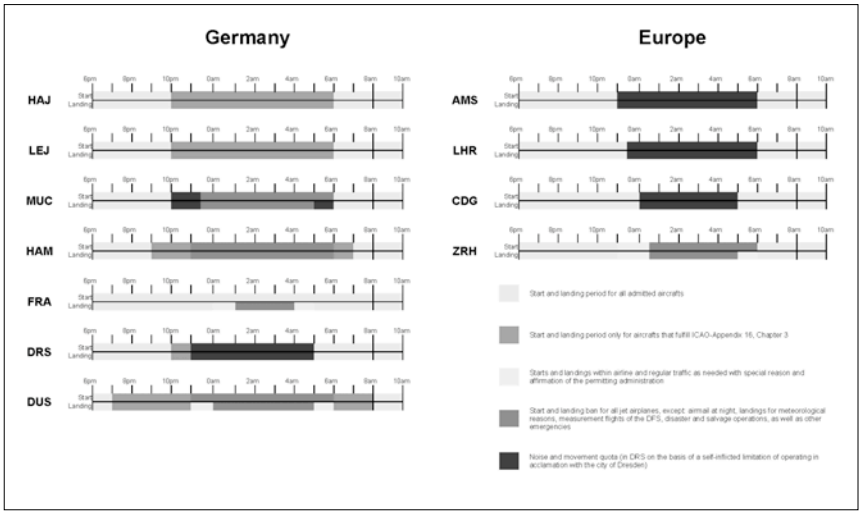

Fig. 1: Survey of night flight restrictions in Europe

Considering this framework, forecasts of future demand for flight movements and more often, specifically for night flight movements are necessary in order to assess the impact of night flight regulations on airlines. While general air transport forecasts predict the number of flight movements at the forecast horizon, the forecast of night flight movements additionally demands the estimation of their future diurnal distribution. The forecast of future night flights at single airports is a relatively new field of research. A review of the state of the art shows that there is no best practice for a demand forecast of night flights.

The paper gives an overview of the methodology used to forecast the night flights of two German hub airports in section 2. In section 3, the relevance of night-time flights for different air traffic segments is illustrated and discussed based on empirical analyses. Assumptions regarding the changing future demand to depart and land at night time are presented in section 4. Next, the forecast methodology is applied to a virtual hub airport (section 5). Finally, strategies for airports and airlines to avoid landing and takeoff activities during night times are briefly discussed in section 6. In section 7, conclusions are drawn and further research questions are raised.

2 Methodology

As mentioned above, there is no standardised method to forecast night flight movements at airports. Generally, traffic forecasts combine quantitative analysis of traffic structures and their determining factors in a reference year and project the structures found into the future, taking into consideration possible structural changes. The overall methodology we applied to forecast the demand for night flight movements at a specific airport is illustrated in Figure 2.

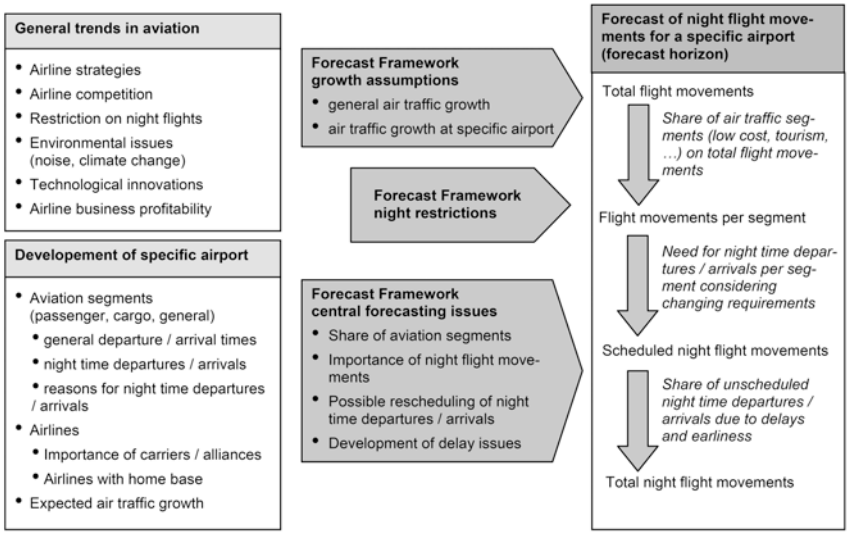

Fig. 2: Methodological framework

The methodology is based on two main analysis steps:

- A detailed quantitative analysis of current (i.e. reference year of the forecast) and past patterns of night flight movements at the respective airport and comparable airports, if possible.
- A qualitative and quantitative analysis of the general trends in aviation business and historic trends of the specific airport

Based on the analysis, assumptions regarding the future demand to take off and land at night time are developed (central forecasting issues), with regard to the expected overall and airport specific growth and possible night operation restrictions.

The general idea of the forecast is that the demand for night flight movements is highly dependent on the air traffic segment considered. For example, low cost passenger traffic shows a higher share of daily flight movements operating at night time than domestic passenger traffic. The segmentation (i.e. the share of total flight movements that belongs to the aviation segments defined) applied for a forecast depends on the airport considered. At regional airports like Hamburg-Lübeck or Frankfurt-Hahn mainly low cost or tourist carriers operate and only few intercontinental destinations are offered. Other airports like traditional carriers serve the main hubs Frankfurt and Munich those focus on their intercontinental connections. Some airports like Cologne or Leipzig focus on cargo transport that has particular requirements for night operations. In section 3 segments for the forecast of future demand for night flight movements at Frankfurt airport are listed and the relevance and reasons for night flight movements of the segments are summarized.

If the segments considered for a specific airport grow at different paces, which is likely, the overall demand of night flight movements will be affected. Higher growth rates expected for cargo traffic than for passenger traffic will result in a greater share of cargo jet movements at the forecast horizon. Besides the segmentation, the demand for night flight movements of a specific segment might also change until the forecast horizon. This can result from airline competition, for example if aircraft operating hours are extended, a phenomenon that could be observed for many low cost and tourist carriers in the past years. It can also be due to changing importance of intercontinental connections that need late departures or early landings at the airport considered.

Starting point of the estimation of night flight movements at a specific airport is a forecast of total flight movements for the forecast horizon. Simple forecasts can be based on trend projection; more sophisticated forecasts are based on complex transport models. The number of total flight movements is disaggregated into air traffic segments with different demands for night flight movements. These segments are defined by type of traffic (i.e. passenger traffic, cargo and general aviation) and destination (i.e. domestic, continental and intercontinental). Usually, the general

segmentation into passenger, cargo and general aviation is known from the total flight movement forecast and can be adopted. However, a finer segmentation will be necessary for most airports.

In a second step, scheduled night flight movements are calculated for each segment, for which the ratio of night flight movements on the total flight movements of a segment is used[1]. It has to be stated that the number of daily night flight movements varies throughout the year (see Figure 3). The ratio of night flight movements should therefore be calculated based on the analysis of a full reference year in order to represent the mean value of daily night movements.

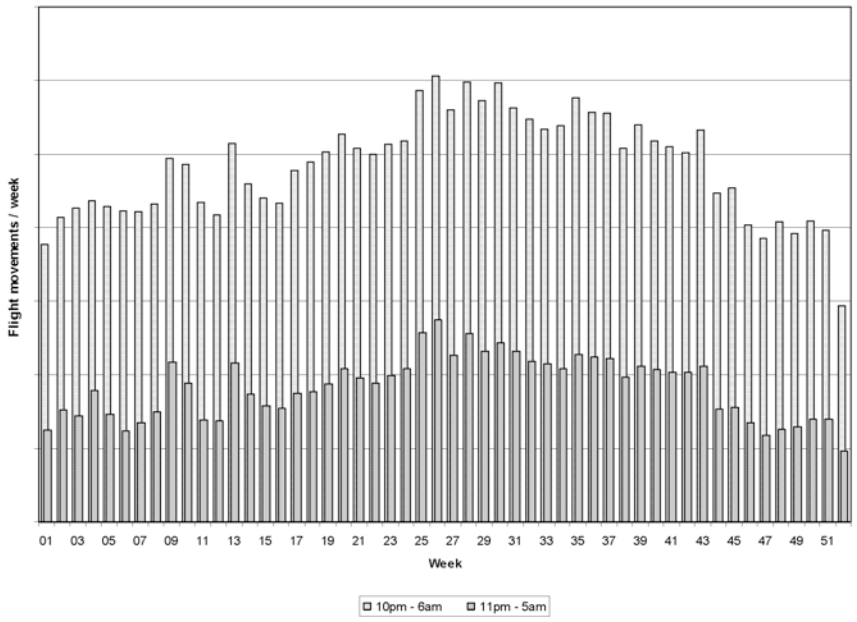

Fig. 3: Distribution of night flight movements per week

Another important reason for night flight movements is the delay of late arrivals and the earliness of departures scheduled just after 6 am. This should be considered in a forecast of night flight movements. Therefore, we estimate scheduled flight movements as well as unscheduled flight movements. This is done using a factor that

[1] In Germany, the night is legally defined to start at 10 pm and end at 6 am. However, the analysis is based on the typical distribution of departures and arrivals throughout the day and can thus be applied to any time period of a day.

reflects the relation of unscheduled and scheduled flight movements during the night.

While the analysis of current night flight movements at the airport considered is straightforward, as detailed flight movement databases are maintained by the airport operators, assumptions need to be made regarding the future segmentation, the future night relevance of the segments as well as the future development of delay and earliness issues. Both the analysis of the flight movement database and possible assumptions regarding the future demand to depart and land at night are discussed in more detail below.

3 Reasons for night flight movements

The analyses presented in this section were performed for the German airports Frankfurt and Munich. The selected figures illustrate relevant issues for the forecast. It has to be stated at this point that the analysis of current night movements and their interpretation has to acknowledge existing night movement restrictions, which can be done by comparing night flight movements of different airports. In this paper, we will not discuss this issue in depth.

Figure 4 illustrates the significance of segmentation. The segment's share in total flight movements and their share in night flight movements can be compared. While continental passenger traffic makes up for more than half of all flight movements, its share in night movements is comparably low. Only 30% of night movements are continental passenger traffic. During the core night, from 11 pm to 5 am, the share shrinks again. Segments of high relevance are continental tourist traffic, intercontinental passenger traffic and intercontinental cargo traffic. For Frankfurt Airport, no separate low cost segment was defined. This is because low cost traffic is of minor importance at Frankfurt Airport. Furthermore the night movement requirements of continental tourist traffic and low cost traffic are getting more similar and a differentiation between low cost carriers and traditional carriers regarding domestic passenger traffic is becoming obsolete. At other airports, some of the segments will drop out, others will be added. In Munich for example, we defined a segment for cargo traffic by integrators, because they had important night movement requirements at this airport. At integrator hubs such as Cologne or Leipzig, this segment would be of high importance.

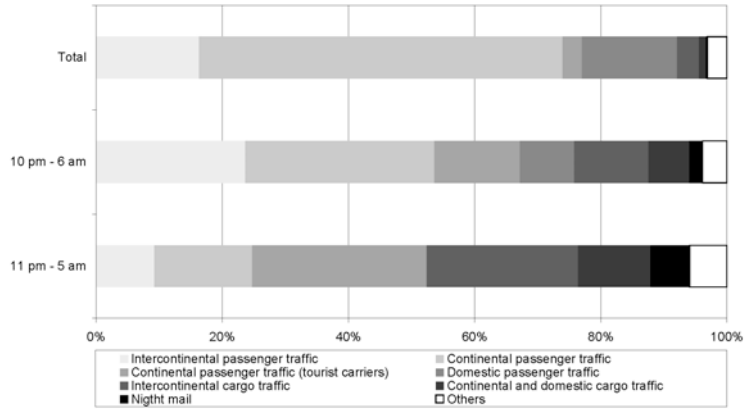

Fig. 4: Segmentation of air traffic at Frankfurt Airport

The distribution of scheduled and performed takeoffs and landings to the time-of-day gives an impression of the night movement requirements of different segments. A general distinction between passenger and cargo traffic is that the acceptable departure and arrival times for passenger flights are limited to the late evening and early morning, as the night is needed for rest. There seems to be, however, a higher acceptance for night time departures and arrivals of tourist flights, probably connected to short holiday trips and low-ticket prices. The scheduling of cargo flights is independent of human preferences. Carriers prefer night time movements in order to guarantee overnight shipments. This becomes obvious considering the nightly operations at integrator hubs such as Cologne, where jets with express shipments from different European regions arrive until 1 am and are unloaded. Shipments are sorted, transferred to the region of destination and loaded into the respective jets that depart between 3 am to 6 am. A further general reason for late arrivals, which is independent of the segment, is the return of aircrafts from home base carriers for maintenance reasons.

In Figure 5, the most important reasons for night flight movements are summarized for the passenger and cargo segments used in the forecast for Frankfurt Airport. It has to be considered, that structures and reasons for night flight movements can be related to individual airport functions. Thus the presented structures cannot be directly transferred to other airports.

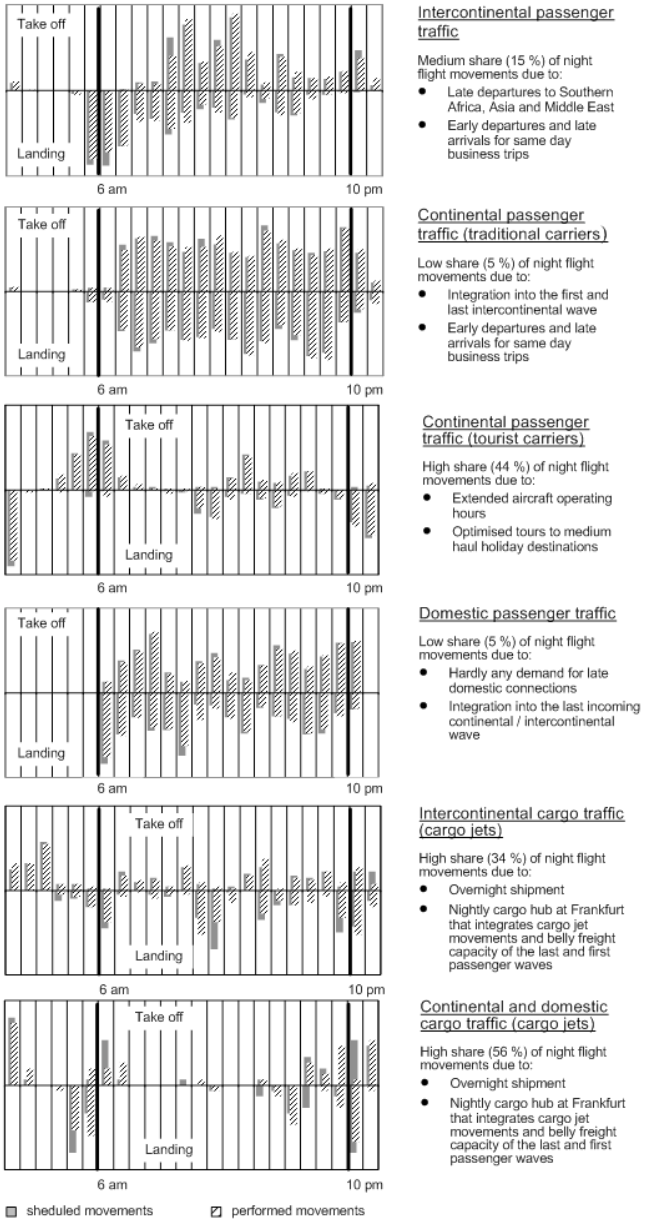

Fig. 5: Diurnal distribution of takeoffs and landings for different air traffic segments

The distribution of departures and arrivals to the hours of the day for a reference week is important to develop an understanding of the segment's structural requirements. The additional assessment of the historic development of the ratio of night flight movements to a segment's total flight movement demonstrates the development trend throughout the past years. In Frankfurt, for example, the night movement ratio of intercontinental passenger traffic was constantly around 14 % in the past five years whereas the one of continental tourist traffic grew from 30 % to 44 %.

Another assessment revealed that the factor for unscheduled night flight movements in the past 5 years was insignificant for cargo, mail and other flight movements, while for passenger jet movements it varied between 5 % and 10 %.[2]

4 Changing future demand to depart and land at night time

As stated before, assumptions regarding the future segmentation, the future night relevance of the segments as well as the future developments of delay and earliness issues are necessary. The assumptions rely on main economical and demand aspects of the submarkets of air transport. To cater for the uncertainty of assumptions, two or three sets of assumptions can be considered, which represent different development paths.

For example, in the first development path considered for the forecast in section 5, the demand will be determined by an adjustment of the future segmentation but with a steady ratio of night flight movements for each segment. In this case we also assume a constant distribution of movements to the hours of the night (structural constancy). In detail this first scenario is determined by:

- Assumptions concerning the different growth rates of the segments, which result in a different share of flights per segment at the forecast horizon, compared with the reference year.
- The ratio of night flights on the total movements per segment is kept constant until the forecast horizon.
- The diurnal distribution of movements per segment is kept constant.

In the second development path considered in section 5 the demand will be determined by an adjustment of the ratio of the flight movements at night and moreover a different distribution of flights to the hours of the night in comparison to the reference year (structural change). In detail this second scenario is determined by:

[2] Meaning that more than actually scheduled flight movements took place between 10 pm and 6 am, namely 105 to 110 % of the scheduled flight movements

- Assumptions concerning the different growth rates of the segments, which result in a different share of flights per segment at the forecast horizon, compared with the reference year (the segmentation is identical for both scenarios).
- The ratio of night flight movements compared to the total flights per segment will grow until the forecast horizon. This concerns the following segments:
- Intercontinental passenger traffic: Traffic to regions with high night flight requirements (Asia, South Africa) grows above average. For example late departures in Germany enable early arrivals in Asia. In the opposite direction late departures from Asia or South Africa lead to early arrivals in Germany.
- Slight increase in aircraft operation time due to competition with low cost and tourist carriers. However the optimization is limited by the preferences of business passengers for certain arrival and departure times.
- Increasing importance of express over night shipments lead to a growing demand of late and night time connections. Increasing late night Integrator flights feeding into the Integrator hubs.

The specific ratio of night flights per hour of the night will change at the forecast horizon, compared to the observed initial situation for the following segments:

- Intercontinental passenger traffic
- Continental passenger traffic (traditional carriers)
- Continental passenger traffic (tourist carriers)

5 Forecast for a hub airport

Figure 6 summarizes the assumptions and results for the night flight movement forecast of a virtual hub airport[1]. This virtual hub will manage a number of 600,000 flight movements at the forecast horizon 2020. The movements are allocated to segments and sub-segments, as shown in Figure 6. The next step is to assume the ratio of flight movements within the time slice from 10 pm to 6 pm and from 11 pm to 5 am and to calculate the flight movements per night. Then, the delay-factor for each segment is set and flight movements are calculated accordingly. The span of assumptions related to the ratio of single flight segments is displayed in Figure 6 by using the letter A and B. As mentioned in section 4, we named the different development paths: Structural constancy and structural change. Future demand for night flights at the virtual hub airport in case of structural constancy (structural

[1] Because of the ongoing plan-approval procedure regarding the extension of Frankfurt Airport, we changed the actual numbers and factors of the forecast for Frankfurt Airport to plausible values of a virtual hub airport.

change) is calculated to 65 (76) movements per night between 11 pm and 5 am. About 13 (13) additional movements will take place because of time schedule divergence.

Forecast procedure		A: structural constancy B: structural change				forecast horizon 2020				*fictive figures*	
FM 2020	**600.000**	**Passanger (92.4%)**				**Freight / Mail (4.6%)**				**Others (3.0%)**	
flight share per segment		Intercont	Cont LH	Cont HF	Dom	Intercont	Cont	Mail		Ferry	Others
		15,5%	63,0%	5,9%	8,0%	4,0%	0,5%	0,1%		1,0%	2,0%
ratio of night movements	*10pm-6am* A	**14,4%**	**5,2%**	44,1%	5,6%	34,0%	56,5%	100,0%		22,8%	8,3%
	10pm-6am B	**15,0%**	**5,5%**	44,1%	5,6%	40,0%	60,0%	100,0%		22,8%	8,3%
NFM 10pm-6am		Intercont	Cont LH	Cont HF	Dom	Intercont	Cont	Mail		Ferry	Others
	173,1	36,7	53,9	42,8	7,4	22,4	4,6	1,6		3,7	0,0
	181,9	38,2	57,0	42,8	7,4	26,3	4,9	1,6		3,7	0,0
ratio of night movements	*11pm-5am* A	**12,9%**	**17,1%**	**67,3%**	0,6%	67,2%	58,4%	100,0%		48,2%	50,5%
	11pm-5am B	**16,9%**	**22,1%**	**77,3%**	0,6%	67,2%	58,4%	100,0%		48,2%	50,5%
NFM 11pm-5am		Intercont	Cont LH	Cont HF	Dom	Intercont	Cont	Mail		Ferry	Others
	65,5	4,7	9,2	28,8	0,0	15,0	2,7	1,6		1,8	1,5
	76,2	6,5	12,6	33,1	0,0	17,7	2,9	1,6		1,8	0,0
delay factor	*11pm-5am* A	**0,0%**	**19,0%**	**-6,4%**	**6,1%**	**6,9%**	0,0%	0,0%		-0,3%	2,9%
	11pm-5am B	**0,5%**	**21,0%**	**-5,0%**	**6,0%**	**7,4%**	0,0%	0,0%		-0,3%	2,9%
Delay 11pm-5am		Intercont	Cont LH	Cont HF	Dom	Intercont	Cont	Mail		Ferry	Others
	13,4	0,0	1,8	-1,8	0,0	1,0	0,0	0,0		0,0	0,0
	12,5	0,0	2,6	-1,7	0,0	1,3	0,0	0,0		0,0	0,0

FM - flight movements
NFM - night flight movements
LH - long haul
HF - holliday flights

Intercont - intercontinental flights
Cont - continental flights
Dom - domestic flights

Fig. 6: Overview of the development paths

It becomes obvious, that night flight restrictions like the one designed for Frankfurt only allowing 17 scheduled flight movements on average per night will have a serious impact on airline operations. In the next section, some possible reactions of airlines to night flight restrictions and their limitations are briefly discussed.

6 Possible reactions to night curfews and their limitations

There are three possible reactions to night flight restrictions at airports:

- Relocating flight movements
- Rescheduling flight movements
- Cancelling flight movements

Relocating flight movements to other airports requires an adequate infrastructure, compatibility to the local night flight regulation, free slot capacity and an acceptable landside connection to the final transport destination. There are a couple of consequences of relocations for the airports, the airlines, regional and local actors, passengers and cargo-runtime. In respect to the impacts of airlines there is a difference between home and non home base carriers.

Carriers that have to relocate flight movements away from their home base cannot use their own service infrastructure any more. As a consequence, they also have to relocate maintenance capacity to the new airport. Moreover the crew has to stay at a hotel instead of their home base and on the next day the daily rotation has to start with a ferry flight to the main origin. All this generates additional costs.

Non home base carriers generally could relocate flights because they are not bound to the airport. They easily could make new maintenance contracts without many additional costs. In case of a night flight restriction at a hub airport night flights might be cancelled instead of relocated, because flights that are bundled in a hub and spoke system are obsolete, if they don't reach the hub. In general, it is not economical to relocate transfer passengers or transfer belly freight to other airports.

Rescheduling flight movements from the core night time to early or late daytime is another possibility to avoid night flight movements. But initially the feasibility of rescheduling depends on the availability of corresponding slots at the origin and destination airports.

Rescheduling, however, is not feasible for all segments of air transport. Especially line operating passenger airlines, integrators and night airmail operators are integrated in hub and spoke networks. Rescheduling a single flight, which is integrated in a balanced and optimized network, means that passengers or cargo might miss the best connection. Therefore the overall transportation time would increase. In consequence particularly premium passengers and senders of time-sensitive cargo goods would decide for alternative airlines/airports. If, consequently the capacity load factor declines, the price per passenger / per tonne needs to be increased to make the flight profitable for the airline. Considering the competition in the air transport market, the airlines cannot overprice without running the risk of loosing passengers or cargo. If the revenue on flight operations declines the break-even point, the cancellation of this service might become necessary.

7 Conclusions

With ongoing air traffic growth and subsequent airport extensions, night flight restrictions, which aim at reducing noise impacts of airports, are getting more popular. In this context, forecasting night flight movements, evaluating the external

costs of night flights and assessing the importance of night flights for airlines emerge as research fields.

In general, no best practice exists to forecast the future demand of night flight movements. Thus we developed a straightforward methodology to forecast night flights at a specific airport presented in this paper. It builds on a detailed analysis of past and current patterns of night activities of relevant air traffic segments, assumptions regarding the future importance of night movements and a general air traffic forecast. A limitation of this approach is that the patterns of night movements at an airport are usually already influenced by existing restrictions. This has to be considered if such patterns are projected onto the future.

The analysis reveals that different air traffic segments require more night flight movements than others. Reasons for night flights are diverse, ranging from competition driven extension of aircraft operation hours to the demand driven operations at night for cargo and intercontinental passenger traffic. In this context, it is difficult to judge, which night flights are "essential"; certainly different perceptions arise. Every scheduled flight that generates revenue might be essential for airlines. People living close to the airport will certainly judge in a different way. In addition, there are several constraints on rescheduling night flights or relocating them to other airports.

In order to acquire an unbiased basis for the regulation of night flights, both the external costs and the economic significance for airlines of night flight movements need to be studied in more detail. Furthermore, possible relocation / rescheduling strategies need to be assessed. To cater for competition issues, it might even be necessary to tackle the issue of night flight regulation not only in the context of plan-approval procedures for specific airports but also on a national or even global level.

List of figures

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This paper is based on consulting work of our Institute in the context of the airport extensions of Frankfurt and Munich airports. The related reports are unpublished and therefore, no references are given.

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New office space at international hub airports

Evolving urban patterns at Amsterdam and Frankfurt/M.

Sven C. M. Conventz

In recent years, international (hub-)airports like Amsterdam or Frankfurt have become vital nuclei of spatial development. One indicator are real estate market key numbers in general and office market key numbers in particular. Airport retailing has been analyzed in-depth so far. In contrast, the growing segment of airport office space has not been widely examined to date. That is to say, it is unclear whether office space can already be considered as a real estate submarket or not. Moreover it is uncertain if office space at airports should be perceived as an additional part of a local office market or as a competitive submarket.

This paper analyzes office space at airports by considering factors such as success, shortcomings, limiting factors, the spatial relationship to other locations as well as the future potential of such locations. Therefore, a methodologically mixed approach of different techniques such as desk and field research was chosen.

1 The past as prologue

Technical developments have a deep impact on spatial patterns. Like in the 18th, 19th and 20th century, rapid advances in transportation technologies such as railroads, automobiles and airplanes largely define the 21st century. Each of these transportation modes has strongly influenced the economy and has led to a specific urban-locational pattern (Marshall, 2003). The last decades of the past century have witnessed an amazing growth in the transportation industry mostly driven by the so called globalization, causing tremendous impacts on the built environment. This especially applies to airports. Hence, they are both consequence and driver of that process. Additionally, the effects and development processes induced by airports have often contributed to rewriting the metropolitan geography.

1.1 Impacts on the metropolitan geography

Today, most cities are not self-sufficient anymore but rather part of a metropolitan area with several cities and emerging sub centres. Traditionally, the nucleus of an urban area is the Central Business District (CBD) with its high concentration of commercial land uses. Usually, it is the city's most accessible area (Gregory et al. 2009: 75). Over the past decades, however, peripheral areas and nearby regional centres have grown much faster than the central cities. Fundamental changes in transportation technologies and telematics have established a new relationship between central cities, metropolitan regions and other elements of the urban system.

One new spatial appearance within the contemporary urban and regional spatial structure is the emergence of new and decentralized clusters of urban activities close to areas of high accessibility. This trend is particularly evident in the US metropolis whereas in Europe it is to a greater or lesser extent a new spatial phenomenon with the airport as its most prominent representative and strongest engine (Kunzmann, 2001: 216; Garreau, 1991).

2 The morphogenesis of airports

Many airports around the world – formerly planned as mechanistic-functional solitaires in the city's periphery – have gone through a transformation process from small terminal facilities with planned arrival and departure halls into complex, technical, commercial, urban and regional poles. Forced through new general conditions within the international aviation industry, airport operators have to open new business segments in order to realize additional non-aviation revenues to supplement the traditional core business (e.g. ramp-handling, landing-fees…etc). In this context, airports have started to concentrate their engagement not only on supplying the core aeronautical infrastructure and services but also on the development of the so called non-aviation sector where commercial facilities and services play a key factor in terms of future growth (Ringbeck et al. 2006 / Deimler et al. 2004).

The airport's morphogenesis from an originally infrastructure facility to a more and more urban-like entity entails not only an increase regarding the structural elements but also an expansion in respect of customer groups (Warschun, 2007: 235). In addition to the intensification of airport retailing, the re-examination of the airport's strategic alignment includes the airport's repositioning as real estate developer. This applies in particular to office developments at the airport's platform and the bordering surroundings.

A second driving force that promotes the airports' transformation into fully functional city-like entities is the integration of airports into the high-speed rail

networks. Thus, airports have become multimodal interchanges integrating two hub functions. While the airport is the hub on the airside, the airport's train station covers this function on the landside. This newly defined intermodality and connectivity on the intersection of a local, regional and international scale facilitates growth in passenger streams by using the location as conference and leisure destination and finally by providing a place of work characterized by its high accessibility for employees (Güller & Güller, 2003:125 / Harriehausen, 2009).

3 Case studies

In the following the new office locational patterns around two international hub-airports, namely Amsterdam-Schiphol and Frankfurt Rhein-Main, will be analyzed. The analysis will be guided by the following research questions:

- Which stage have office-related developments reached and what are the underlying forces?
- What are the factors of success and what are the limiting factors of the development?
- Are these developments already to be considered as an office real estate submarket and what is its spatial relationship to the total market?

3.1 The case of Amsterdam-Schiphol

The Randstad office market is the largest and most sophisticated office market in the Netherlands. Within this market area, Schiphol is – in conjunction with the South Axis (Zuidas) - considered the absolute prime office site. In the Amsterdam office market[1], tcontrary to what one might assume, it is not Amsterdam's city centre that is the most expensive office location. With an upper price limit of approximately 390 €/m², the current prime rent of the whole Netherlands is realized at Schiphol-Centre followed by the South Axis with 375 €/m² and De Omval with 360 €/m². In comparison to this, the city centre and the IJ Oevers come up with prime rental values of around 300 respectively 295 €/m²(DTZ Zadelhoff, 2009).

The current office stock at Schiphol-Centre comprises nearly 195.700 m². Prominent examples of office buildings at Schiphol Centre are the Schiphol World Trade Centre, the Triport- or the Outlook Building (Schiphol Group, 2009). Due to a number of completions and developments in the pipeline for the short term (e.g. "The Outlook, phase 2"), the stock will grow by another 8 – 15 percent over the next years (Jones Lang Lasalle, 2009: 11).

[1] The analysis for Amsterdam follows the office market view according to DTZ Zadelhoff. All stated prices are yearly rents per square meter.

From an international perspective, the corridor Schiphol – Zuidas is perceived as an international top location within an otherwise modestly priced Dutch office market. Nevertheless, one has to understand that the Dutch prime locations are moderate in size, market dynamics and rents in comparison to other European top locations such as London or Paris. This especially applies to Schiphol-Centre, which is classified as small and relatively undynamic by experts (Jones Lang Lasalle, 2009: 16).

Apart from the office property related activities at Schiphol-Centre, ambitious and high-end office developments have also taken place at other locations in the airport's vicinity. This particularly includes business sites in the municipality of Haarlemmermeer where the airport is actually located. As examples, Schiphol (East, South and Rijk), Hoofddrop Beukenhorst (East, West and South) or De Hoek can be mentioned. Here, a diverse office market with differently specialized subzones and a broad spectrum of rental ranges as well as office space occupiers has emerged. The rents in the first half of 2009 ranged between 90 €/m² in Hoofddorp and 220 €/m² as maximum in Beukenhorst South (DTZ Zadelhoff, 2009). The last years have shown that internationally oriented companies offering higher business services have favoured these locations. The demand is specifically attracted from industries such as finance, consultancy, IT & telecommunications, retail, community and social services, traffic and transportation or healthcare (cf. Amsterdam Airport Area, 2009). Hence, the demand is generated from companies that are not directly linked to the aviation-business. In order to heighten the business estate's attractiveness, considerable efforts have been made notably in the field of business infrastructure (e.g. hotels, conference facilities, gyms… etc.) and design qualities (e.g. business boulevards, ponds… etc.). In addition to a further densification of office uses at Schiphol-Centre, new office sites are planned at Beukenhorst and Schiphol-Elzenhof. The latter is probably one of the most ambitious office projects in the nearer surroundings of Schiphol Airport featuring an office area of roughly 200.000 m² (SADC, 2009).

3.2 The case of Frankfurt Rhein-Main

Frankfurt is continental Europe's leading financial centre and one of Germany's most important office centres. The city harbors more financial institutions than any other continental European city. In addition to this, an array of companies offering services related to the finance industry is located in the Rhein-Main metropolitan area (DEGI, 2008: 72). Within this office market,[2] the airport has become an expensive submarket over the last years. The City centre, including the subzones

[2] The analysis for Frankfurt follows the office market view according to BNP Paribas Real Estate (formerly Atisreal).

Bankenviertel, Westend, Innenstadt and Hauptbahnhof, is the most preferred and most expensive area of the whole market. In the first half of 2009, the absolute prime rent of 420 €/m² was achieved in Westend and Bankenviertel. In contrast to this, the prime rents of 180 €/m² realized in the office cities such as Eschborn and Niederrad were more than 50 % below the prime rental value of the overall market. The airport again – located in the periphery approximately 6 minutes southwest of Niederrad and 15 minutes south of Frankfurt's CBD by public transit - records a top rent of about 300 €/m² (BNP Paribas Real Estate, 2009). Recently, contractual agreements with maximum rents of 408 €/m² have been registered (Schiner, 2009). Thus, despite its peripheral location, the airport largely approximates the inner cities' prime rents.

The dynamic real estate and infrastructural developments as well as the increase in letting successes have contributed to the airport's emergence as an attractive office location. Since the year 2005, the airport has been gradually introduced as a new office submarket into the market inquiry of most real estate companies with BNP Paribas Real Estate leading the way. Currently, 366.000 m² of office stock is available only on the airport grounds. Including the whole submarket, it comes up to more than 576.000 m² gross floor area (Stadt Frankfurt 2003). The demand for office space is generated by industries such as human resources, traffic and transportation, administration, finance and consultancies, healthcare as well as IT and telecommunication (Conventz, 2008).

Today's office locations are the Frankfurt Airport Centre (FAC) I and II, Cargo City South, Air Cargo Center / Airbizz and Cargo City North, all being localized on the airport's premises. In addition, there are office sites in close spatial linkage to the airport either already existing or being in the implementation phase. Such locations are for example the Main Airport Center (MAC), the AirRail-Center and Gateway Gardens. Furthermore, there is office space projected at the Mönchhof Area and at the Airport Office Centre (Fraport AG, 2009).

New office real estate developments will add a substantial contribution to the revenues of Fraport, the owner and operator of the airport. According to Fraport, the need of airport office space due to the airport expansion is expected to increase from currently around 500.000 m² to approximately 650.000 m² in the year 2015. Office stock that is out of date or not in line with the market requirements will thus be taken out of the market (Hommerich 2006). Consequently, the current office stock will decrease by the year 2015. At the same time, modern office estates will gradually substitute this stock. These construction activities reflect the market's high dynamics.

3.3 Intermediate results

Structural changes in the world economy have promoted the new valorisation and perception of airports and their hinterland. Office real estate developments and key numbers are indicators of these changes. In this regard, the economy's globalizing process has an impact on both the demand as well as on the supply side. For the demand side, time has turned the fundamental business performance variable. Flexibility has become crucial especially for those companies that can be assigned to the so called mobile industries. Such industries are generally marked by their integration into international networks, their desk sharing practice, low transaction costs, their high need of frequent (face-to face) contacts to clients and their time sensitive working environment.

Airports as representatives of the supply side have been forced to rethink their strategic alignment in order to face the consequences of globalization such as liberalization and deregulation. One approach has been the consequent repositioning of airports as real estate developers. Other underlying drivers advancing airport office projects are the opening towards other protagonists (e.g. property occupiers, developers, investors…etc.) as well as an intensified planning on the part of different actor groups. This general framework has hauled the evolvement of new office submarkets around airports. While in Amsterdam the developmental status has made considerable progress due to the airports' early opening of airport premises to office real estate projects, Frankfurt is in its start-up period. Here, the submarket is characterized by a manageable amount of singular office buildings and an already differentiated supply of office space (Conventz 2008).

4 Assessment and perception

4.1 The submarket's factors of success

The location's success arises from an array of different factors. The biggest locational advantage is owed to the multimodal transportation links. Multimodality guarantees accessibility while the airport's integration into the airline's network establishes the city's respectively the region's connectivity with the world. This in turn implies for example a higher flexibility in terms of rescheduling business appointments and a broader choice concerning the mode of transportation.

An increased construction activity accompanied by a simultaneously growing number of high-quality facilities (e.g. hotels, meeting and conference facilities) has formulated a new multifunctional dimension of office space offering modern specifications. This spatial concentration of different business facilities at the airport

and the close vicinity to locations with a strong international orientation helps business travellers to reduce time consuming journeys and to avoid costs of overnight stays.

The office supply itself is characterized by sophisticated architectural office buildings with Class A office space. Although both cities dispose of relatively high rates of vacant office space, there is a scarcity of high quality properties especially in the prime submarkets. The new offer of office space at airports compensates this deficit.

Moreover, airports are the spatial manifestation of the "hyper global" (Koolhaas, 1995: 1251). They represent mobility and flexibility. This kind of unique selling proposition helps to underpin the self-image of many companies as globally operating enterprises.

4.2 Limiting factors and shortcomings

Beside the advantages described above, there are also numerous limiting factors and shortcomings that have to be addressed. The biggest stumbling block could arise from the high lease prices. That applies especially to Frankfurt. In contrast to Amsterdam, cheaper leasing options of high quality and easily accessible office space are available in the immediate surroundings of Frankfurt's airport (e.g. Niederrad).

Other impediments could result from the location itself, which is perceived as isolated particularly in Frankfurt as well as from the extreme noise pollution. According to some experts, a "certain robustness is required" on the part of the employees. Beside this "stress test for employees", the locations are not able to exist autarkically due to the currently not fully developed infrastructure (Conventz, 2008). In this context, the supply of food for employees for example during lunch break was frequently mentioned. Presently, the locations only provide an offer of food at prices that correspond to the airports high- leveled prices.

Beyond this, the still insufficient urban design qualities (e.g. landscape architecture, public space…etc.) have been criticized. Airports were originally designed with the passenger in mind. Consequently, the airport's environment is still primarily adjusted to the passenger's necessities.

Finally, the car accessibility during peak traffic periods and the critical situation regarding parking lots as well as the parking fees are seen as problematic (Conventz, 2008).

Factors of success	Limiting factors and shortcomings
Higher flexibility through multimodality	High lease prices (especially Amsterdam)!
Multifunctional and high quality business infrastructure	Extreme noise pollution / emissions
Round-the-clock productivity	Difficult local supply
Short distances (e.g. other office locations)	Weakly developed walkability
High quality office space and sophisticated architecture	Low urban design qualities
Availability of office space to let	Difficult car accessibility during rush hours

Source: Own illustration, 2009.

Tab. 1: Submarket's factors of success and limiting factors

4.3 Perception

To date, it still remains unclear whether office space at airports is to be perceived as an additional part of a local office market or as competitive submarket. Spatially speaking, both market areas are characterized by an extensive office supply. The submarkets have to face this market environment. Additionally, both submarkets are in close proximity to the city centres and very well interconnected with them, probably heightening the "competitive pressure". Based on these spatial circumstances, most experts perceive the submarkets as a new supply of high quality and thus as an addition to the overall market. It has been frequently labelled as a new spatial entity of postmodern urban development. Airports are not primarily perceived as a transportation node but as an advantageous business location. Multimodality combined with an extensive business infrastructure is understood as a crucial competitive and developmental advantage within the global time-based competition (Conventz, 2008).

Until recently, the urban system of Amsterdam has been more or less monocentric. This spatial formation has been transformed into a polycentric urban landscape. From the early 1960ies onward, the historical inner city, characterized by its channels, heritage protected buildings etc., has not been able to fulfil the increased demand of large scale leasings on the part of the rising service economy. As a result of this, companies started to settle in the surroundings of the urban ring road or

sometimes further away. This relocation has been intensified by the city centre's accessibility problems. Under this spatial condition, the relationship is consistently positively perceived (Salet, Majoor, 2005 / Conventz, 2008).

In Frankfurt, the risk of a competitive situation between an office submarket at the airport and the total market is assessed as relatively low especially under the assumption of ongoing investments in the inner city. Instead, a division of labour between the locations of the inner city areas and the airport is expected. While the traditional districts will still accommodate for example banking and other finance industry related services, the airport will be chiefly in demand among mobile industries (Conventz, 2008).

Another reason for the positive perception of office space at Amsterdam-Schiphol and Frankfurt Rhein-Main results from the scarcity of high quality properties in the city's prime submarkets. The new offer has a share in compensating this deficit.

In contrast to this, only a minority of experts observes a competitive relationship to more "traditional" business locations for example within the core cities or the suburban office locations such as Zuidas or Niederrad (Conventz, 2008).

5 Summary and concluding remarks

Airports have been transformed into urban-like entities. The centralization of activities formerly localized in the CBD and the emergence of office markets around international (hub) airports indicate the airport's morphogenesis. The results of the analysis clarify that the enormous success of new offices at airports or their surroundings is based on intelligent, comprehensive and innovative strategies on the part of different protagonists. This kind of unique locational quality is exactly tailored to the needs of the so called mobile industries. An increase in lettings and the tenant groups' willingness to pay top rental prices reflect this circumstance and the demand for such locations. Thus, hub-airports have become essential for the future successes in attracting companies and for the economic success in general. For the future it is expected that prospective improvements of the design quality will further contribute to fostering office submarkets at airports.

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The planning of airport regions and National Aviation Policy

Issues and challenges in Australia 2008-2009

Robert Freestone and Douglas Baker

The planning of airports has long been contentious because of their localisation of negative impacts. The globalisation, commercialisation and deregulation of the aviation industry has unleashed powerful new economic forces both on and off-airport. Over the last two decades, many airports have evolved into airport cities located at the heart of the wider aerotropolis region. This shifts the appropriate scale of planning analysis towards broader regional concerns. However, governments have been slow to respond and airport planning usually remains poorly integrated with local, city and regional planning imperatives. The Australian experience exemplifies the divide. The privatization of major Australian airports from 1996 has seen billions of dollars spent on new airside and landside infrastructure but with little oversight from local and state authorities because the ultimate authority for on-airport development is the Federal Minister for Transport. Consequently, there have been growing tensions in many major airport regions between the private airport lessee and the broader community, exacerbated by both the building of highly conspicuous non-aeronautical developments and growing airport area congestion. This paper examines the urban planning content of Australia's National Aviation Policy Review (2008-09) with reference to current and potential opportunities for all-of-region collaboration in the planning process.

1 Introduction

The modern airport presents an almost insoluble planning conundrum in its concatenation of benefits and costs over different geographic scales and particularly its juxtaposition of localised disbenefits with more diffuse regional benefits (Short, 2004). While issues of noise, amenity, air quality and public safety have traditionally dominated airport planning, discourse, responding to the broader planning impacts of airports on property and economic development is generally less well advanced. Yet this wider airport region is now recognised as an increasingly unsettled space

caught "in the crossfire of different ambitions" (Güller and Güller, 2003, 144) and is posing considerable challenges for regional planning governance (de Jong 2008; Prins, 2008; Schaafsma et al, 2008).

This paper briefly surveys Australian manifestations of these challenges through the lens of the National Aviation Policy Review conducted in 2008-09. It reports a review and analysis of those submissions to a major government "Green Paper" released late in 2008 relating specifically to airport planning and infrastructure issues. The aim of the analysis is to recover the main types and sources of opinion on contentious planning matters, including recognition of the idea of the airport region as a planning construct, to point the way toward constructive resolution of conflicts over airport development.

2 From airport city to airport region

The attention given to place-specific contestation about airport expansion, site selection and facilities development belies the reality of much more pervasive area planning issues across all world regions. The fundamental problem is the divide between airport and city planning. Both have grown in sophistication and complexity through the years, yet the ways in which they interrelate are frequently crude to non-existent. The historical reasons often lie in the national interest stake in and control of airports, and correspondingly, their narrow conceptualisation as specialised transportation centres requiring approaches set apart from more everyday planning concerns. This divide is no longer sustainable since it inhibits the optimal and equitable interdependent development of both airport and region.

In a globalised world, airports have become key infrastructural hubs in dynamic city region economies. They are of particular interest to the private sector which has helped transform them into mixed use activity precincts servicing both airport employees and wider regional needs beyond just the travelling public. This is the "airport city" phenomenon, defined by Güller and Güller (2003, 70) as "the more or less dense cluster of operational, airport-related activities, plus other commercial and business concerns, on and around the airport platform". The larger frame of reference is what Kramer termed in 1990 the "airport formation", exceeding the spatial boundaries of the airport and stitching together a varied mix of airport-bounded, airport-using and airport-susceptible activities (van den Berg et al., 1996). These represent archetypal new economic spaces driven by the trans-national relational geography of the network society. They almost invariably have developed across a fragmented institutional landscape characterised by complex structures of interests and coalitions - private, public, local, regional and interregional, national

and international - with differing values, interests, resources and authority (Salet and Thornley, 2007).

A range of airport-related land use problems has arisen within the airport "frame" area, including:

- lack of alignment between airport, city and regional planning;
- lack of integrated forward-looking spatial planning and joint-agreements;
- lack of coordination between different levels of government and other stakeholders;
- blighted conditions where small-scale older uses have been disenfranchised from wider improvement coalitions;
- competition, conflict and confusion between local authorities over development philosophies and planning controls;
- equitable financing of infrastructure provision;
- traffic congestion at airports stimulated by airport-related commercial activity;
- uncertainty regarding optimal character of on- and near-airport commercial development; and
- resistance from 'high street' traders and local municipalities to expansion of retailing at airports.

Effective governance is hampered by two main factors: one, the conflict between different sets of laws and policy objectives governing air and land, and two, governments routinely being forced to compromise between proponents of action exaggerating benefits and critics overstating costs of airport and airport-related development (Appold et al., 2008). The outcome is almost invariably "mixed spatial-economic results" in which "the relation between the airport and the wider urban fabric of the city-region is underdeveloped" (van Wiljk, 2007, 16). Even Kasarda, the main advocate of the "aerotropolis" model of urban form, concedes that most development to date has been spontaneous and haphazard resulting in airport area congestion and environmental problems – a long way short of the synergistic ideal of integrated airport, urban and regional, and business site planning (Kasarda, 2001).

The capturing of benefits from airport and related development suggests the desirability of a regional policy approach (Green, 2007). However, there are no ideal models because of vast cultural differences in planning systems, land ownership, development models and infrastructure provision. The Schiphol area is known for innovative approaches to inter-stakeholder planning. However, its development and governance has only evolved through "trial and error" and still embodies more universal tensions between national, regional, local and airport goals in relation to economic growth, international competitiveness, accessibility versus amenity, and the optimum balance between commercial and public interests (Appold et al., 2008). For some critics it remains a region in turmoil with a "patchwork quilt" of

governance, suggesting rather too much putative planning coordination (De Jong et al., 2008). As a consequence, for here and elsewhere, more relational (actor-oriented) and less territorial approaches to airport region planning have been advanced (De Jong, 2008). Drawing on collaborative planning theory, the solution is thought to rest in better methods of organizing connectivity (Salet and Thornley, 2007).

3 The Australian scene

The need for the better articulation of spatial governance structures is similarly apparent in Australian airport settings, but has rarely been explicitly addressed in policy terms. An explanation may well lie in various factors including 1) the tripartite structure of government (national, state, local) which creates little space for robust regional and sub-regional strategies, 2) a concentration in the political arena on "across the fence" issues between airports and surrounding jurisdictions, and 3) the continuing skew in public debate toward noise as the dominant airport planning concern.

Most major capital city, general aviation and regional airports previously run by the Federal Airports Corporation were privatised in 1996. This policy direction was in line with the broader economic philosophy of neo-liberalism, evident elsewhere in the global aviation industry with moves towards de-regulation and corporatisation (Hooper et al., 2000). Over the last 13 years the basic provisions of the Airports Act 1996 have remained intact. Under the Australian Constitution, federal law prevails for airport land to the exclusion of state and territory laws. Hence, a unique planning approvals system was created. Key requirements are preparation of master plans for twenty-year planning horizons every five years, major development plans for any proposed work costing more than $20 million, and designation of building comptrollers for approval of minor development. Formal public exhibition requirements are stipulated. Both master and major development plans must now address 'consistency' (or lack of) with local and state planning schemes, a provision that does inject some acknowledgment of the external planning environment. However, development and plan approval rests with the Commonwealth (federal) Government in Canberra and specifically the Minister for Infrastructure, Transport, Regional Development and Local Government. Parallel processes have been put in place for the drafting of airport environmental strategies also updatable for five year planning horizons. These also require the concurrence and ongoing scrutiny of a separate Minister administering the federal Environmental Protection and Biodiversity Conservation (EPBC) Act 1999.

Highly visible commercial development at airports over the last decade along with the great increase in airport passenger and freight traffic promoted both by deregulation of the airlines and globalisation have raised a variety of planning challenges and problems which have been aired extensively through the courts, popular media, inter-governmental dealings, and various public forums. Much of this tension stimulated the federal government's National Aviation Policy Review initiated by the new Rudd Labor Government after its election in late 2007. This policy review provides an opportunity to more systematically survey the nature and extent of pertinent issues in the Australian sphere.

4 The National Aviation Policy Review

The rationale for the National Aviation Policy Review reflected the need to stock take a range of challenging circumstances, both global and local, in the aviation environment. Urban planning issues took their place alongside other concerns including customer and community protection, industry training, liberalisation of airline policy, emissions and climate change, public safety, and security. The Federal Department of Infrastructure, Transport, Regional Development and Local Government (DITRDLG) has carriage of the Review. In the British Westminster tradition, the Review produced an Issues Paper (April 2008) and a Green Paper outlining preliminary proposals (December 2008) en route to a White Paper in the last months of 2009.

The Issues Paper noted that although there had been "unprecedented investment by private airport operators", investment decisions must meet not only industry needs but also allow "for proper consideration of developments and appropriate recognition of the impacts on local communities" (Australian Government, 2008a). The Paper posed questions such as 'are airport planning and development mechanisms working effectively?' and 'how can we improve consultation?' It attracted nearly 300 submissions. The main planning issues raised are summarised in Table 1 and capture in outline the tranche of concerns which have been raised by local and state governments, community organisations, and business groups who comment on the scale of on-airport commercial development unregulated by normal state planning controls since the late 1990s.

State and local government:
• Lack of effective integration between federal, state and local planning regimes
• Local communities having to meet off site infrastructure costs to support airport expansion in the absence of mandatory developer contributions
• Competitive advantage gained by airports conducting non-aviation based activities over commercial rivals that are subject to jurisdictional planning controls
• Master Plans and Major Development Plans lack specific detail and accompanying traffic and similar studies required for developments of a similar scale proposed for land outside airports.
• Poor consultation with local communities over development proposals, especially for developments worth less than $20m
• Concern about lack of developer contributions (required by state law) to upgrade community infrastructure in response to increased activity and employment
Airports:
• The airports supported continuation of the 'light-handed' regulatory regime
• Complications and delays caused by operation of the interaction between the Airports Act and the Environment Planning and Biodiversity Conservation Act
• Greater coordination of off-airport land use planning to prevent residential creep and high-rise encroachment on airspace
Airlines and operators:
• Aeronautical requirements of airports and airlines should take precedence over non-aeronautical developments of airports.

Tab. 1: Planning issues raised in submissions to the Australian Government's National Aviation Review Issues Paper released in April 2008

The Green Paper subsequently outlined a general blueprint for the aviation industry (Australian Government, 2008b). The spread and depth of concerns overall aired in submissions is more or less comparable between the two documents. The topic of airport infrastructure, most directly denoting content relevant to airports and their development, attracted the lion's share of submissions (181 or 86% of the total) as summarised in Figure 1.

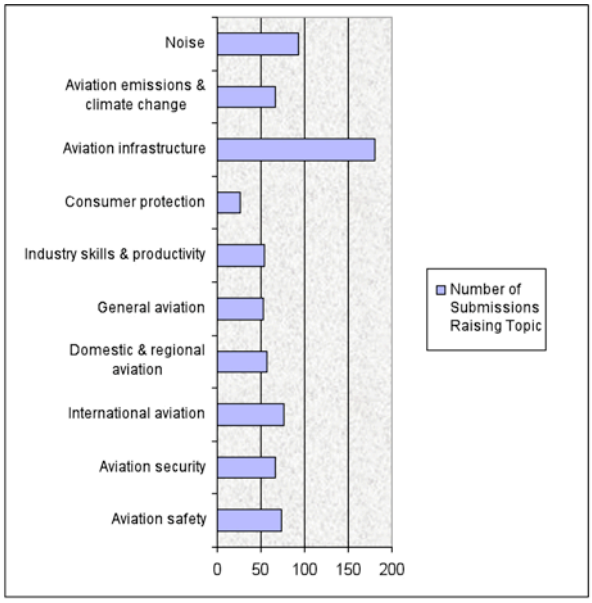

Fig. 1: Concern about airport infrastructure and other issues in submissions to the Australian Government's Aviation Green Paper released in December 2008

The planning issues raised in the Green Paper submissions were categorised into 16 specific topics derived from both the contents of the Green Paper and the recording of other airport planning issues raised in the submissions themselves. The discourse was analysed by recording, for each submission, positions or judgements on issues raised, arguments and proposals on issues, and emotional or rhetorical phrases used. Each submission was also classified according to participant type and the main airport discussed. The resulting database was sorted by participant, issue, and airport to identify competing discourses and potential discourse coalitions. Table 2 outlines the 16 specific issues identified in order of importance and conveying the broad canvas of opinion on planning-related matters.

Regional Airports: including significance of regional airports to regional development, international access to regional airports, desirability and cost of security measures, and funding programs for regional and remote airports (83).

Planning Around Airports: including risk-based planning of off-airport development to allow for airport operation & growth, public safety zones around airports, planning under flight paths and to manage noise exposure, and general planning of airport regions (but not off-airport infrastructure planning) (70).

Airport-Related Noise Mitigation: including desirability and operation of curfews, noise-insulation programs and industry funding for noise mitigation and compensation (65).

Airport Community Consultation: including desirability of establishing airport community consultation groups, compositions, roles and responsibilities, and procedural matters (64).

Government Responsibilities in Airport Planning: including desirability of Commonwealth control over airport planning, jurisdiction over non-aeronautical development on airport land, intergovernmental coordination for airport-related development and Local Government control of smaller airports (64).

Non-Aeronautical Uses at Airports: including potential impacts on aeronautical uses, desirability or need for non-aeronautical uses, and competition with similar uses outside airports (55).

Airport Investment and Growth: Including impacts on investment from global financial crisis, oil depletion, and proposed regulatory changes, significance of non-aeronautical revenues to investment, desirability of airport investment/growth & alternatives to airport investments (54).

Airport-Related Noise Information Tools: including adequacy of Australian Noise Exposure Forecasts as planning information tools, web-based flight path information tools, the Transport Noise Information Package and providing noise exposure advice to home-buyers (53).

Off-Airport Transport and Community Infrastructure: including extent of airport impacts on surrounding infrastructure, infrastructure funding responsibilities and integrating planning of on- and off-airport infrastructure (53).

Airport Master Planning: including accuracy and transparency of master plans, level of detail in master plans, and desirability of proposed changes to master planning including precinct plans (51).

Airport Planning Advisory Panels: including desirability of establishing panels, composition, roles and responsibilities, and funding (43).

Second Sydney Airport (SSA) and Sydney Airport Capacity: including desirability of second Sydney airport, alternatives to a second Sydney airport and possible locations (42).

General Aviation at Airports: including significance of and provision for General Aviation (GA) at airports, noise from GA activities, location of GA airports (40).

Airport Development Control: including review of major development plan triggers, call-in power for sensitive developments and prohibition of incompatible uses on airport land (38).

Airport Pricing: including desirability of more extensive price monitoring, price monitoring of airport car parking, and proposed 'show cause' process for pricing misbehaviour (31).

Airport-Related Noise and Health Impacts: including health impacts of aviation noise, studies of health impacts, and use of health risk assessment for airport developments (14).

Tab. 2: A categorisation of airport planning issues raised in submissions to the Australian Government's Green Paper on Aviation Policy, ranked ordered by the number of substantive mentions in submissions (in parentheses)

Major airport planning issue	Business submissions	Community submissions	Government submissions
Regional Airports	1	13	1
Planning around Airports	2	9	2
Noise Mitigation	7	1	6
Community Consultation	10	2	10
Government responsibilities	4	5	4
Non-aeronautical uses	12	12	3
Airport Investment and Growth	3	4	13
Noise information	13	3	7
Off-Airport infrastructure	14	10	5
Airport Master Planning	8	8	9
Airport Planning Advisory Panels	5	15	8
Second Sydney Airport	9	11	12
General Aviation Airports	15	6	14
Airport Development Control	11	14	11
Airport Pricing	6	16	15
Noise and Health Impacts	16	7	16

Tab. 3: Major planning issues responses to the Australian Government's Aviation Green Paper as ranked in submissions from the business, community and government sectors

Table 3 elaborates by showing the airport-related issues most frequently mentioned overall and their varying significance according to three broad stakeholder groups: business (including the airports), government (state and local) and community interests. Regional airport concerns topped the list with 83 mentions, aided by a letter writing campaign organised by Tourism Tropical North Queensland that accounted for more than two dozen identical submissions. Regional airport concerns, also mentioned by local councils responsible for managing regional airports, included positive recognition of the role, which airports can play in regional development. Airport pricing was primarily a concern for the business sector,

particularly airport companies and the airlines that pay to use their facilities. Similarly the health impact of airport-related noise was primarily raised by community groups and individuals. This issue was also mentioned by two state governments, but not a single business or business organisation.

Issue	No. of comments
Safeguard against incompatible development important	28
Planning for noise attenuation important	17
Need for coordinated area planning and impact assessment in airport vicinity	15
Supports public safety zones	9
Supports review of ANEF standards	6
Supports risk based land use framework	6

Tab. 4: Specific concerns with "planning around airports" nominated in submissions to the Australian Government's Aviation Green Paper

While the general heading of aviation infrastructure is inclusive of diverse but interrelated topics, the generic issue "planning around airports" identifies a major concern in 70 separate submissions and can be further deconstructed into several sub-issues (Table 4). The analysis of these submissions below, orientated to spatial governance issues and some of the ideas canvassed in the Green Paper, draws out significant contrasts between the airports and most other stakeholder's view of the world.

5 Summary of submissions on airport planning and development

The airport (business) submissions provide strong support for continued and singular Commonwealth control over airport planning, although there is nervousness about the application of untested measures such as mooted Ministerial "call-in" powers. Brisbane Airport suggested the Commonwealth should even extend its planning power to cover off-airport proposals compromising airport safety and efficiency. Canberra Airport provided a range of options for planning around airports including a "show cause" mechanism requiring developers to fully justify their proposals to the Commonwealth. The airports nonetheless provided some support for better intergovernmental coordination, particularly between Commonwealth and State Governments. The airlines also provided a degree of support for improved intergovernmental coordination. In relation to the new idea of airport planning advisory panels (APAPs), many of the airports opposed their establishment on the grounds that the groups were unnecessary. Adelaide Airport,

with an effective consultative committee mechanism already in place, argued that introducing APAPs carried the "very real risk" of conflict and confusion. Another said that they might foster "uncertainty". Other airport operators, such as Bankstown and Australian Pacific Airports (Melbourne and Launceston), also expressed concern, arguing that membership must be independent of local and indeed State Governments. The Australian Airports Association argued there must be "safeguards" against airport critics in any consultative process. Perth warned of the danger of community consultation groups being "hijacked".

The property industry, government and community submissions were strongly, but not unanimously, opposed to continued sole Commonwealth airport planning control, particularly in relation to commercial developments characterising the evolution towards the 'airport city' model. The Shopping Centre Council argued that "the most equitable approach" was for non-aeronautical developments to comply with state and local planning regulations. Some government submissions indicated that if planning approval role were to stay with the Commonwealth, non-aeronautical developments should at least be tested against state and local requirements for consistency. In relation to the idea of a "national land-use planning regime" for airport-related noise, the Western Australian Government said it opposed any shifting of off-airport planning responsibility to the Commonwealth. Almost all of the property industry, government and community submissions, however, supported the proposed APAPs. State government submissions generally said state representatives should be on the panels, while local government submissions predictably proposed council membership. In relation to complementary community consultation groups, state and local governments were supportive but warned of problems already evident with existing ad hoc airport groups. The community group submissions were remarkably even less enthusiastic for the same reason. While most supported improved community consultation, they were highly critical of existing airport community consultation groups and processes.

6 Recognising the airport region

Only a relatively small number of submissions explicitly commended integrated airport area development as a desirable policy direction (Table 4). The strongest endorsements came from local government interests, of which three are representative. The Australian Mayoral Aviation Council said that "no airport exists only within the boundary fence" and that planning processes need to better coordinate conflicting objectives of airports and surrounding communities. The Australian Local Government Association maintained that "airports in urban areas are major generators of employment & traffic and therefore must be properly

integrated into local and city wide plans". Thirdly, Brisbane City Council specifically wanted a "well-balanced framework to enable an effective and sustainable integration of Brisbane Airport with the urban fabric of Brisbane City and the (South-East Queensland) region". The most expansive view of airport related land use planning beyond noise considerations was offered by a national business lobby group, The Urban Taskforce, in arguing that "growth, commerce and industry must not be unrealistically restricted near airports and it is the role of planning to facilitate the right type of development".

This issue of rationalised spatial governance, which goes to the heart of a more synergistic model of planning at the airport-city interface, is barely touched upon. The issue is nowhere explicitly canvassed within the Policy Review, perhaps partly because of the inherited notion that the federal government should avoid involvement in state and local land use planning issues except where operational matters are concerned. As a result, the Green Paper largely treats airports in a rather traditional fashion as entities disconnected from the broader metropolitan and regional fabric, despite emphasizing their importance for economic development and their potential disbenefits in environmental amenity terms. Beyond the airport boundary, the formal interest conveyed by the Green Paper narrows very sharply to noise, building height, and flight paths. In this sense it conveys an unbalanced or at least incomplete vision. The primary concern is fixated on preventing incompatibility rather than more pro-actively promoting compatibility.

7 Conclusion

Schaafsma (2008, 78) comments that airport regions "are a new reality, often still overlooked by planners and policy makers". The recent Australian experience confirms that this observation and many of the same planning issues evident overseas surface albeit within a distinctive governance regime for major airports created by the combination of privatisation and light-handed national regulation. Australia's National Aviation Review nevertheless foreshadows greater public scrutiny of airport development, particularly non-aeronautical proposals. However, submissions to the Green Paper of December 2008 as a sampling of national opinion on airport planning issues indicate two distinct discourses across which a rapprochement needs to be mediated.

On the one hand, airport business interests generally believe that existing airport planning is effective and they are uneasy at any major policy changes, especially given the major financial commitments which they have made under the privatisation arrangements embodied in the Airports Act 1996. They want a regulatory framework that provides investor certainty, support continued

Commonwealth control, but do see some merit in better integration of on- and off-airport planning. They argue for state and local governments to accept their fair share of responsibility for land-use and transport planning, and emphasise that off-airport planning must be improved to ensure safe and efficient airport operations.

On the other hand, the property industry, state and local governments, and communities believe existing airport planning is inadequate. They want a regulatory regime that is fair and consistent with state planning laws. They can see some merit in better integration of off- and on-airport planning to increase safety for airports and nearby residents. However, they want new airport planning and consultation measures to reduce the risks from airport developments and noise. They argue such measures are necessary to increase certainty for surrounding businesses and communities.

The challenge ahead for Australian aviation policy-makers will be to promote constructive collaboration in planning for sustainable airport regions. The new consultative mechanisms and augmented information requirements floated in the Green Paper effectively signposted the formal recommendations in the climatic White Paper released in December 2009 (Australian Government. 2009). More information-sharing protocols and greater scrutiny of airport land use decision-making, particularly with regard to commercial developments, will be put in place in the wake of the National Aviation Review. However, no augmented statutory role for state or local governments in federal airports will eventuate; oversight for airport infrastructure development will stay firmly with the Commonwealth Government, and in particular the relevant Minister. The "black hole" remains the airport environs. What is missing is the coherent vision for the future of the airport and the region that can come from a more synoptic perspective within which the airport "can take ... the role of a uniting rather than a dividing force" (Knippenberger, 2006, 9). Although holistic airport area strategies have not emerged as a major topic of deliberation though the National Aviation Review, they nonetheless constitute one procedural innovation which could provide a more effective framework for integrating the host of economic, environmental and social considerations, including the realisation and rationalisation of area development potential, involved in the better planning of airport regions.

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The Luxembourg air freight-hub

Market niche development, supply chain-insertion, global positionality

Markus Hesse

The Luxembourg airport hosts the fifth largest air freight-hub in Europe, which has been steadily developing over the last four decades. Ten percent of the world's B747-400 freighter fleet is being operated here. A total of 3,245 people are employed in two cargo-centres as well ascarriers and freight forwarders. Three issues seem to be of interest in this particular case: first, the somehow accidental historical trajectory that started in the late 1960s/early 1970s, based on specific circumstances in the regulatory environment, a niche position relative to major competitors in Western Europe and the successful insertion of firms (and thus the place) in global value chains and distribution networks. Second, as a result of the establishment of this specific network-place, it has gained an important relative position in the urban system that exceeds the significance of the material place by far (city and region comprising about 120,000 inhabitants, the country overall 480,000). Third, the Luxembourgish government has dedicated the logistics sector a focal point of its future economic development policy. Against this background, the paper critically discusses the potential for maintaining this position, given the volatility and vertical rather than horizontal structure of the global air freight chain that might not easily fit for cluster-policies focusing on regional impact. Places such as Luxembourg are neither airport city nor airport region, but intermediate in the very sense of this term. They are thus facing the risk of becoming victimized by changing corporate value chain-strategies.

1 Introduction

This paper examines the case of Luxembourg as an air freight-hub in the context of its economic geography, particularly regarding the ability of the place to become part of global commodity chains. The capital of the Grand Duchy is situated in central Western Europe and comprises a population of less than 90,000. Given that it is a relatively small city, it is characterised by an extraordinary degree of regional and

international connectivity. By focusing on air freight logistics, the paper aims at reconstructing the rise of Luxembourg airport to the fifth largest air freight-hub in Europe. The more recent logistics performance of the place indicates that the city gained its current status not only from banks and European institutions (and here due to massive tax advantages), but also from becoming a node in global networks.

The contents of this paper are fourfold: After expressing the aim of the paper and my argument, I will shortly put the issue of the paper into theoretical context, mainly consisting of globalisation, commodity chains and the related role certain cities may play. I will then present a case study on Luxembourg and air freight. Finally, I will discuss these findings in the light of my argument.

What is my argument? First, Luxembourg became part of the global commodity-circuit thanks to successful chain-insertion and based on strategic positioning. Following a historical trajectory of airport and air traffic development, it is not only the firms that achieve a certain competitive position in the global logistics network/air freight commodity chain, but it is the place, understood as the complex interplay of location, infrastructure, market niche-development and corporate strategy, after all supported by increasing government intervention. However, the advantage of Luxembourg might be limited, and there are certain challenges for the government regarding the economic success and the sustainability of the cluster.

The empirical basis of the paper comes from ongoing research on Luxembourg as a city within networks, subject to comparison alongside in Antwerp in Belgium. In addition to statistical data assessment, several expert interviews have been held with key corporate and government players during the first half of 2009, which this paper draws upon.

2 Theoretical underpinnings

Theoretical corridors that are being addressed include globalisation and global production networks (Coe et al. 2004), the concept of the global commodity chain (Bair, 2005) and the ways certain actors – and in this case places as well – can become "inserted" into the chain. In order to conceptualise the related role of cities, I will make particular reference to Sheppard's notion of "positionality" (Sheppard, 2002).

A starting point is my contention that research on global commodity (or value) chains has become increasingly popular, yet often omits physical issues such as infrastructure, accessibility, land etc. – if you want "place" as a whole –, compared to its focus on governance and institutions. However, as it is strikingly evident, the significance of cities for flows (and vice versa) is fundamental. Along the historical path of urbanisation, this relationship has changed dramatically. Being a central

place in the very sense of the word, cities have later specialised in organising flows: as a gateway city, connecting foreland and hinterland, and as an intermediate city, focusing on connecting other places, rather than being central on its own (cf. Hesse, 2008).

My question is to what degree cities, in particular the city of Luxembourg, are involved in the management of commodity chains. Regarding port-city relationships, Hall/Robbins (2007) have conceptualised different forms of chain involvement (see Figure 1). *Insertion* means that it provides agents in supply chains with access to critical resources such as technology, markets, capital, knowledge and expertise. Once agents *integrate* activities within the supply chains, they aim at reducing overall costs and providing services more efficiently. This is often done through vertical and horizontal integration, in order to effectively extend control over the chain. *Dominance* is the ability or power to extract value from localized (logistics) activities on a sustained basis, e.g. by assuring control over scarce resources or assets, or by further exploiting economies of scale. The traditional seaport can be considered the prototypical case of dominance, at least of integration, whereas the modern hub appears to be only loosely coupled to creating value. I will return to this point later on.

		Logistics chains	*Value chains*
Port *(i.e. on- or near-dock/terminal facility*	**Insertion**	Attract lines through concessions, leases	On- or near-dock value-added activity
	Integration	Improved on-dock information systems	Integrate on-dock w/ overall supply chain information systems
	Dominance	Specialised and dedicated terminal	Unique on-/near-dock processing facilities
Port-city *(i.e. immediate port hinterland)*	**Insertion**	Local road connections	Export promotion
	Integration	Backhaul cooperation	Local cluster strategy
	Dominance	Transport industry cluster strategy	Develop immobile capacities
Nation *(i.e. beyond port-city)*	**Insertion**	Long-distance (rail) service and infrastructure	Inward investment attraction
	Integration	Regional corridor strategies	National cluster strategy
	Dominance	Transshipment hub	Strategic trade policy

Fig. 1: Supply chain insertion, integration, dominance (after Hall/Robbins 2007).

3 The Luxembourg air freight-sector

The city of Luxembourg is the capital of the Grand Duchy and hosts about 90,000 inhabitants (120,000 in the region) and more than 140,000 jobs. The relatively small size of the city is compensated for by an increasing “stretch” of job holders

beyond the borders. According to a recent study, the significance of metropolitan jobs in Luxembourg appears to be rather unique (Sohn/Walther 2008). "Metropolitan jobs" mainly include corporate services firms (comparable to the FIRE-sector as in the U.S.) and comprise about 45 % of the labour force just in the city of Luxembourg. This workforce developed quite dynamically in recent years.

What composes the quasi-metropolitan status of Luxembourg? Unlike the usual cases, it is neither derived from mere size, the number of corporate headquarter functions on site (albeit there are plenty of global firm offices represented) nor from gateway-functions. Rather, it is the international significance of the city, as it is indicated by the share of migrants in the city's population (about 40 %) and by the strong banking- and financial services-sector that was attracted to be located here by a favourable fiscal environment. Also, European institutions have massively reinforced the internationalisation of Luxembourg. The city can thus be considered subject to processes of "metropolisation", not necessarily being a metropolitan region as such. Consequently, these processes contribute to the "city-ness" rather than "town-ness" appeal of the city. Not surprisingly Luxembourg is posted in the GaWC-classification of world city-formation at the Delta-level "*Di",* indicating *relatively strong evidence* for world city formation. It thus compares to cities such as Dublin, Helsinki, Lyon or Vienna – cities that are far bigger …

Regarding the airport: Luxembourg-Findel hosts the fifth-largest air freight-hub in Europe, handling freight since the late 1960s/early 1970s. Findel is the home base of the largest 'freight only'-air carrier worldwide, operating ten percent of the global fleet of B747-400F airplanes. Based on this trajectory, the Luxembourgish Government aims at supporting the development of a logistics "cluster", besides the airport also in road and intermodal affairs.

The spatial setting of Luxembourg as an airport-location is characterised by major competitors surrounding, particularly Paris-CDG, Frankfurt and Amsterdam, also London-LHR (see Figure 2). The former U.S.-airbase Hahn, not included in the map, is being used by air freight companies as well. Luxembourg took off as an air traffic- and air freight-locale almost accidentally, thanks to the supply of infrastructure (i.e. due to the runway of 2.8 km, later on extended to 4 km) and its favoured location in the heart of Western Europe. A second issue from the very beginning were specific conditions of non-regulation, i.e. the offer of certain "Freedoms of the Air" that made slots and foreign market access possible. Also, an early model of developing Luxembourg as a "hub" for passenger travel failed, which shifted attention further towards freight.

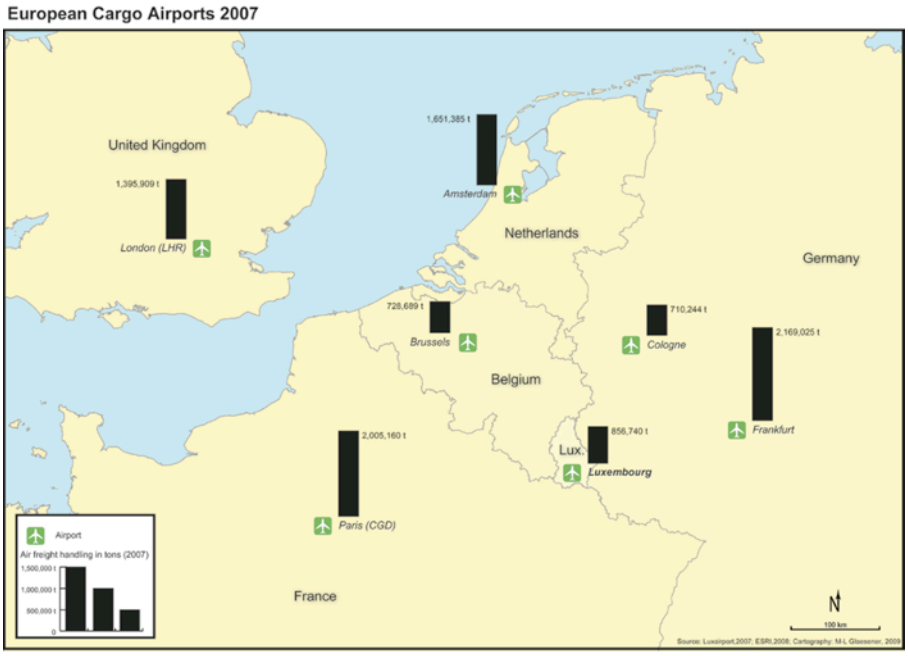

Fig. 2: European cargo airports.

Key corporate players that took this advantage comprise a couple of corporations each specialised in its area of business, but altogether joined in the interest of "making the place": the operator of a warehousing and cargo centre; several global air freight-carriers operating their own fleets; the airport owner and operator, also several specialised freight forwarding firms. In 2008, about 3,245 people were employed in the air freight-sector in Luxembourg, which compares to a third of logistics occupation nationwide. Freight volumes handled at Findel airport have increased from less than 2,500 tonnes in 1970 to about half a million tonnes in 2000 and to almost 900,000 tonnes in 2007 (see Figure 3). The latest rise in freight handlings mirrors the impact of accelerated globalisation since the late 1990s.

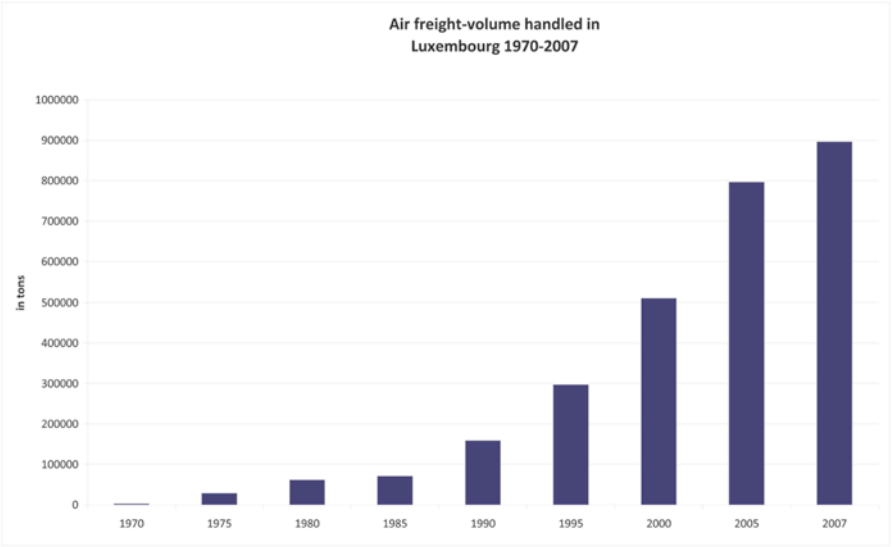

Fig. 3: Air freight-volume handled in Luxembourg 1970-2007.

Globalisation literature reveals that the local and the global are mutually intertwined; the local scale is distinguished by its massive physical space and network infrastructure. The contrasting dimensions of passenger and freight related activities are inscribed in the layout of the airport and handling facilities, the cargo centre exceeding the size of the passenger terminal by far. At the global scale, only the largest carrier operates a world wide web of connections to more than 90 destinations. The business once commenced with managing the oil drilling-commodity chain in Nigeria (bringing facilities, maintenance etc. from Aberdeen/Scotland to Western Africa). It serves air freight-deliveries between Asia and Europe, from North and Latin America to Europe etc.

A huge variety of commodities are handled in Luxembourg, almost impossible to break down to some key commodities. However, what is listed here – general cargo, meat and fruits, perishables, livestock, artworks – seems to be representative both for the global extent and the high degree of specialisation pursued by the agents. About 20 % of the shipments are handled in Luxembourg for through put, 4/5 are being exchanged with customers in all Western Europe. The chain is mainly buyer-driven, with a strong role performed by the middlemen (air freight-forwarders) who provide access to customer markets and allow carriers to bundle the consignments.

4 Discussion: Why Luxembourg? How about place and chain?

Luxembourg gained its current position regarding air freight almost accidentally, based on specific circumstances in the regulatory environment, a niche position relative to major competitors in Western Europe and the successful insertion of firms (and thus the place) in the global commodity chain. Insofar, this adds to the city's portfolio: being a somehow central place for Europe, and an off-shore place for the financial economy. Among the different modes of chain-involvement, I suggest it is the case of *insertion*, rather than *integration* or even *dominance*. Insertion renders the city, functioning as a hub and being intermediate, neither central nor even gateway.

It is confirmed by interviewees that politics initially played a role in placing Luxembourg on the air freight map, yet remained absent for a long time, even though the state had been in favour of these developments (as a shareholder, by offering tax incentives and a business-friendly climate, with direct access to decision makers). However, only recently the government is strongly supporting logistics as a matter of cluster development and promotes a related profile.

Regarding corporate management, time-space relations are essential for the success of the firms (and thus the place), in different regards. First, a sophisticated system of aircraft-turnover is being practiced, in order to achieve best possible load factors etc., and also to cope with constraints such as landing restrictions after midnight, flight delays etc. Second, the cargo-centre is operated in a 24/7 mode. Third, an average freight load of about 120 tons of commodities can be un- or reloaded within 2 hrs, thanks to the layout of the cargo-centre and the short door-to-door distance (200 m) between aircraft and lorry.

The issue of time-space-management leads us to *positionality*. In the words of Eric Sheppard (2002, 324): "Defining the status of [...] cities by their position within transnational networks, rather than by place-bound characteristics like size, corporate headquarters, or dominant economic activities, one can see that the role and trajectory of such cities is bound up with their positionality." Luxembourg appears prototypical for being well positioned related to the commodity chain:

- locally by providing plenty of space and direct access to infrastructure;
- regionally by being situated in the heart of Western Europe;
- globally by being placed in between different time-zones.

5 Conclusion

Two points. First, there are certain threats or challenges for the commodity chain-business and thus for the place to remain inserted:

- Peak oil and climate change may have the potential to work as a major constraint to the business in the near future, since almost half of the operating costs of air freight-carriers may account for fuel costs.
- The logistics business appears to be extremely fluid, volatile. Chains are not stable but contested, subject to increasing competition. Mere insertion implies the risk of losing a competitive advantage under changing framework conditions.
- The vertical instead of horizontal management of the chain may hinder the potential to establish a full-fledged regional cluster that is desired by economic development.
- Finally, hubs tend to depend upon the routing & scheduling decisions made by major shipping companies, which leaves them situated at the very end of the power chain. There is the risk of a further de-centralisation of the air freight-carrier network away from Luxembourg to other places in Southern Europe, as it was observed in one case in 2008.

Second, the question is whether Luxembourg may represent a case of an "airport-city" or "airport-region"? Answering this question is highly depending on what we understand as a "city" or a "region". According to a relational understanding of place developed in human geography, globalisation includes "variegated processes of spatial stretching and territorial perforation". These processes "add up to the displacement of … nested territorial formations … by a world of heterogeneous spatial arrangements in terms of geographical shape, reach, influence and duration." (Amin 2004, 33)

In this emerging new order, spatial configurations and boundaries are no longer territorial – at least not necessarily. Based on this point of view, Luxembourg is far from being considered an "airport-city" or "-region". Rather, this place is part of economic networks that are stretching across the global scale, making accessibility and flexibility the determinants of spatial development, and not the other way around.

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Global transfer points

International airports and the future of cities and regions

Sven Kesselring

Airports are powerful institutions and infrastructures defining and shaping the relations and connectivities of a world of flows and mobilities. They are 'glocal infrastructures', built interfaces on the thresholds of territorial and global scales. The talk of fundamental airport dependencies signals a new wave in the transport-driven modernisation of society and the economy. Political controversies over the whys and wherefores of giant airports rage in the very centre of the 'mobile risk society', not on the periphery. At few other social "loci" do the local and the global interface so tangibly as at the great transfer points of international air traffic in London, Paris, Frankfurt, Amsterdam, or Madrid. This, it has been noted, has fundamentally changed the character of mobility politics and mobility policies. It has brought about and it propels 'glocalisation' and global interdependencies.

1 The structural transformation of mobility

We are in the midst of a new transformation of spatial mobility. A dramatic increase in the importance of 'aeromobilities' (Cwerner, Kesselring, Urry 2009), the airplane and air travel accompanies the continuing economic and social importance of the automobile and automobility. To be sure, the airplane is not as ubiquitous a part of daily life as the automobile but the dependence of modern life on the accessibility, reliability and convenience of globally interconnected air transport and the constant deliveries of goods transported by airplanes continues to rise.

Air travel and international airports are emblematic of the globalisation and cosmopolitisation of modern life. Interdependence, interconnectedness and complexity are increasing in all economic, social and political realms. Ever more products, semi-finished and finished goods, perishables and durables, not to mention human beings, are transported by airplane. And yet the social sciences are slow in calling attention to the degree to which transnationalisation, globalisation and cosmopolitisation are being driven by the revolution in mobility technology and the aeromobilities systems in particular.

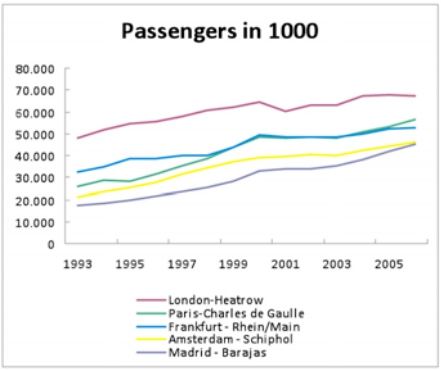

Fig. 1: Passengers by selected European airports

The graph above shows the trend in number of passengers at the five most important airports in Europe (London Heathrow, Paris Charles de Gaulle, Frankfurt, Amsterdam and Madrid Barajas). Taken together, these five have nearly doubled their passenger numbers between 1993 and 2006. 145 million people passed through their gates in 1993, 268 million in 2006.[1] This steady development is visible at smaller hubs such as Munich Airport, too. In 1992 it served 12 million passengers; in 2008 34.5 million passengers are being reported. Discussion of the need to build a third runway in Munich began two years after the opening of the second. Frankfurt Airport processed about 30 million passengers in 1992; in 2008 it reached the historical peak of 53,5 million passengers.

2 The structural transformation of airports

Airports are strategic locations in the globalisation process, with a significance that transcends their practical function. They serve as mobility and acceleration mechanisms in "fast capitalism". No more can airports be legitimately called "no-places", characterless outposts in suburban no-man's-land, as did the ethnologist Marc Augé in his 1994 book with the same title. Airports may still be transit points functioning to link land and air travel, but at the same time they are gateways to the world, job machines, logistics and service centres. The economist David Jarach describes modern airports as economic crucibles and – not to be neglected –places of fun and experience. International airports today bear no resemblance to the bare

[1] Source: Bundesministerium für Verkehr (2008): Verkehr in Zahlen 2008 - 2009. Bonn: Deutsches Institut für Wirtschaftsforschung.

grey vaults of yesteryear. They are scintillating complexes of glass and steel, "windows on the world", quasi-urban concentrates with enormous structural economic, political and social weight. Charles de Gaulle Airport in Paris is home to one of the world's biggest convention centres; Munich has two convention centres. Airports accommodate medical centres, showrooms, restaurants, discothèques, cinemas, planespotting platforms and much more. A total of around 600 companies gather on Munich airport, including firms like SCA, one of the world's biggest paper manufacturers, Siemens and McKinsey, have locations on the premises of the Munich airport operator Flughafen München GmbH.

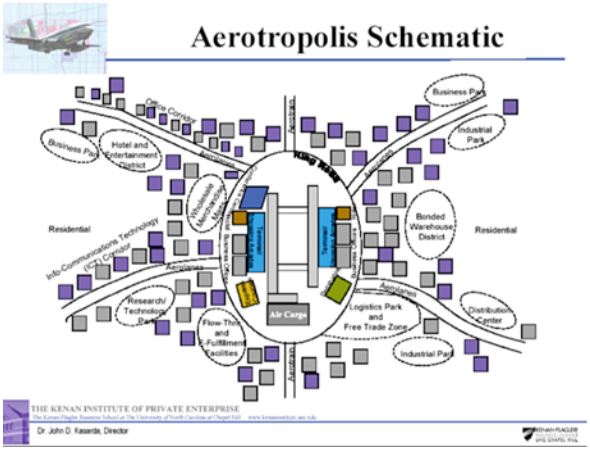

Fig. 2: Aerotropolis scheme by John Kasarda

3 Aerotropolis

The American economic sociologist John D. Kasarda has coined the term "aerotropolis" to denote a new structuring of airport-proximate suburban space. He has identified an increasingly more interdependent functional interface between systems. Airport proximity makes it possible for companies to dispatch people and goods into the air quickly and to receive them equally quickly.

Airports occupy a prominent position in society and in political and social thinking. The term "Airport City" may have seemed far-fetched in the 1950s, but today we see these growing agglomerations on the outskirts of great cities as indicators of a heretofore underestimated structuring mechanism leading to the decentering of cities and regions and to a new quasi-urban network (Sieverts 2003). Transportation policy discussion of airports must thus reflect the changing face of urbanity as characterised by such new terms for new observations as "splintering urbanism" ( ), "exopolis", "thirdspaces", "heterotopologies", or "heterotopia" and the

urbanism" ( ), "exopolis", "thirdspaces", "heterotopologies", or "heterotopia" and the "100 mile city". Airports are part of an increasingly amorphous urban or quasi-urban architecture of geographical space in which the boundary between the centre and the periphery has become fluid.

4 Airports as embedded boundaries in the nation state

Airport policy is also social policy that transcends the nation state. The creation of a "European monotopia", a common European domain with minimised geographic and social resistances to mobility, is prominent on the agenda of the European Union. This political project includes the creation of "open skies" in which individuals can move relatively freely.

The 9/11 attack on the World Trade Center in New York dramatically changed the world sense of security, with airports now seen as security risks. Without land boundaries within the European monotopia, European airports represent a boundary embedded in the nation state, which is defended and secured by complex security and control assemblages (Salter 2008) to sort and detect.

EU airport security requirements have become much stricter since 9/11. The new EU norm for airport security requires architectural changes to separate so-called "clean flows" from "unclean flows". The identification of "unclean persons" is supposed to transform a diffuse risk situation into a clearly definable one.

Airports have become a greater presence in the public consciousness of political, economic and social issues. With increasing global economic interdependence, the geostrategic and geopolitical relevance of airports has increased, with flow management and boundary management becoming transport and mobility policy issues.

The cosmopolitanization of Europe (Beck, Grande 2004) depends primarily on whether people and ideas can come together, how and when. Cosmopolitism is the cultural side of globalisation. The more possible human relationships, interactions and social networks become across great distances, the more ordinary and part of everyday life and culture they get. This sounds so easy and banal. But in fact, the omnipresence of aeromobilities in modern lives is accompanied by a profound and deep going transformation of the social and the culture of social integration, social connectivity and intimacy. Physical proximity is the prerequisite for the confrontation with difference, whether positive or negative in outcome. If difference and heterogeneity become mere risk potentials, the idea of an open society and an open European monotopia is called into question. In this sense airports and air travel raise fundamental questions and problems for societies, cities and regions. Airports are not only economic factors or technologies to overcome space. They are

mobility machines which indirectly impact and shape social life and regional and local identities and cultures.

The issue as to whether open skies also mean an open society will (also) be decided at the point where the local and the global meet, at airports. But perhaps the exact opposite will be the case. Perhaps what happens at airports, where the real and paranoid fears of the post-9/11 world culminate, foreshadows what awaits the larger mobile society. Will these fears cause global capitalism to renege on its promise to create an open society of free mobility?

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100

Airport-region governance

Conundrums of airports and regional coherence

Ute Knippenberger

While noise impact and security constraints have been acknowledged topics of the airport-region relationship, the results of current land-use development in airport regions and the consequences for planning policy are yet under-researched. The following contribution represents part of my ongoing PhD-research. Using the example of the "Airport City" in Frankfurt Rhine-Main, in the PhD the aim is to explain the actual form of governance in the airport region. Part of the question here is what causes the lack of coherence in landside planning and how far the governance structures in the individual region contribute to this. Understanding airports as components of the socio-technical system air-transport contextualizes the research question. I will argue that this system collides with the spatial planning system, and that the collision illuminates general shortcomings in achieving regional coherence. As a conclusion it will be argued that collective mediation on the one hand and compensatory measures on the other are possible approaches of governance to tackle the complex issue. However, it is important that people need to know that time and effort put in will be rewarded with an amendment of airport-region governance. I will argue, that the individual and general preconditions of the airport-region relation have to be analysed thoroughly. They determine the applicability of certain forms of governance. The argument will be underpinned by some findings at the example of Frankfurt Rhine-Main.

1 The spatial transformation of airports

The transformation of airports towards multifunctional places is, in terms of spatial planning, a relatively new phenomenon. Even if airports have always hosted a limited set of services such as hotels, conference space and retail, the development of the past 15 years marks a tipping-point: the discovery of the airport as a real-estate asset, the "Airport City". The market deregulation and the resulting competition are the main drivers for this (Burghouwt and Huys, 2003). Airports have reacted to this development by strategically expanding non-aviation service as a new source of

revenue (see fig. 1). Still we see many nuances in the conceptual implementation of non-aviation concepts (Jarach, 2001), resulting in large hub-airports showing the most substantial approaches.

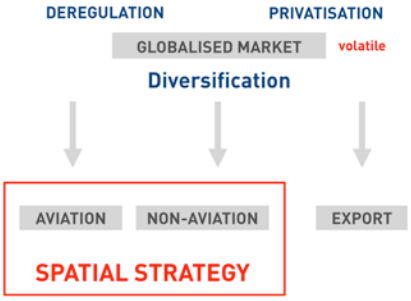

Fig. 1: Schematic diagram of the strategy using airports as a source of revenue

At the same time we are faced with a partial rearrangement of space in general, resulting in stronger centralities of metropolitan areas, also called the global city development (Sassen, 1991). Airports, especially hubs, are entangled with these agglomeration processes as drivers and beneficiaries of new centralities, with spatial impacts beyond the airport fence. Thus we can understand airport cities as a commercial product as well as an agglomeration process (see fig. 2).

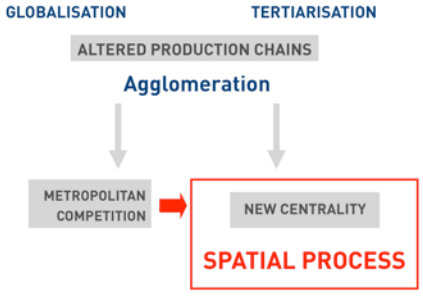

Fig. 2: Schematic diagram of the agglomeration process of airport cities

The regulative environment surrounding airport operation, development and enlargement is very complex. Privatization and market liberalisation have resulted in different organizational forms of airport management and its relation to the regulatory institutions. New methods of moderation and negotiation arose in the massive conflicts between airports and their neighbours, which the conventional

procedures have not been able to cope with. The forms of negotiation and the temporal horizon of the planning procedures are put into question. The conflicts arising around the airport can also be seen as a conflict between groups who see themselves as excluded from the benefits of globalization, but receiving its negative externalities, and those participating in and welcoming the development (Kesselring, 2007).

Additionally the functional diversification of airports enlarges the scope of regulation and puts further questions onto the applicability of the instruments. Privatized airports as the obtainers of the national interest "accessibility by air" are altering into highly diversified firms with strong real-estate departments. Thus they become actors in a different field than actually perceived by politicians and society. The conventional procedures seem incapable to develop a satisfying approach to this new complexity. Considerations regarding the regulation and governance of the "new airport" have to be accompanied by thoroughly elaborated analyses of the governance structures.

Regardless of this, airports are still viewed in a rather sectoral way, the approval procedures are mainly based on its infrastructural function. The impact on the surrounding is focused on negative externalities opposed to the positive economic effects. If we consider the studies done by the Airport Region Conference (Berthon and Brigand 2001) we see a process of change here, in the sense that planners are reflecting on the transformation of the airport. However the question how to deal with the airport in an urban planning context remains open. This mainly emanates from two aspects: the logic of the technical system air-traffic and the conundrum of regional planning implementation.

2 Airports as components of large technical systems

Following the arguments of Hughes and Mayntz, air-traffic can be understood as a large technical system or a societal subsystem. These are characterised by an own institutional framework, their own knowledge base, as well as norms and standards (Hughes, 1987, Hughes/Mayntz 1988, Mayntz 1995 and Mayntz, 2009). The hypothesis is for Mayntz that these systems and the societies they are connected with show congruence in their evolution. Large technical systems (LTS) are especially characterised by their physical presence. Whether electricity, water supplies or transport: the LTS forms physical representations in the presence of nodes and networks. Airports can therefore be understood as physical components of the LTS air traffic. Their importance for nation building in a spatial sense of infrastructuralisation is reflected in the approval process.

This also characterises the situation in Germany, where the planning of infrastructures is subject to a specific legal procedure, exceptional from other planning procedures. The sectoral procedure called *Planfeststellungsverfahren* has been installed due to the national importance of infrastructure. It bundles together all other procedures and is characterised by far-ranging interventions such as possible expropriation of land. Regarding building development on the airport site the sectoral plan encompasses any building activity and no zoning or urban planning will apply.

The preferential treatment for infrastructure is justified with public interest in air traffic. It is exactly this normative conception, inherent in the logic of the LTS, which makes it so hard to deal with a diversified airport and its management as an actor. In the actual extension procedure in Frankfurt the enactment labelled all commercial uses on the airport site as "serving the public interest" (Hessisches Ministerium für Wirtschaft, Verkehr und Landesentwicklung, 2007). Whether retail concessions or logistics, the commercialisation of the airport site is argued to be necessary to cushion the negative consequences of competition within the aviation industry. The strategy can be detected at most airports, whether public or private. Zhang and Zhang (2003) present findings that a public airport allowed to gain revenues from concessions is more likely to increase overall welfare compared to a privately owned one, but also compared to a public airport with restrictions to commercial revenue. Over the last two decades, concession revenues have grown faster than aeronautical revenue and have become a main revenue source. It is therefore hardly manageable to draw a line on the airport between the procedures for aeronautical and non-aeronautical development, especially since they are spatially entangled.

3 Rhine-Main: a functional "Airport Region"?

The illustrated transformation now poses questions as to what we actually mean by an airport. However, when speaking of an airport region relation the question arises: what consitutes a region? Here we face a central problem of regional planning: the administrative boundaries and institutional responsibilities rarely correspond to the functional constitution of the region, whereas the airport catchment area often does. Fürst (2005) argues that the term region applies also to a functional interaction of flows by people, goods and money. This functional region is usually incongruent with the administrative boundaries that exist in regions. He argues the governance of regions being either territorial or functional. Especially in polycentric regions the overlay of functional interactions is complex. If we take commuting patterns in Germany as an example, in monocentric regions like Hamburg or Munich, most commuters travel from the suburbs to the centres. Polycentric regions like Frankfurt

still show a significant flow of commuters into the main centre, but smaller centres also attract. Disperse regions like the *Ruhrgebiet* are lacking a hierarchical pattern of commuter-workplace interaction (Spiekermann, 1997).

When speaking of a functional "Airport Region", we can consider some basic numbers for landside access of different groups. Generally a hub-airport has a catchment area of maximum 120 Minutes for international flight costumers. More relevant, but also difficult to discover is the travel-time distance important for firms of different branches, studies from Munich estimate the maximum travel time for business passengers around 80 Minutes (STMWIVT, 2007). To distinguish its effect from general agglomeration advantages seems almost impossible in the complicated process of location decision. Though evidence for a location decision due to airport vicinity is hard to isolate, some findings can be interrelated. As Appold and Kasarda state in this publication, the ground access and the interconnectedness of the same however is one criterion.

Considering findings about the internationalisation in Rhine-Main and the location of internationalised firms on the micro- and meso level, we see some evidence for this. Hoppe (2005) showed that on a meso (regional) level we see a location of internationalized firms on the North-South Axis along the A5 (*Autobahn*) that connects the airport with Frankfurt and its Western suburbs, supporting Schaafsma's (see p. 177) idea of an airport corridor. Also within the city level, we can detect a locational concentration in a quarter best accessible from this axis in Frankfurt, besides the clustering of banks in the CBD. However considering the supply side, these locations are offering a lot of space and were developed as office parks. But compared to other locations in the eastern part, whose land-accessibility to the airport is less convenient, at least a tendency of internationalised firms to be located in good interconnectivity to the airport can be assumed. This correlates insofar with the office rental prices on a micro- and meso-level, as the airport itself has climbed second behind the inner city and the banking district (NAI apollo, 2008). However, prices are also high in good accessible locations without interconnectivity to the airport. And on a macro-level the Frankfurt region shows a clear overall agglomeration tendency, stretching in an 80 km radius around Frankfurt and the airport, where prospering and less prospering places can be most distinguished by their land accessibility.

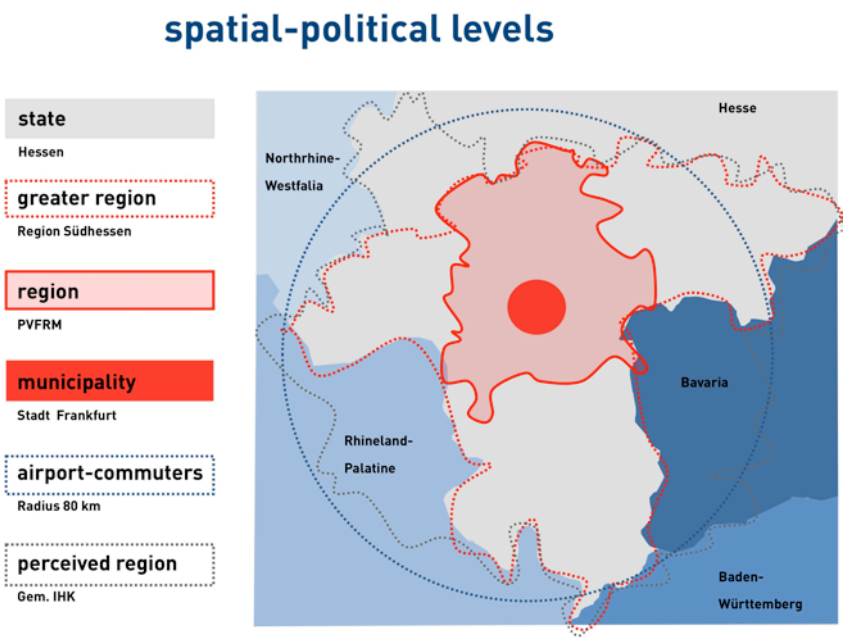

Fig. 3: Spatial-political levels in the Rhine-Main region

Fig. 3 shows the Rhine-Main region with Frankfurt as a municipality and an airport in the centre. Airport workforce commuters show a relevant maximum of an 80 km radius catchment area (Langhagen-Rohrbach, 2002). This shows relative congruence with the „perceived region" of the chamber of commerce. It underpins that the possible impact are of the airport crosses administrative borders of four German *Bundesländer* and lies in between two regional levels, one is the regional planning level (greater region), the other the conurbation resoponsible for the zoning on and around the airport (PVFRM). This preconditions the airport-region relation also in terms of urban planning. As findings of the Airport Regions Conference (Berthon and Bringand, 2001) state, airports in most cases are located at the boundaries of various municipalities and administrative entities. In the case of Frankfurt the airport is located within the boundaries of Frankfurt, but in a complex set of other boundaries in the surrounding. The regulatory system would offer two possible levels to discuss the airport on-site and off-site on an urban planning basis: the level of the regional land-use plan and the level of the city planning department of Frankfurt. But both levels refer to the sectoral procedure *Planfeststellungsverfahren* that lies in the responsibility of the greater region and

the state. An additional mediation process *Regionales Dialogforum* accompanying the sectoral procedure was focused on noise and environmental impacts. The regional plan does consider the airport in terms of landside traffic, but planners have to rely on the status quo of the approval. Any transformations happening later are approved by the building department of Frankfurt. Therefore the main regulators responsible for the airport planning are the state department of Hesse and the city of Frankfurt. Ironically these two public actors are at the same time the main shareholders of FRA, and they also form a stable, historic growth coalition. Analysing the attitude of these actors towards non-aviation development at the airport it shows that the arguments of the Fraport management are assumed. The *Planfeststellungsbeschluß* of December 2007 states that public interest and the interest of the airport management are congruent. At the same time the mayor of Frankfurt discusses the "Airport City" as a tool to sustain the city's competitiveness. Still no overall concept exists, what exactly this new location means for the planning system of Frankfurt or how exactly it could contribute to amend it (Speer & Partner, 2009). Rather the topic is negotiated confidently between the heads of both organisations.

Whether general agglomeration procedures or an agglomeration process fuelled by exceptional accessibility by air, we can consider this agglomeration a functional region in the sense mentioned above. Consulting the administrative boundaries we see a fragmented body with many municipalities and regional levels that do not correspond to the functional interrelation. On a macro level we even see that the functional region crosses state boundaries. Many approaches have been made to strengthen regional planning and coordination, but have mostly failed due to a consolidated system of local tax competition and a competitive attitude between the municipalities. In a strong system of land-use and airport regulation we are faced with a complex systems that blurs out the development on and off site of the airport. But where should a planning approach towards an integration of the airport assess?

4 Governance of an airport region?

Which instruments could foster a coherent development of an airport region, making use of the benefits of the spatial strategy and process it induces? A master plan of an airport region could encompass the complete set of criteria such as land-use, agglomeration drivers, noise impact and health questions with the demands of a successful airport operation for cargo and passengers. Reality shows that the discussion is dominated by antagonisms and historical conflicts reduced to noise vs. economy and that spatial effects remain underrepresented. At the same time we understand, that the focus on noise is connected with non-acoustical factors of

conflict perception that can be influenced by trust in the airport-region-relation (see Suau-Sanchez in this publication p. 139). Regardless of the regulatory regime at many airports negotiation structures are developed to tackle the local conflicts. Schimank and Werle (2000) argue that the tendency towards a mix of governance forms is rooted in the accelerating complexity and interweaving of societal issues. Looking at the airport-region relation it is almost impossible to define boundaries of the complex functional interaction between the two. It is an example of what Beck (1986) calls delimitation or non-finalisation of processes in modern societies. Thinking of airport development, the term non-finalisation might also apply. Therefore mediation can be a tool to be combined with the general procedures. The work of Geis (2003; 2005) provides further insight into opportunities and constraints of mediation in airport regions.

Another approach responds to the location concurrence between municipalities in airport regions: In Rhine-Main some municipalities have recently claimed to receive shares from the tax revenues generated by the airport operation in favour of Frankfurt, because the noise contours prevent them from further housing development (Offenbach Post, 2009). How can a satisfying approach for an airport region be developed to benefit from the growth without giving up quality of living? Since the negative impacts are definitive, a pareto optimality will hardly be achieved in airport regions, and in general it does not represent a practical criterion of legal consideration (Eidenmüller, 2005). In order to adapt to the changing circumstances of the infrastructure Bickenbach et al. (2007) suggest an incorporation of compensatory measures and a flexible model of approval. It is therefore applicable since spatial conflicts encompass specific criteria: They are dynamic processes and are the result of opposing interests, focused on the same object (Reuber, 1999). Compensation can lead to an efficient political coordination. As a welfare-theoretical, normative approach, which offers compensation for those disadvantaged by the negotiated solution, the Kaldor-optimum or Kaldor-Hicks-criterion (Scharpf, 1993); Sager, 2008) is useful. It indicates that an outcome of coordination is efficient if the gains are sufficient to compensate the negative externalities.

The applicability of this approach might also influence the planning situation: The misfit between the spatial impact and the administrative boundaries is a potential source of conflict, since it excludes compensation measures. A general shortcoming of the administrative region is the spatial mismatch between taxation and planning perimeter. A compensatory regional planning system could also create incentives for municipalities to develop less land and leave more open space, making models as airport corridors more realistic. In any case, an airport region cannot be thought without solving some of the conundrums of regional planning.

5 Conclusions

The Frankfurt example shows that the situation of any airport is special. The airport is located in a polycentric region within the boundaries of the high-order centre Frankfurt. Compared to Amsterdam Schiphol, also an airport in a polycentric region with a strong high-order centre, AMS is within the boundaries of the small community Haarlemmermeer. In Germany's federal system municipal tax competition exists, motivating the municipalities to develop space for office and housing, in the Netherlands this is not the case (Wijk, 2007). Also compared to the other German hub, Munich, differences in the governance of the airport and the region can be distinguished. This means we need a deeper understanding of how the individual situation of the airport-region relation influences the airport-region governance to develop a coherent regional approach. It shows how many variables might influence the landscape. Path dependencies of conflicts and technical irreversibilities, as well as oppositional or growth coalitions influence the urban planning issue. Further issues are ownership structure of the airport, local tax distribution system and the general level of regional coherence.

In the diversity of interests and actors, forms of collective negotiation could be more successful than hierarchical steering and law enforcement. These forms of coordination can enhance trust and therefore the acceptance of airport development. Still they have to be worked out carefully in terms of constitution and implementation power. People need to know that time and effort put in will be rewarded in that sense that the negotiated outcome will become a consistent part of the airport-region governance. Compensatory measures should be part of the process, though they are hard to implement. Even if these forms of coordination seem to raise more transaction costs than law enforcement, regarding the complicated and long procedures at airports in Europe the tendency to collective negotiation is given and showing successes (Berthon and Brigand, 2001; Halpern, 2003). The airport-region relation must be worked out carefully and with a strong focus on "managing the interfaces" (Baker, 2008).

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Defining the Airea

Evaluating urban output and forms of interaction between airport and region

Johanna Schlaack

In the discourse on the worldwide emerging phenomenon of airport related growth, often labelled as Airport City development, differing concepts can be distinguished. In the following I will explore the terrain of urban output where the interaction of metropolitan region and airport becomes tangible and I will propose a new concept to define this space: the *Airea*. The Airea is often characterised by immense pressure for development and a significantly higher investment activity compared to the rest of the metropolitan region. But how exactly do the spatial configurations within the Airea function and how could the quality of urban design, architecture and open space furthermore be evaluated and improved in research and practice? Is there a specific typology of airport agglomerations or even a typology of interaction in the Airea? This article presents a framework for analysis of the function, interaction and integration of the airport area and provides first research outcomes in terms of a typology of the conceptualised Airea. Case studies are hereby the Denver region including the Denver International Airport (DIA) and the Berlin region including the future Berlin Brandenburg International Airport (BBI).

1 Introduction

Although many Western cities have faced depression and shrinkage, over the past two decades until the present day a trend of continuous growth can be observed around airports that produced an enormous urban output. However, these new forms of growth often take place in the absence of overarching planning concepts and with little to no participation of communal and regional stakeholders. Despite the potential of becoming an integrated development hub in the metropolitan region the insufficient cooperation of planners, public institutions, airport authorities and private investors results in the well known image of today's airport areas: faceless business parks sprawling alongside traffic corridors and unstructured suburban residential areas.

In the discourse on airport related growth various concepts can be distinguished, for example the model of the *Aerotropolis* (Kasarda 2000) or the *Airport Corridor* (Schaafsma 2003). The following paper analyses the different parts of the metropolitan area highly related and actively interacting with the airport. Additionally it introduces the new concept of the *Airea* to define this space. The broader concept of the Airea is no longer limited and dependent on the Airport City debate and hence opens up different perspectives and new possibilities for analysis and interpretation. Moreover this article seeks to highlight the urgent need for a closer scientific attention and a strategic intervention in this often uncontrolled process of airport related growth.

First of all some basic questions should be considered, why has the airport area become such an important hub for development in the metropolitan region over the past two decades, and why is it growing so extensively? And secondly what are the main concepts and the framework for analysis of these new airport related development schemes?

The post-industrial age is characterised by a high degree of mobility of people, goods and knowledge. In the trend towards the survival of the fastest one crucial aspect for metropolitan regions in global competition for new economies and highly qualified young professionals is accessibility. As a direct node between global and local, the airport has become a key location within the 'global-local-interplay' (s. Häußermann/Läpple/Siebel 2007). In this regard the airport area could be considered a so-called 'glocal' place (s. Swyngedouw 1997) where the overlapping and interdependence of macro and micro levels are particularly evident.

As a result airport authorities as well as local and regional governments have increasingly sought to take advantage of the potential and the possibilities of strategic development around the airport. Consequently the importance of non-aviation revenues has been increasing for the airport authorities and the general economic focus shifted from 'Airside' to 'Landside'.

2 Questioning the airport city

To market the new non-aviation business and to generate high revenues nearly every ambitious airport nowadays has developed, is developing or at least has a plan to develop landside business parks with inventive labels like Airport City, Air City, Aerotropolis, Aeropolis, Aeropark, Aviopolis, Avioport, Flight Forum, Sky City or Airpark. Regarding the panel theme 'Airport City Perceptions', the Airport City needs to be questioned on principal in terms of its actual capacity to become a city. Hence, the question should be raised, can the airport be a city at all and if so what type of city?

Obviously the unorganised, extensive growth around airports should rather be described as Airport Suburbia than as Airport City Development. Lacking important city characteristics such as density, heterogeneity, mixed-use, public amenities, design quality and permanence instead of transit character the Airport City label remains a marketing tool for real estate interests in the airport vicinity.

3 Concepts and models of airport area development

In the ongoing discourse on the worldwide emerging phenomenon of airport related growth one can mainly distinguish four models or concepts. Given below is a short overview of these four probably well known concepts including the *Airport City*, the *Aerotropolis*, the *Airport Corridor* and the *Airport Region*.

Fig. 1: Schematic diagram of the different airport area development concepts.

The first approach is focusing on the *Airport City*, the area immediately surrounding the airport, which is predominantly marketed by the airport authorities themselves and characterised by an economically integrated development of airport and real estate. This like Güller and Güller formulated "more or less dense cluster of operational, airport-related as well as other commercial and business activities" mostly includes the typical components such as hotels, conference centres, offices, shopping and entertainment facilities as well as cargo, logistics and distribution (Güller/Güller 2003). This form and pattern of Airport City development can be observed around almost every hub airport in the world.

Inevitably the question arises as to whether a homogeneous, commercial, low-density cluster, consisting of the aforementioned transit-oriented components can really be called an Airport City? Or perhaps airport authorities and stakeholders in the airport region in reality simply use this label as an instrument to market their properties.

The second concept is focusing on the wider airport area, the so-called *Aerotropolis* and is mainly influenced by the work of the US-American professor John Kasarda. According to Kasarda's approach, the Aerotropolis extends over an area of 25 kilometres around the central airport and is characterised by a system of radial transportation links. Along these corridors he advocates the development of business and residential clusters with intermediate green spaces. He assumes the

conceptualised Aerotropolis is comparable in dimension to the North American metropolitan areas and hence consists of an airport city core and circumjacent aviation-oriented suburban clusters (Kasarda 2000).

But does the direct analogy of dimension and configuration of the US-American metropolis in comparison with the emerging Aerotropolis that Kasarda suggests, help analyse or sustainably improve or in any way influence the development processes around airports in this context? Instead of coherent development and sustainable land use this model for airport growth obviously paves the way for further unorganised extensive development and urban sprawl in the manner of US-planning practice fifty years ago by using the same outdated commuter-oriented principles (s. Charles 2007).

The third concept is focusing on the *Airport Corridor*, which emerges in the area linking the airport with the centre of the metropolitan region. The Airport Corridor concept, for example advocated by the Schiphol Group, is often characterised by a strategically public-planned infrastructural spine to the inner city and by a functionally integrated development of rail or road infrastructure and real estate. This development often takes place in the form of a joint venture between airport authorities, private developers and public institutions (Schaafsma 2003).

On the one hand the concept of the Airport Corridor provides the potential to sustainably integrate the airport area as a hub for development in the polycentric metropolitan region and to enable a balance of economic benefits for the involved municipalities, communities and other stakeholders. On the other hand the central longitudinal infrastructural connection to the city could also become a barrier for crosswise development and hence fuel further fragmented linear development.

The last overarching concept is the *Airport Region* that is also included in the conference theme ‘From Airport City to Airport Region’. The commonly used term Airport Region, from my perspective, instead of describing a status quo is rather a shared political planning vision, which implies a self-conscious functional, infrastructural and governmental complex woven territory stretching out around a centrally positioned airport.

In order to primarily foster those regional visions an objective, integrated research approach is first needed to analyse and describe the status quo of airport related development in regard to the metropolitan region. Therefore the approach of the Airea as an open tool kit and research method has a particular relevance for regional science and urban planning.

In contrast the other abovementioned concepts are not fully delivering an open analytical research approach and all have a certain connotation or refer to a particular scale, complexity or actual spatial form which could be misleading. The term Airport City implicitly refers to the city, a complex urban centre, which tries to

upgrade the appeal of office and business parks around airports for marketing reasons. The Aerotropolis model inappropriately combines the notions of 'Aero' and 'Metropolis' and hence creates a hypocritical image of the airport as generator for a whole new airport metropolis. Also, terms like Gateway or Airport Region imply a rather complex scale, an inherent regularity and homogeneity which in reality is often non-existent and refer implicitly to the airport rather as an independent central node for regional development. Certainly the Airport Corridor can be observed in reality but limits itself to an actual spatial form, which in some airport cases might be true but can not deliver a functional category which is flexible enough to facilitate analyses of various forms and patterns of development around airports.

4 Defining the Airea

In the research discourse the analysis of the interrelation and the interaction of airports and metropolitan regions is underrepresented and mostly focuses on the airport perspective rather than on the perspective of metropolitan region and city centre. Thus my focus is on the function and the spatial configuration of the direct airport area and the urban output in the greater airport region with regard to different forms of interaction and potentials for sustainable integration within the metropolitan region.

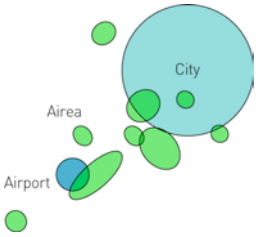

Fig. 2: Schematic diagram of the Airea.

In order to complement and partly integrate the different concepts discussed before and also in order to go beyond the limitations of these concepts and the debates associated with them, I introduce the *Airea*.

The concept of the Airea delivers an approach, a toolkit and a new spatial and functional category to analyse and describe processes of airport related development within the metropolitan region. The Airea is, unlike the other concepts, a rather objective term which refers to the various fragmented islands of development within a certain space of opportunity in relation to the airport. Which means it refers to

those parts of the metropolitan area, which are predominantly influenced by the airport, or which, in reverse, influence the airport directly.

The global and the local interaction and interrelation of airport and city become particularly tangible and evident in the Airea. The clash in terms of scale, program, space, economy, culture, stakeholders, mindsets etc. produces and shapes each of the Airea components as a spatial, functional and governmental specific space in the metropolitan region. The Airea as sum of its spread parts is often characterised by an immense pressure for development and a significantly higher investment activity compared to the rest of the metropolitan region.

Presumably, to a large extent the Airea features familiar city components and hence can be explored with the following key-parameters: firstly programming in concept, function and use, secondly physical form in framework and development pattern and thirdly major involved stakeholders regarding their main goals and power-relations. The Airea apparently combines the components differently on small and large scale and is missing some essential urban ingredients.

Thus, the overarching goals are first to explore and reveal the inherent characteristics of the Airea as a whole and also in comparison with the case studies by analysing the different component parts of the Airea regarding their functional program, their physical form, their main stakeholder constellation, their interrelation to each other, to the airport and to the city. Secondly to define overarching types of interaction between city and airport on a greater scale like the symbiotic, the competitive, the parasitic or the isolated, which presumably become traceable for the different case studies in location and function of the Airea components. And finally to give recommendations for a sustainable integration of each individual Airea component regarding the airport and the city, regarding each other and regarding their particular surrounding and for a robust development concerning program, process and design.

The following figures illustrate the framework for research of the Airea concept first in general and secondly applied on the case studies of Denver DIA and Berlin-Brandenburg and the future BBI.

In the first step the actual spaces in the region, which show an interaction in direct airport relation by influencing the airport and being influenced by the airport need to be defined. Research criteria on that account are the proximity and accessibility regarding isochrone or distance, the development status by time and the marketing strategy regarding the airport. The component spaces together form the Airea and could each be ranked by their airport relation, airport focus and evaluated by their relation to each other.

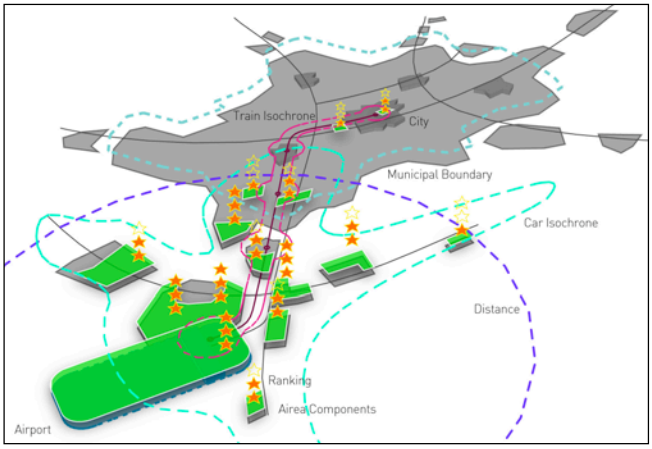

Fig. 3: Schematic definition and ranking of Airea components.

In a second step the component parts of the Airea are analysed by program, physical form and stakeholder constellation in order to reveal inherent characteristics of the component parts in comparison to each other and to the other case studies and to further specifically characterise the overarching Airea. In the third step the interaction and interrelation of the Airea components to the city and to the airport, between each other and to their immediate vicinity are explored in order to characterise different types of interaction in the Airea.

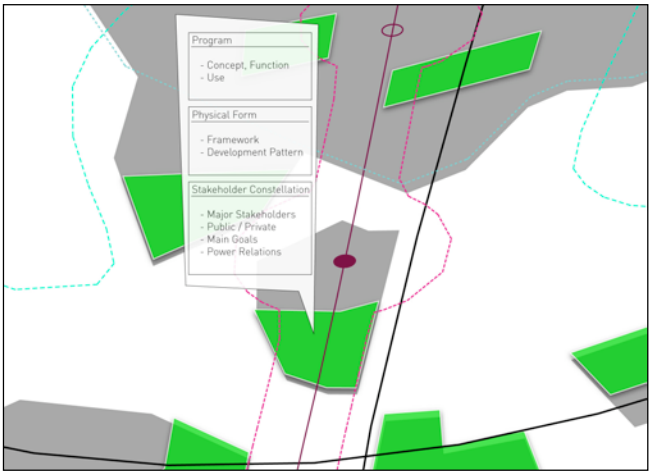

Fig. 4: Criteria for analysis of Airea components.

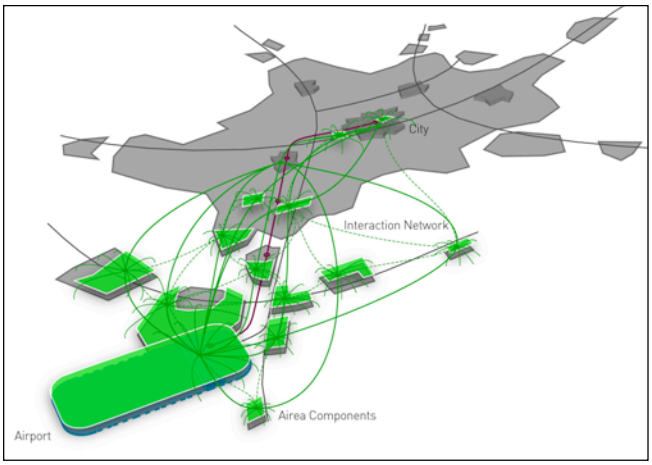

Fig. 5: Schematic interaction and interrelation of Airea components.

In the last step overarching types of interaction between airport and city are defined and a typology of interaction is developed. In this regard the aforesaid types of interaction of airport and city like the symbiotic, the competitive, the parasitic or the isolated become evident.

5 Case studies

The main case studies for the Airea analysis are Denver International Airport (DIA) and the future Berlin-Brandenburg International Airport (BBI) besides Dallas-Fort Worth International Airport (DFW) and Amsterdam Schiphol (AMS).

Several general conditions of these case studies, especially in Denver and Berlin, show interesting analogies and are therefore worth to be compared. Both metropolitan areas have already closed or are closing inner city airports to relocate one major airport in the periphery. In Denver the DIA replaced Stapleton Airport in 1995 and in Berlin-Brandenburg the BBI will replace Tempelhof and Tegel Airport in 2011. Moreover in both cases a large variety of stakeholders is actively involved and participating in the regional planning and marketing process for a development corridor between airport and inner city.

In addition some key problems in both regions also show interesting similarities for example the relatively minor cargo development, the glut of real estate properties in the wider airport area, the comparably weak regional economic performance of Denver and Berlin and the very difficult, complex woven stakeholder constellation around the two airport mega-projects.

Hence, the analysis of processes around the DIA in the Denver metropolitan area is helpful to develop strategic advises for Berlin-Brandenburg and the BBI airport area development and to formulate lessons learned. Also because the DIA is a relatively new US-American planned hub-airport but already experienced 15 years of regional airport development.

5.1 Denver International Airport (DIA)

The following figures will illustrate and exemplify the approach of the Airea applied on the metropolitan area of Denver, Aurora and the DIA.

The component spaces of the Denver Airea with direct airport relation are defined by the proximity, accessibility regarding distance (25 km or 20 min. travel time by car), the development status by time (between 1995 and 2008), the airport related marketing strategy and are evaluated by their airport focus in relation to DIA. Hence, the processes within the Airea are analysed by program (function and use), physical form (framework and development pattern), major stakeholders (public and private) and pressure of development and demand.

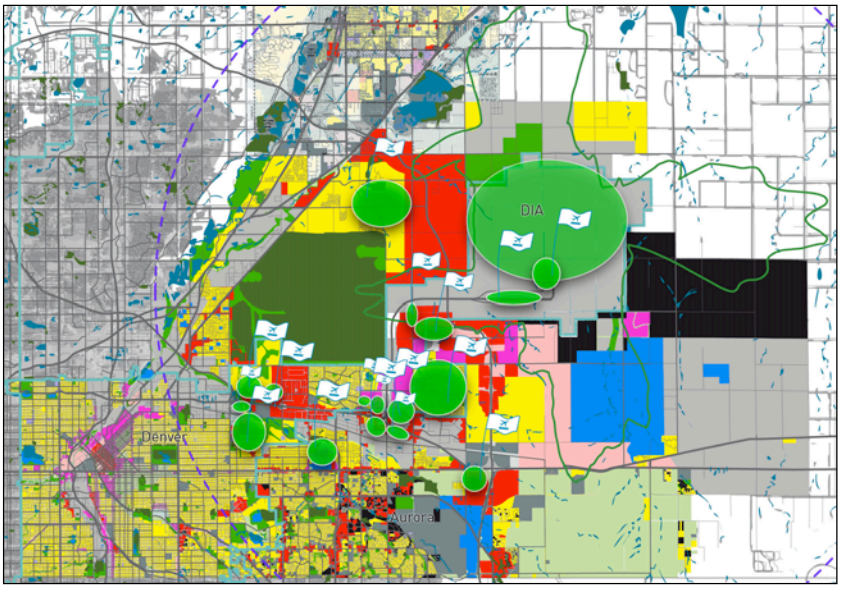

Fig. 6: Denver Airea in combination with the different development plans.

Airea Components, Location	Distance (miles)	Travel Time (minutes)	Start (year)	Airport Focus Relation
Airside, DIA	0	0	1995	+++
Landside, DIA	2	5	1995	+++
Gate, Denver	7	11	1997	+++
High Point, Denver/Aurora	8	14	2007	+++
Reunion, Commerce City	10	15	2001	++
Green Valley Ranch, Denver/Aurora	12	18	1983	+
Gateway Park, Denver/Aurora	12	14	1997	+++
Horizon Uptown, Aurora	14	18	2008	+
Fitzsimons, Aurora	16	20	1999	++
Stapleton, Denver	16	20	1995	++

Tab. 1: Airea components and relation to DIA, Denver.

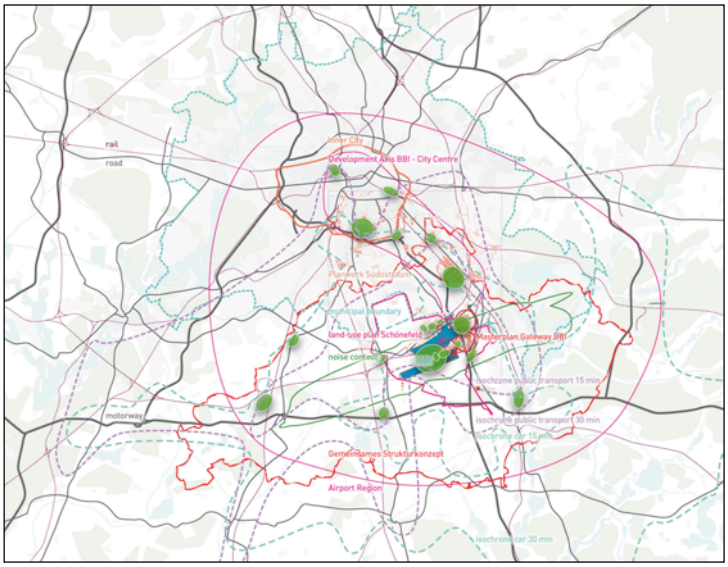

Fig.7: Berlin Airea and BBI-related planning concepts for Berlin Brandenburg region

5.2 Berlin Brandenburg International (BBI)

The Berlin-Brandenburg metropolitan area is an interesting example of current planning for an Airport Corridor and a whole Airport Region. The tri-polar airport system will be replaced by the new major airport Berlin Brandenburg International (BBI), which is under construction with a planned opening in 2011. The overarching concept that is pursued by regional and local planning authorities together with the BBI airport authority mainly aims at a strategically integrated axis from the new BBI airport to Berlin's inner city and its new main train station Hauptbahnhof.

Also in this case the Airea components are defined by the proximity, accessibility regarding isochrone and distance (25 km, 30 min. travel time) and the airport related marketing strategy. Each of the Airea components is furthermore evaluated by the airport focus concerning their program and their stakeholder configuration in relation to BBI.

Airea Components, Location	Distance (kilometres)	Travel Time (minutes)	Airport Focus Relation
BBI Airside	0	0	+++
BBI Landside	0	0	+++
BBI Airport City	1	1	+++
Gatelands, Schönefeld	3	3	+++
Waltersdorf, Schönefeld	4	5	++
BBI Business Park Berlin	8	9	+++
Schönefeld North	8	10	+++
Schönefeld Centre	9	12	++
Mahlow, Blankenfelde-Mahlow	10	14	++
Adlershof, Berlin	12	14	++
Wildau	13	19	++
Oberschöneweide, Berlin	16	18	+
Triangle Neukölln, Berlin	18	15	+
Dahlewitz, Blankenfelde-Mahlow	19	18	++
Tempelhof, Berlin	23	17	++
Mediaspree, Berlin	24	26	+
GVZ South, Großbeeren	25	26	+
Ludwigsfelde	29	22	++
Hauptbahnhof, Berlin	29	30	++

Tab. 2: Airea components and relation to future BBI, Berlin-Brandenburg.

6 Conclusion

The Airea approach applied on the two case studies of Berlin and Denver depicts the plain status quo of airport related development, a heterogenic configuration of spread islands within the wider metropolitan area. All islands together form the Airea of the particular region and each of the Airea components is defined and analysed with the aforementioned criteria. The pursued regional planning strategy of an Airport Corridor in Denver and Berlin becomes roughly tangible.

In a nutshell the key aspects and the framework for research of the Airea are:

- Defining the Airea (proximity/accessibility, development status, airport relation/focus)
- Analysing and comparing the Airea components among each other and with the different case studies (program, physical form, stakeholder constellation)
- Characterising and specifying the Airea (typology)
- Exploring the interrelation in the Airea and defining different overarching types of interaction between airport and city
- Developing strategic advice first for a sustainable integration of the Airea components regarding the airport and the city, regarding each other and regarding their particular surrounding and secondly for a robust development concerning program, process and design

Employing the Airea as an objective and open approach, toolkit and new spatial and functional category will help to further explore and describe processes of airport related development within metropolitan regions. Finally the overarching challenge for research and practice will be to create and implement strategic planning concepts, which aim at a functional and infrastructural integration of the Airea as development hub within the wider metropolitan region, and which enable a more sustainable and robust development around airports in the future.

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The interrelationships of airport and spatial development

Zurich Airport – Experiences from a test planning process

Bernd Scholl

Airport development in densely populated regions presents a major challenge to all parties involved. Spatial planning especially is called upon to deliver integrative solutions for future spatial and airport development through innovative planning processes. Using the region around Zurich Airport as an example, one such process is presented and conclusions concerning future processes are drawn from it. In particular, technological advances in noise reduction at the source and improved arrival and departure procedures are opening new possibilities. An important condition for the acceptance of solutions by those affected by air traffic problems is interdisciplinary cooperation between airport regions, airport operators and aircraft manufacturers, scientists, and experts from spatial planning and politics.

1 Introduction

The starting point of this report on the interrelationships of airport and spatial development is a set of hypotheses on the future development of major traffic airports in densely populated regions, mainly in Europe. Using the development of the Zurich Airport as an example, spatially important conflicts, central problems and questions and possible perspectives will be pointed out. The case study makes it clear that spatial planning is being called upon to proactively engage with the development of high-density traffic airports. In particular, technological advances in aircraft manufacture to reduce noise emissions as well as innovative landing and take-off procedures open new perspectives to mitigate the central conflicts in airport and spatial development, if not actually solve them.

2 Main hypotheses

Five hypotheses should help to structure this complex topic. The example of the Zurich Airport later on in this article illustrates these hypotheses.

- Many European airports are located relatively close to their city centres, which is beneficial for the surrounding metropolitan region. Well-functioning and efficient airports are traffic hubs in an increasingly globalised world and create a network for the exchange of people and goods. Airports in the vicinity of large European metropolitan regions have better connections to high-performance traffic systems than peripheral airports. The connections to high-performance track systems especially, i.e., national and European high-speed lines, allow environmentally appropriate traffic connections and subordinate track networks give airports access to important, and often international cross-border catchment areas.
- Relocation of airports, as in Munich in the 1980s, will be the exception more than the rule. Therefore, the best possible integration of airports, also considering the increase in capacity and size, occurs in thickly settled regions of major importance. This will increase the number and difficulty of the spatially important conflicts needing to be solved.
- To integrate airports can only be achieved with – and not against – the people living in the respective airport regions, therefore, the highest requirements must be proposed. In addition, thought and consideration should be given to combination projects with other airports in the area.
- However, integrated solutions are in order, especially ones that consider the issues of spatial and airport development just as much as the advances in noise reduction from aircraft innovative take-off and landing procedures.
- The actors participating in these processes should be open to the fascinating tasks in one of the most strategic areas in the competition between metropolitan regions.

3 Test planning process of spatial and airport development for Zurich Airport

3.1 Starting point

Founded 22 June 1945, Zurich Airport has developed into a modern and high-performance intercontinental airport. The increase in airline passengers and flight movements could be met with a gradual build-up of the airport. However, the topographical circumstance forces a self-crossing runway system (Figure 1). The construction of the so-called V-runway 14/32 made independent starts and landings possible.

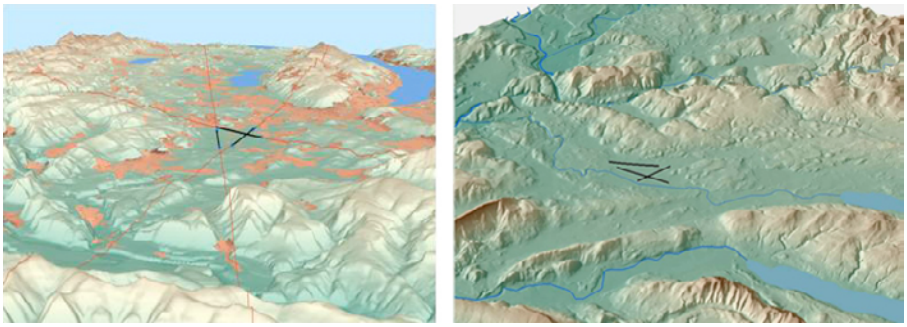

Fig. 1. Topographical circumstance of the Zurich Airport (UNIQUE, 2002)

Fig. 2: Gradual development of Zurich Airport. (Source of images: www.zrhwiki.ch; UNIQUE 2009)

Air traffic at Zurich Airport experienced steady growth in the 1990s reaching the highest figures up to this day in 2000 with 22.7 million passengers and 272,000 flight movements in regular service. Internationally seen, Zurich Airport belongs to the mid-sized European airports.

After a stark drop in passengers to 17 million at the start of the new century, by 2008 the airport was once again handling around 22 million passengers. With the high capacity utilisation of the airport, conflicts, especially in the area of aircraft noise, led to a series of changes and limitations in air traffic. This produced open questions that have not been solved yet.

The following section identifies the central elements needed to understand the conflict. These form an important component for future solutions of airport and spatial development in the airport region of Zurich as part of the ongoing work on the Swiss Federal Aerospace Infrastructure Plan (Sachplan Infrastruktur der Luftfahrt / SIL)

Rank	Country	Airports	IATA	PAX	Change 2007-2008
1		London Heathrow Airport	LHR	67,056,228	▼1.5%
2		Paris-Charles de Gaulle Airport	CDG	60,874,681	▲1.6%
3		Frankfurt Airport	FRA	53,467,450	▼1.3%
4		Madrid Barajas Airport	MAD	50,846,104	▼2.4%
5		Amsterdam Airport Schiphol	AMS	47,429,741	▼0.8%
6		Rome Leonardo da Vinci-Fiumicino Airport	FCO	35,132,879	▲6.6%
7		Munich Airport	MUC	34,530,593	▲1.7%
8		London Gatwick Airport	LGW	34,214,474	▼2.8%
9		Barcelona El Prat Airport	BCN	30,208,134	▼7.9%
10		Atatürk International Airport	IST	28,553,132	▲11.7%
11		Paris-Orly Airport	ORY	26,209,703	▼ 0.9%
12		Dublin Airport	DUB	23,500,000	▲0.9%
13		Palma de Mallorca Airport	PMI	22,832,865	▼1.7%
14		London Stansted Airport	STN	22,360,364	▼6.0%
15		Zürich Airport	ZRH	22,100,000	▲6.8%
16		Copenhagen Airport	CPN	21,530,016	▲0.8%
17		Manchester Airport	MAN	21,219,195	▼4.0%
18		Moscow Domodedovo International Airport	DME	20,430,000	▲8.9%
19		Vienna International Airport	VIE	19,747,289	▲5.2%
20		Oslo Airport, Gardermoen	OSL	19,344,459	▲1.6%

Tab. 1: Zurich in comparison to other international airports by passengers/year (Data source: Airport Council International 2009)

Since the end of May 2000, the essential circumstances of the Zurich Airport have undergone many changes. Some of these are:

- Ordnance, repeal and new ordnance for noise emission limits for large civil aircraft (from April 2000 to May 2001).
- Termination of the 1984 administrative agreement between Switzerland and Germany by Germany (31 May 2000).
- Passage of the concept section of the Aerospace Infrastructure Plan by the Swiss parliament (18 October 2000).
- Privatisation of the airport and granting of an operations concession to Zurich Airport AG for 50 years (1 June 2001).
- Terrorist attack in the USA (11 September 2001).
- Grounding of the Swissair fleet (2 October 2001).
- Gradual introduction of restrictions on the use of southern German air space (starting 19 October 2001) based on the CH-D treaty on arrivals traffic at Zurich Airport signed on 18. October 2001.
- Subsequent failure of the treaty when the upper chamber of the Swiss parliament rejected it on 18 March 2003. Germany's response on 17 April 2003

was to put a stricter unilateral executive order into force in German air traffic regulations.
- Discussion of five new operation concepts as part of the SIL coordination project with a plan for 420,000 flight movements (starting 25.10.2001).

These uncertainties have also considerably increased the spatially significant conflicts in airport and spatial development. In its position statement on the design of the cost object bulletin (Objektblatt) for Zurich Airport, part of the Aerospace Infrastructure Plan of 3 July 2002, the government of the Canton of Zurich, represented by the Cantonal Building Office, commissioned a special ad hoc project organisation to work out a long-term perspective. The main conditions were to:

- Assure long term scope of action for the spatial development of the airport region and for the airport traffic
- Keep the negative effects of air traffic on the population and environment at the best possible limits for the long term.
- Prepare and present concrete fundamental principles for the Cantonal Planning Guide (Richtplan) within an appropriate timeframe.

3.2 Project organisation of the test planning process

To manage the requested foundation work, a special ad hoc project organisation was selected for the test planning process, in the sense of a Wiener Model, which showed the following characteristics:

- Power of the best argument, practical before formal competence
- Bias-free exploration of long-term perspectives using several teams
- Competition of ideas, simultaneous test planning
- Supervision by independent experts
- Clear role division between work on the fundamentals and policy
- Direct report of results to the executive representatives

The options for the long-term spatial development of the airport region and the development of the airport infrastructure were surveyed and evaluated, free of prejudice and uncoupled from politics, by administratively independent external experts.

- Consideration of the special topographical conditions
- Weather conditions (wind, visibility, temperature)
- Settlement structure according to the canton plan of 1995
- Traffic capacity maximum of 420,000 flight movements per year
- Top capacity of 90 flight movements per hour, i.e., 60 landings and 30 starts or the reverse (plan values for Zurich Airport (formerly Unique) for the SIL variations comparison of October 2001)

- International regulations for air traffic (ICAO, etc.)

From 1983 to 2003, the number of registered flights in instrument air traffic at Zurich Airport increased from 141,000 to 256,000 (+82%). Up to 2001, landing aircraft were mainly guided from the north to runways 14 and 16, which are equipped with an extremely precise instrument landing system. After the termination of the administrative agreement by Germany in 2000, major reductions in the use of southern German air space were established in steps, bringing it down to regulation levels. Since the end of October 2003, arrivals from the east are routed to runway 28 and from the south to runway 34 (Figure 1).

The bulk of aircraft departures continue to use runway 28 to the west. The importance of runway 16 to the south for departures has starkly increased, especially since 1997. To comply with the German restrictions, runway 32 to the north will be increasingly used.

The central task of the test planning team was to create a perspective for the long-term development of the airports and its spatial catchment area. This perspective should especially demonstrate the critical element of feasibility as well as the effects and consequences of the long-term perspective. The work was oriented to the following requirements:

- Reduce noise pollution to minimise the effect on residents and meet planning and construction restrictions.
- Ensure a safe and stable air traffic operation
- Identify possibilities and offers of cooperation with partners outside the canton
- Describe modules for development that represent key and well-rounded steps
- Protect the future compatibility of the development steps with regard to air traffic as well as spatial planning

4 Main results

During the investigative phase from October 2002 to March 2003, all imaginable options were roughly surveyed and evaluated as part of the simultaneous test planning of the four planning teams (including Zurich Airport). The evaluation committee eliminated three approaches by testing them against the defined frame conditions (Figure 3).

- Change location of airport
- Airport networking system with other Swiss airports
- Unchanged runway system

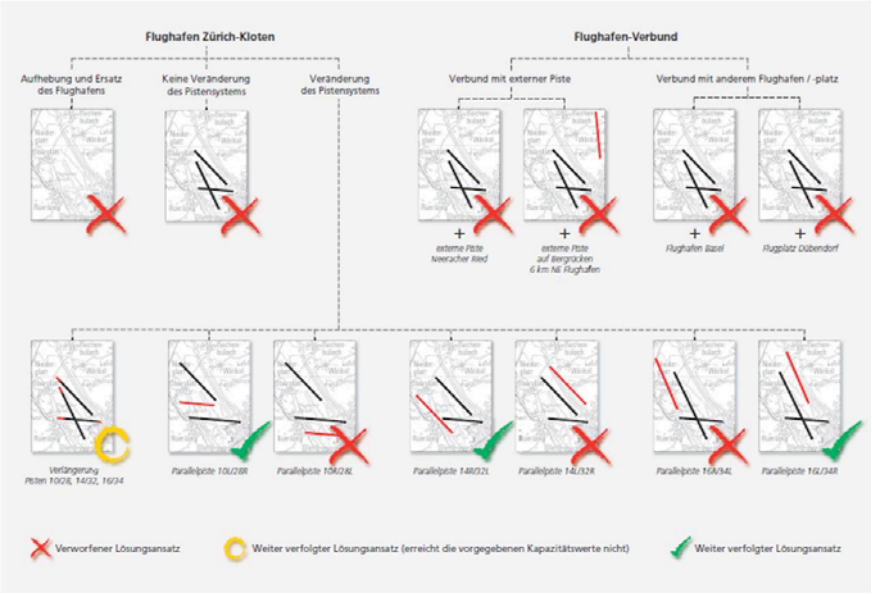

Fig. 3: Elimination process of the options

In addition, the results showed that the top capacity of 90 flight movements per hour (i.e., 60 landings and 30 take-offs and vice versa) could only be achieved with an, at least partially, independent runway system. Therefore, an optimisation of the existing runway system in such a scope could be excluded. The evaluation committee in its closing recommendations could establish that, based on the uncertain development of air traffic increases at Zurich Airport, a specific commitment to a defined parallel runway system will not lead to the goal. However, to secure sufficient latitude for following generations, a parallel and north-south oriented runway configuration should be held open. This means that at some point the required top capacity can be managed if needed. Through appropriate operational concepts, an additional long-term reduction of noise pollution can be achieved through measures taken at the source of the noise and through careful flight management.

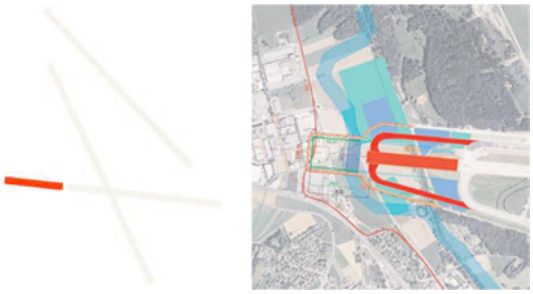

Fig. 4: Extending runway 10/28 to the West very reliable

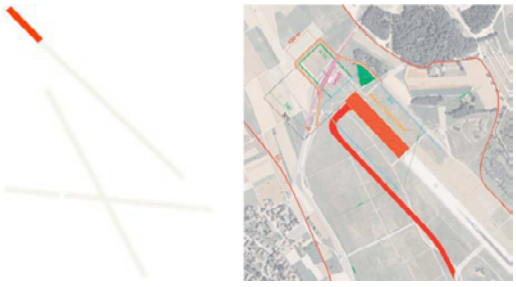

Fig. 5: Extending runway system to the North is reliable

Given the reigning uncertainty, it appears to be risky to settle on an all-or-nothing solution, i.e., to depend only on a long-term variant. It is more important to secure the scope of action for the short- to mid-term perspective (i.e., 5 to 7 years) through appropriate measures. Long-term development should however not be hindered by prejudice or by their organisation. Gradual developments with key building blocks that create benefits and clear manageable effects are therefore of central importance. One short- to mid-term recommended construction measure is the extension of runway 10/28 to the west in order to enable all aircraft types to land from the east. In addition, an extension of the north-oriented runway should be further looked into, as it would give additional possibilities for a safe and strong air traffic operation, as well as reducing noise pollution for residents. It is obvious that not all actors and stakeholders will profit equally from future developments. Each community and each actor that must take on additional responsibilities should submit a concrete request for compensation. The well-organised direct and regular exchange of information on the organisation, subject matter and hierarchical limitations used in the test planning process should be continued in subsequent

endeavours, especially in view of the complexity of spatial and airport development in the Zurich region.

In the opinion of the evaluations committee, various possibilities exist to embed spatial and airport development in larger cross-border interrelationships. This would allow potential traffic development in the Greater Basel area, the High Rhine area and the economic region of the Bodensee to improve connections to Zurich regions, including the airport. In this connection, it was deemed worthwhile to invite a cross-border expert evaluation of various approaches to infrastructure and spatial development at an appropriate time in future.

5 Outlook

The test planning process using Zurich Airport makes it clear that complex questions of airport and spatial development can be approached and solved through the use of compact planning processes. The recommendations that followed from the test planning process, also discussed in public forums, have led to numerous additional planning processes. The runway extensions and the option of a parallel runway system in particular were heatedly discussed. Under the leadership of the Swiss Federal Office for Civil Aviation, the core elements were confirmed in further planning processes, especially the runway extensions, which were recommended as a result of the test planning process. These should strengthen the robustness of the airport in its operations and above all relieve the densely populated areas around the airport from aircraft noise. This is possible because the air traffic can be directed over the less populated areas in all weather situations and independent from the type of aircraft.

Although specific to the situation of the Zurich Airport, an additional perspective can nonetheless be mentioned here. This would be the possibility to reduce noise at its source, meaning the aircraft itself and through improved take-off and landing procedures, thus reducing the noise at ground level. At Zurich Airport, the number of flight movements, even after possible runway extensions, is limited by the topography. It follows that after reaching the maximum number of flight movements, the reduced noise levels can be passed on to the population and not compensated by increasing the number of flight movements. Experts estimate the achievable noise reduction in aircraft alone will be about 10 dB(A) over the span of the next ten years.

This would halve the effective noise and would considerably relieve the airport region. Naturally, these possibilities not only affect the Zurich Airport, but also all major airports around the globe. Because reducing noise at its source is connected to additional applications, a cooperative effort from the airport regions, airport

operators and aircraft manufacturers is required. European aircraft manufacturers in association with their engine manufacturers have a special responsibility in this area. In order to recognise the reduction potential for each airport and to develop measures for the exploitation of this potential, essential work must be prepared. For actors in this field, this opens challenges.

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Subjective appraisal of aircraft noise

From decibel measurements to effective noise management

Pere Suau-Sanchez

It is widely known that aircraft noise emissions over populated areas are a constraint for airport capacity. Traditional noise management focuses on objective noise measurements. However, noise annoyance is a subjective issue. This chapter briefly introduces the importance of subjective elements of noise annoyance and suggests how to incorporate them in noise management schemes.

1 Introduction

Air traffic demand has increased greatly during the last decades, implying a doubling of traffic about every 15 years (de Neufville and Odoni 2003). The 2008 world financial crisis has had important impacts on demand and airlines operations, but recent forecasts by the International Air Transport Association (IATA) announce that by 2011 air traffic growth will be again above 4% (IATA 2008).

Because of air traffic growth and the lack of free land for new airport expansions, many European airports are in a dead end situation concerning the possibilities of increasing their capacity. The lack of space for new expansions has been fostered by:

- the growth of the European metropolitan regions and the formation of mega-city regions
- the lack of successful metropolitan governance, which has made it possible for some small municipalities surrounding airports to develop residential areas in zones that should have been protected because of noise or potential noise exposure
- the fact that most airports did not carry out effective land-banking measures.

Hence, physical constraints impede the expanding capacity to satisfy future demand (Coleman 1999; Graham and Guyer 1999; Madas and Zografos 2008; de Wit and Burghouwt 2008). In addition to the difficulty of expanding with new runways, the noise generated by aircrafts over residential areas makes it impossible to reach the

potential airport capacity. Therefore, we should add the notion of environmental capacity to the concept of airport capacity (see Upham et al. 2004).

This chapter presents a short summary of an ongoing research about the importance of incorporating noise annoyance and the subjective appraisal of noise in airport noise management.

2 Traditional objective and new subjective elements in noise policies

2.1 Traditional noise policies and ICAO's Balanced Approach

According to the International Civil Aviation Organization (ICAO) aircrafts coming off the production line today are about 75% quieter than 40 years ago and, also, the number of people living within 65 dB DNL has decreased about 30% from 2000 to 2006 (ICAO 2007). While major efforts by institutions and the air transportation industry have traditionally been made on the reduction of aircraft noise at its source, in 2001 ICAO adopted a new policy to address aircraft noise in another way. It is referred to as the "Balanced Approach" and it deals with aircraft noise in a more comprehensive way. The Balanced Approach (ICAO 2001) aims to reduce noise using four elements:

- reduction of noise at source
- land-use planning and management
- noise abatement operational procedures
- operating restrictions.

The Balanced Approach adds three strategies to the traditional measure of reducing the noise generated by aircrafts. However, noise abatement operational procedures and operating restrictions are reactive measures that do not anticipate the noise problem and can create reductions of airport capacity. On the other hand, land-use planning is a proactive policy, which can avoid the appearance of noise nuisance, by rejecting the development of aircraft paths or by choosing the right land-use. Nonetheless, land-use planning remains a prerogative of local, regional or national administration – depending on each particular country.

2.2 When sound becomes noise: the subjective appraisal

Sound intensity can be objectively measured. However, annoyance and disturbance by noise are a subjective issue that is related to the perception and tolerance and cannot be objectively considered and measured because noise level descriptors are not able to explain individual levels of noise annoyance (see Stallen 1999; Thomas

and Lever 2003; Upham et al., 2004; Bröer 2006; Cidell 2008; Kroesen et al. 2008). According to Stallen (1999:69), "sound becomes noise because of a particular appraisal of it. Therefore, understanding noise-induced annoyance requires the understanding of judgmental, attitudinal and thus social processes". Consequently noise annoyance is not only dependent on objective acoustical factors, but also on many others that are non-acoustical and depend on subjective appraisals. Numerous studies and surveys demonstrate that non-acoustical aspects are as significant as purely acoustical variables (Job, 1988; Fields, 1993; Guski, 1999; Baarsma, 2000; Bröer, 2006; Gordijn et al., 2006; Stallen, 2007a, 2007b; Lieshout et al., 2008; Kroesen et al., 2008). In fact, only one-third on the variation in noise annoyance can be explained by acoustical factors (Guski, 1999). In addition, the number of complaints is often unrelated to the level of annoyance or the number of annoyed people (Lieshout et al., 2006; Gordijn et al., 2006; Lieshout et al., 2008). ICAO's Balanced Approach tackles the objective elements of noise annoyance, but does not mention the subjective elements.

Stallen's framework on environmental noise annoyance (Stallen, 1999), based on the psychological stress theory of Lazarus (1966), reflects that in addition to perceived noise disturbance, perceived control (e.g. predictability of a noise situation, accessibility of information and transparency, trust and recognition of concern, and voice) over the noise emissions is a key aspect for the capacity of coping with noise. High disturbance and high control may be less annoying than moderate disturbance and no control. Hence, coping with annoyance is a reappraisal of the person-environment situation.

In this regard, Bröer (2008) adds the policy factor. He considers that the dominant policy discourse resonates in people's everyday perception. Therefore, the level of annoyance will differ depending on the policy setting; and the kind of opposition will depend on the policy discourse. If policy treats a situation as problematic, people will experience it as problematic. Government, industry and science often force citizens to be alert and react emotionally.

These non-acoustical and subjective factors are not always taken into consideration nor integrated in the airport management policies. Cidell (2008), for example, does a critical analysis of noise maps and discovers that airport noise conflicts are often grounded in different experiences of those who measure the noise and those who suffer its effects. In this regard, in UK, a study by OMEGA (Hooper 2009) faces the absence of a common language between these two parties. Existing noise metrics based upon decibel measures are difficult to understand and are not trusted by the general public. This frustrates any dialogue between airports and their neighboring communities. The study seeks for new measures that can improve communication between airports and communities.

3 Including subjective factors in noise management

Traditional regulatory policies, based on objective measurements of decibel levels, do not incorporate the above-mentioned subjective factors. Effective noise management should include such factors in order to offer benefits to both neighbouring communities and to airport's environmental capacity. But, how are they to be included? In general terms, noise management should have a holistic perspective and create a policy setting understandable and unambiguous for the community. If the policy creates unambiguities, it leaves room for a reactive behaviour of the community.

Although each airport has its own particularities, the dialog between the airport manager and the community usually takes place in round tables, which were established once the noise nuisance problem appeared. However, these round tables usually do not constitute an essential part of the management structure of the airport, where the decisions are taken, but rather function as satellite elements, as though they were created in a reactive way. If round tables do not constitute an essential element of the decision-making process, they can undermine the community's trust in the airport and thus become a place for conflict. On these grounds a reformulation of part of the airport's management structure is needed to include subjective factors in noise management. Round tables, where the community is represented, should become an essential part of the airport management structure. This does not imply that the community should have the right to fully decide on the airport's future or the daily management, but listening, considering and including the community's perspectives into airport management is the only way to build trust between the airport and the community.

Each country has its own airport management system. Some are private owned, others are public, some include local institutions as shareholders, and others include regional or national bodies. The management systems vary, but this should not prevent the presence of all the actors involved in the territorial setting of the airport at the round table because, currently, governance is complex, fragmented and influenced by a growing number of public and private actors (Wijk 2007). This renders the decision-making process much more difficult. Effective noise management can only be achieved by adapting the decision-making process to a new reality that is increasingly influenced by informal and networked relationships. The comprehension of today's complexity can only be incorporated in airport management by relating social processes and spatial forms (Healey 2007).

Another important strategy for including subjective factors is to build a new communicative language between actors, as, for example, the OMEGA study proposes. Transparency is not enough. The community will not trust the airport if data, maps and other sources of information provided by the airport are not

comprehensible for them. In that case, the use of complex information by the airport manager could be seen as using technocracy as a defence.

Another important element is how to implement the consensus decisions and how to guarantee their application. Consequently, the only way to bind the decisions taken by the parties in the round tables is by a legal agreement.

To conclude, in general terms, reactive strategies should be substituted by a more proactive environment in which the relationship between the airport and the neighbouring communities is based on a constant dialogue, instead of the traditional obscure distrust that dominates such relationships.

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Southeast Florida in the age of aviation

Three international airports in the coastal metropolis

Alex Wall

This paper is about the structural and spatial significance of the three international airports serving the Southeast Florida coastal metropolis, their part in the regional transportation network, and their potential role in extreme weather events. It represents a preliminary research to be further developed. The information for this article comes from airports authority material available to the public, secondary literature, and from interviews with directors and managers of the three major airports in the region. I use all three airports. The airport-city-region relationship in Florida, especially in the Southeast, is both universal and place specific. On one hand, almost all commercial airports will need to expand their facilities to accommodate growth; while on the other hand, questions of inter-airport synergies, and their value as secure places in extreme weather events are specific. Questions addressed are: What are the potentials of this specific airport system? How do the physical differences between the airports and their market niches influence local and regional development? And finally, in a low lying coastal environment that is densely settled, what are the strategic security advantages that airports might offer in the face of climate change and extreme weather risks?

1 Florida and the Southeast coastal metropolis

The state of Florida marks the Southeast boundary of the continental United States. Climate, flora and fauna in the southern half, which extends into the Northern Caribbean Sea is progressively sub-tropical. The state population of 18.7 million is concentrated in two urban clusters and two single cities all of which have international airports: Tampa-St.Petersburg is on the Gulf Coast; Miami, Fort Lauderdale and Palm Beach on the southeastern Atlantic Coast; Orlando is in the middle of the state and Jacksonville is near the northeastern border.

1.1 Aviation culture and economy

The aviation culture of Florida is broadly developed and directly tied to the state's economy.[1] The climate and terrain are ideal for flying, and this was the basis for the rapid development of training facilities for World War II. Today, 90% of Floridians live within 30 minutes or less from an airport; there are 19 commercial airports, 6 of which serve international traffic, and some 112 community airports. There are also several significant military airports and coast guard stations. Airports contribute over $96 billion annually to the state's economy and provide over 1 million jobs with an annual payroll of $26 billion (Florida Airports, 2007); more than one half of all jobs in Florida depend each day on aviation. Florida airports are crucial partners to one of the largest tourist industries in the world. Less well known is that in a large state, which also has a dispersed rural population, community airports are the base for important services and support functions (Florida Aviation System Plan, 2007). These include: disaster relief (search and rescue teams, emergency supply, evacuation); law enforcement (border patrol, narcotics interdiction, homeland security); environmental protection (wildlife management, coastal survey, air sampling), and firefighting.[2]

Southeast Florida is the sixth largest urban area in the U.S. after NY, Los Angeles, Chicago, Dallas-Fort Worth and Philadelphia. Unlike those cities, which continue to spread out, the Everglades National Park and the Atlantic Ocean form a boundary resulting in a linear city some 150km long by 15 to 30km wide. Railways and highways structure the more densely built up area along the coastal ridge to the East, while subdivisions and industrial estates have recently reached the edge of the Everglades to the West. The population of 5.5 million is centered around the coastal cities, principally West Palm Beach and Palm Beach in the county of the same name, Hollywood and Fort Lauderdale in Broward County, and Miami and Miami Beach in Dade County. Each is served by an international airport: West Palm Beach International (PBI) serves Palm Beach and Martin Counties; Fort Lauderdale-Hollywood International (FLL) serves Broward County; and Miami International Airport (MIA) serves Miami-Dade (and the region). The counties are important here as the airports are administered by their respective County Commissioners. These are locally elected officials who resist airport related decisions being made outside of their offices (Allen, 2009).

[1] Many pioneers of aviation, innovations in the design, testing and developmnt of aircraft, and innovative practices in the commercial airline industry have taken place in Florida. In private aviation, Florida is home to several „airpark" communities, which have their own airfields. One of the best known is Spruce Creek near Daytona Beach.

[2] see Florida Aviation System Plan 2007 – Statewide Overview, p 20-22.

2 Three Market-niche and Place Specific Airports

2.1 PBI and Palm Beach County

Palm Beach County has a population of 1.3 million. The basic demographic includes both a large number of high-income residents and elderly population; there are numerous retirement communities (Starret, 1997). With 25 gates serving 6 million passengers in 2008, PBI is a small national airport with some international flights to Canada and the Bahaman and Caribbean Islands. A large percentage of aircraft movements are private jets, and there are nationally known flight schools nearby. The airport is anticipating intensive use by the new generation of VLJs (Very Light Jets) beginning in 2015. In terms of development potential, despite being surrounded by the city, there are some 54 Hectares of land available for development at the edge of the airport. Because of its modest size, PBI is convenient for automobile access and use. The project to build a public transit line to connect airport with the shopping and convention centres, the downtown and the beaches all to the East has fallen victim to the recession. (Allen, 2009)

2.2 FLL and Broward County

Fort Lauderdale and Hollywood together have a population of 325,000, with a county population of 1.75 million. Of the three Southeast Coast Metropolis international airports, FLL, 80 kilometres to the South of PBI, is a base for low budget airlines as well as national and international carriers. An expanding cruise ship industry at nearby Port Everglades is an additional tourist draw. The airport has a policy of aggressively low landing fees to maintain its competitive position. Currently with 59 gates serving 22.5 million passengers in 2008, FLL's 2025 Plan includes a new runway, terminal extensions with 20 new gates and an office park. A large site has been reserved and initial planning permission received for an intermodal transportation centre near the airport entrance. This multi-functional facility will bring together automobile and bus traffic from the interstate highway and nearby city, a new light rail connection to the cruise ship port, and a new North-South rail line linking the airport to nearby cities and the other international airports. (Gambrill, 2009; Florida Aviation 2007; Broward County, 2004)

2.3 MIA and Miami-Dade County

Miami and Miami Beach together have a population of 510,000, with a county population of 2.5 million. Miami Beach is an internationally known tourist destination; Miami itself is a provincial American city but a major Latin American metropolis. City and airport are an "air bridge" between Europe, the U.S. and Latin

America. Located 30 kilometers South of FLL, with 120 gates serving 34 million passengers in 2008, MIA is a main international gateway to the U.S., and the main international cargo hub. 345,000 people are involved in airport related businesses with an economic impact of $23 billion. As David Prosperi has pointed out, the distribution and light industrial area to the South and West of the airport are dense employment node (Prosperi, 2008). The airport is undergoing a major refit to be completed in 2012. Besides rebuilding terminals and gates, an Intermodal Transportation Centre (MIC) is nearing completion. This will link private automobiles and buses with the metro, local and national rail service, as well as providing a new rental car centre. It will be connected to the airport by a "people mover." Miami, together with Los Angeles-San Diego and Houston, are new centers (core city and hub airport) of bi-lingual Hispanic-American culture and economy (Fernandez, 2009).

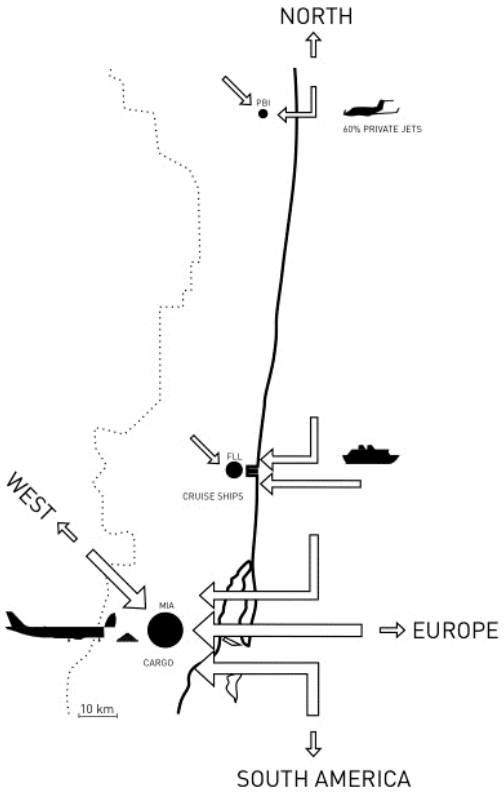

Fig. 1: Southeast Florida's international airports and their main connections

3 Sustainability and climate change risk

3.1 Wind, storm surges and coastal flooding

Miami is among the top ten cities whose populations are exposed to high winds and potential flooding caused by storm surges. It is the most exposed city in terms of the value of property and infrastructure assets exposed to these risks (OECD, 2007). The problem of coastal flooding and inundation is complex. Not only is there the threat of flooding of low-lying areas near the ocean, there is also risk due to flooding from the West as salt water pushes into the Everglades. In addition, any salt water invasion of the aquifer would push water upwards through the region's soft limestone substructure creating flood risks from below.

In Southeast Florida (and all low-lying coastal cities), airports are critical to emergency response, disaster relief, and other vital services. Yet FEMA (the Federal Emergency Management Agency) has determined that both FLL and MIA are located in the coastal flood zone, therefore the defence of the airports against flooding may be an important theme for the near future.

3.2 Sustainable airports?

Environmental problems at airports are ubiquitous, yet intelligent redevelopment decisions can make airports active protagonists in the quest for sustainable infrastructure. Noise, one of the most common complaints, can be addressed by active engagement with local stakeholders, noise abatement procedures, and strategic land use planning. Aircraft themselves will soon have a new generation of quieter and more efficient engines, which will lower emissions. The large impermeable surface of runways and apron areas produces substantial rainwater runoff, which can be handled by reedbed remediation. Energy required for landing illumination can be reduced by using LED lighting. Terminal buildings must function far more efficiently by employing smart building technologies and recycling. Already one of the terminals at Singapore Airport generates enough energy from its roof-mounted photovoltaic panels to return energy to the grid (Taylor, 2007). In North America generally, airports as effective transportation nodes bundling local, regional and national transportation systems are, compared with Europe, underdeveloped. The spectacle of hundreds of vehicles circulating over 24 hours a day at both airside (passengers, maintenance, and baggage and freight handling) and landside (public and private vehicular access, rental car vans) is primitive and produces maximum emissions. Electric or alternative fuelled service vehicles, and intermodal stations serving local and regional traffic need to be established.

3.3 PBI, FLL and MIA

In terms of emergency evacuation and disaster relief, PBI is a secure site based on its elevation of 5,5 meters above sea level. In the case of weather and storm emergencies, the airport will act as a relief centre. If it is implemented, the planned tram/bus line to the downtown and beaches will be able to provide an alternative escape route.

Of our three airports, FLL is the closest to the ocean and the lowest standing at less than 2,0 meters above sea level, protected only by Dania Beach and the Inter Coastal Waterway. Thus all new construction must have a first inhabited floor above 6 meters, and be able to withstand a 100-year storm over three days. The new Intermodal Transportation Centre will play an important role in future security scenarios.

MIA is aggressively implementing energy and fuel saving strategies. For airplane movements, the airport has developed "tailored and continuous descent approach and departure procedures" for reduced fuel burn. All airport vehicles will soon be compressed gas and electric based; and the lighting system will be transformed to an LED system. The Miami Intermodal Centre (MIC) will substantially reduce emissions from the many continuously running rental car buses and vans. The Miami survival plan has identified the MIC as a key element.

4 Conclusion

The sheer number of users, the variety of functions, and the density of development within and adjoining them ensure that airports accumulate the key conflicts in global societies.[3] Today they are becoming strategic security centers, where information gathering techniques and body-scanning technologies are perfected and enacted.

In his opening address to the Airports and Regional Development Conference, Thomas Sieverts pointed out that airports have become intermodal transportation and logistic centers. They are the logical location for both established firms and start-ups in many fields, and they are places (if not cities) where the functional program reflects all social, cultural, and economic activities.

Perhaps in the near future, our three airports, linked by both highways and local and regional transit lines, will each have a separate intermodal station and people mover reducing reliance on the private automobile, and thus act as a single movement system. If we accept the compromise figure of 1,5 meter sea level rise over the next fifty years, our three airports may be a defended and secure territorial

[3] Kesselring, Sven. „Airports in the Mobile Risk Society" conference paper given at the Airports and Regional Development Conference, Karlsruhe, 2009.

system, crucial to the security and economy of a new Southeast Florida city archipelago.

Notes

Dipl. Ing. Marcus Kopper produced the graphic maps and diagrams.

I thank Jerry Allen, Director of Planning, PBI; Carlos Fernandez, Deputy Director, MIA; Mark Gambrill, Airport Development Division, FLL; and Dr. David Prosperi, Florida Atlantic University, School of Urban + Regional Planning.

Airport directors and operations managers were asked five questions:
1) Character and market niche: With three international airports within a 190 km stretch of coastal city, what is your profile and competitive advantage?
2) Airport city: International airports are often referred to as airport cities or aerotropli; what will be the outcome of your current development strategies... an airport city?
3) Intermodality: What role will the airport play in future public and private transportation services within the county and Southeast coastal metropolis?
4) Climate change risk and sustainability: What are your goals regarding sustainability, energy use, emissions and transportation? How seriously are you taking sea-level rise?
5) Future design and planning: How are you developing for the future? How is the recession affecting current and future design decisions?

For general information and statistics see:

State transportation plans.	http://www.dot.state.fl.us/aviation
State demographic and population.	http://edr.state.fl.us/population/popsummary.pdf
Southeast Florida 2060.	http://www.sfrpc.com/2060htm

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M. J. Taylor (Partner, Urban Design and Planning Practice. SOM LLP) in a lecture at the University of Michigan School of Architecture. 2007. Taylor referred to the Photovoltaic Power Plant at the new budget airlines terminal at Changi International Airport in Singapore.

Interviews

J. Allen (Director of Planning, Palm Beach International Airport). Author Interview. 2009.

C. Fernandez (Deputy Director, Miami International Airport). Author email interview. 2009.

M. Gambrill (Director, Airport Development Division, Fort Lauderdale-Hollywood International Airport). Author Interview. 2009.

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Practise and Policy Approaches

Betz
Buchholz
Buser and Flinner
Schaafsma
Sperling
Uber

Sustainable Airport Region

Managing Airport Cities: Benchmark Study 2008

Stephanie Betz

In 2008 ICME Management Consultants conducted a benchmark study about the phenomenon airport city, its conceptual approach and potential success factors. After framing the scope of interview partners, like European hub airports and international Best practice airport, a three-pillar questionnaire has been prepared in order to inquire necessary data, concepts and proceedings. In cooperation with our benchmark partners generic models, development paths and success factors have been derived. Based on the individual success factors profile ICME has designed tailor made airport city approaches for implementation. Furthermore, ICME has currently launched a follow-up study to verify the results of the first one and to refine them if necessary.

1 Challenges for airport operators

Permanent change has been characteristic for the aviation industry since its beginning. Nowadays, these even more intense and profound changes implicate complex challenges for airport operators. These dynamics mainly arise from global megatrends, summarised in buzzwords like globalization, increasing life expectancy or environmentally friendly technologies. However, there are also important drivers on the local level, as the development of passenger and air cargo traffic figures. They are the main drivers for strategic planning onsite and hence for investment planning. In conjunction with the individual airport profile and its range of airlines and destinations, comprehensive master plans based on capacity calculations are designed. Needless to say that these plans underlie strict rules and therefore have to be adapted to the relevant regulatory frameworks, potential regional development planning, and often the most restrictive, rigid investor requirements on rates of return. The exemplified pressure to permanent refinement is enforced by comparatively young ideas like the airport city concept, which was the focus of this study. Looking ahead this complexity is unlikely to be reduced, on the contrary, it is rather likely to increase in the future. Vital to this development is a yet more

distinctive multi-stakeholder model consisting of shareholders, national, regional and local authorities, airlines, passengers, residents, etc. The focal point of the network is the airport and its management, which has to balance the individual claims and interests against the inevitable dynamics of the system airport as a whole. Moreover, the degree of competition increases in different dimensions and levels. Hence, the modern airport is not only competing with other airports and substitute forms of transportation, but is standing in rivalry to other asset classes for funds.

2 ICME Benchmark Study 2008

2.1 Study design and approach

Best practice airports, European airports like Frankfurt, Munich or Amsterdam and international best in class airports such as Dubai or Seoul, are the focus of the study. Contacts to the responsible key players, among them Head of Airport Strategy, Head of Development, Head of Real Estate have been established and were underfed with secondary data from annual reports, strategy papers and statements.

A questionnaire compromising the following three parts has been designed:

- Part 1: Overview - This part examined the overall situation of the airport, stages of the development, etc. (Description, infrastructural connection, strategy)
- Part 2: Interaction within the region – The focal point was the collaboration with the region and the municipality, communication tools and concepts, positioning of the airport etc.
- Part 3: Airport City – The third part concentrated on airport city concepts, individual visions of the airports and the particular city- respectively cluster elements within the master plans.

The next step was the analysis of the results on strategic, tactical and operational level.

2.2 Development process of an airport city

The existence of a strategic planning approach towards an airport city is one of the study's basic assumptions. Its key drivers are the shareholders' strategies, which provide the general framework for the management. If the strategy contains the implementation of an airport city concept, ICME would recommend at first a detailed analysis of the airport's current situation to identify and define the potential development path. A realistic evaluation of the current and the planned positioning has to be carried out regarding the appropriate stages of development, which are shown below.

- Pure Airport; focusing on the infrastructure function of the airport
- Airport Add-on; additional functions for the support of the airport
- Airport Development “Beyond the fence”; rudimentary investment measures for additional use
- Integrated Airport City; contractual partnership between airport and city
- Aeropolis; Creation of a new, cluster-based city type with airport as a core

In the next step the individual financial situation and the stages of cooperation have to be designed and implemented for the tailor made airport city solution based on the success factors profile.

2.3 Results and deductions from the benchmark study

There is no explicit definition and differentiation of the term “Airport City”, although the phenomenon is the centre of discussion at numerous airports. Fig. 1 demonstrates the integral parts of an airport city, which have been distinguished in this study.

Subsequently these airport city models have been identified and deducted as a result of interviews. These varying airport city models range from simple marketing concepts for non aviation offers as well as the genesis of city districts, where urban elements merge with parts of the airport.

Furthermore, eight success factors have been identified. The combination plays an important role in the applicability, practicability and the success of an airport city concept. These factors are on the one hand of exogenous nature and on the other of endogenous nature and can therefore be manipulated and optimised to a certain extent. The fig. 3 discloses these factors and their main determining parameters.

For instance, the framework represents a particularly exogenous element as it is determined by the political system and the government in charge and independently from the visions of the airport management. By contrast, the parameters of leadership are of completely endogenous nature and hence have potential for alignment with the airport city concept.

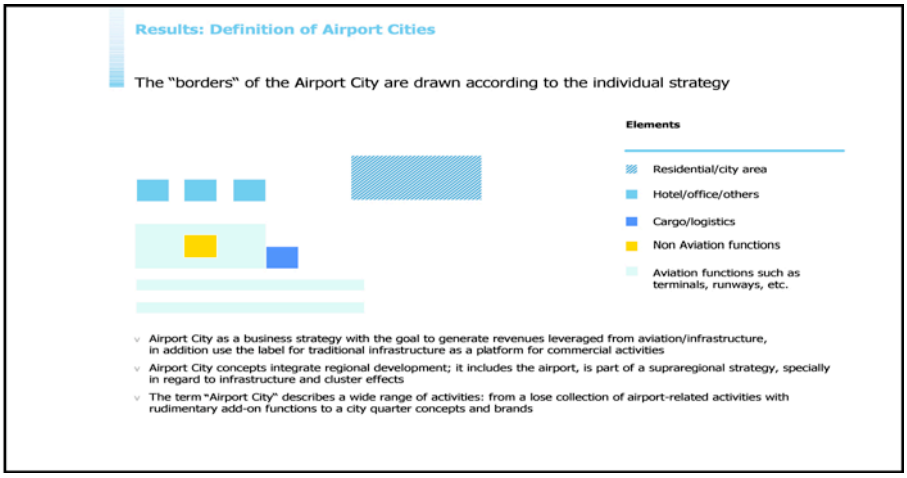

Fig. 1: Airport city definitions

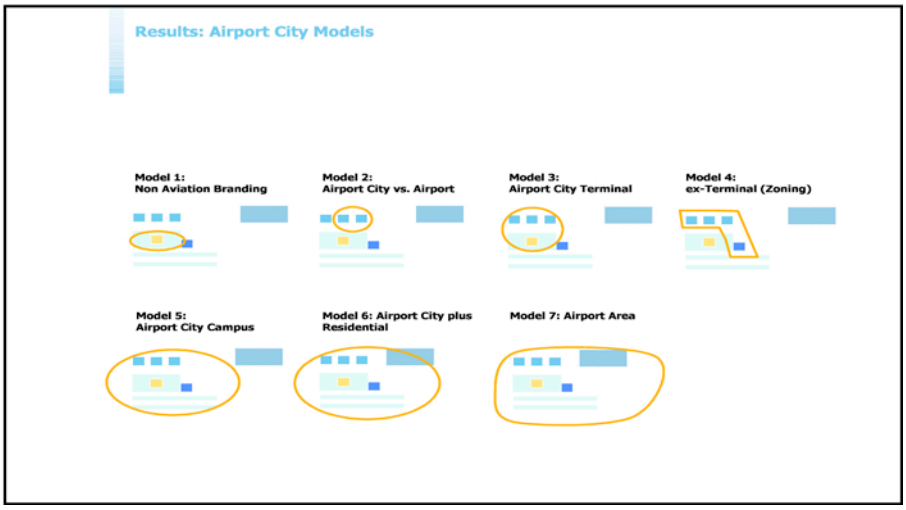

Fig. 2: Airport city models

3 Conclusions and outlook

Generic models, development paths (not mentioned in the article) and success factors, which allow the categorization and evaluation of individual airport city projects, have been identified in the scope of the study.

At present, ICME is working on a follow-up study. Participants include advanced airport cities in the US, smaller European airports at the edge and additional capital airports. The study aims to enlarge benchmark database and network, a stress test of previous results of the first study, the determination of best practice approaches for the partners, the creation of possible new models and the deduction of action plans for new projects.

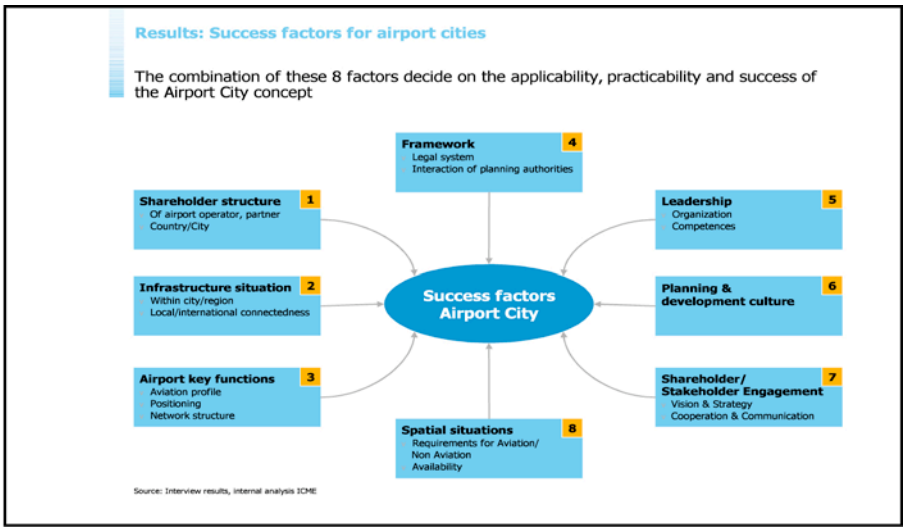

Fig. 3: Success factors

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Airport city

Approaching an already existent phenomenon

Peter Buchholz

Our topic is „From Airport City to Airport Region?“ All theses contributions are made in order to describe a phenomenon. But we do not have a clue about what we are describing. In order to explain this I will refer to Christopher Columbus. Columbus approached the coastline of Bermuda with his ships and walked onto the beach. The natives asked him how he came over the water, because they could not see the ship. They were incapable to see such a big ship. The wise man was the first who recognised the altered waves on the beach. And he concluded the size of the ships by the waves he saw. Only following his thoughts he could see the unbelievably big ship.

Compare it to the Airport City: The „City“ is then the source of the waves going out of the gravity area. We only use the label „city“ to name the gravity field, because we have not found a name for it yet. But the waves going out of the gravity field encompass the influence field of it. Compare Frankfurt airport with this: Frankfurt is hanging like a spider in a web of intermodal spokes: The net of the motorway, of the railway connections and the international airport net. If commuters are the waves going out of the gravity field, take a distance of 2 hours and you may imagine the area of the Frankfurt Airport Region. Remember Columbus: The airport region already exists, and we are the ones to learn and observe.

1 Einstimmung

Nähern wir uns zuerst dem Thema mit einer These: wir haben keine Ahnung von dem, was wir da beschreiben. Uns in diesen Aspekt zu versetzen nehmen wir die Geschichte von James Cook oder Christoph Columbus - die Geschichtenerzähler schreiben sie mal dem einen und mal dem anderen zu. Die Geschichte erzählt, dass die Seefahrer mit ihrem Schiff eine Insel erreichen und in einer Bucht vor Anker gehen. Sie lassen die Boote zu Wasser, um an Land zu gehen. Am Strand werden sie von den Einheimischen empfangen, unter ihnen der Häuptling und der weise Schamane. Der Häuptling fragt, wo sie herkommen und die Seefahrer deuten auf ihr Schiff in der Bucht. Doch der Häuptling und sein Stamm können das Schiff nicht

sehen. Das Schiff, das so viel größer ist als ihre Boote, das können sie sich nicht vorstellen. Und weil sie es sich nicht vorstellen können, können sie es nicht sehen.

Erst der Schamane beginnt zu begreifen: die Wellen kommen in veränderter Form über die Bucht und an den Strand, also muss da draußen etwas sein, etwas bisher nicht Gesehenes. Er ist der erste, der das Schiff der Seefahrer sehen kann, und nachdem er es seinem Stamm vermittelt hatte, konnten auch sie sehen.

Es geht darum, etwas sehen zu lernen. Machen Sie sich keine Sorgen, wir sind dabei in guter Gesellschaft, wir sind zusammen mit Curt Goetz, mit Goethe und Faust, mit Sokrates. Das Bild der Indianer am Strand erleichtert nur ungemein, sich von vorgefassten Determinanten zu lösen.

2 Definition und Entgrenzung: Das Zentrum beschreiben statt der Außengrenzen

Spätestens seit 1989 haben wir in Europa mit dem Phänomen der Entgrenzung umzugehen. Erst fielen die innerdeutschen Grenzen, dann – mit Schengen – fielen die europäischen Grenzen. Spätestens schließlich seit der Finanzkrise ist deutlich, dass der Flügelschlag eines Schmetterlings in China in Mexiko einen Sturm verursachen kann. Uns sind – so sehen es andere – mit dem neuen Zeitalter des Wassermanns die Begrenzungen weggefallen, die Definitionen – im wahrsten Sinne der Übersetzung.

Es gibt sie noch, die kommunalen und staatlichen Grenzen. Sie dienen heute eher dazu, Steuern und Rechtssysteme und soziale Organisationsformen zu fassen. Unser Leben aber richtet sich nicht mehr danach. Das Leben von Familien und Personen, das Wirken von Unternehmen und Organisationen hat seine eigenen Wirkungskreise gefunden. Dies meine ich auch im Wortsinne: die Kreise und Räume, in denen sie und in die hinein sie wirken.

Der Versuch also, für die Airportcity Frankfurt RheinMain eine einheitliche Definition zu finden ist abhängig von der Beschreibung, welcher Wirkungskreis gemeint ist – dann können die Kreise gezogen werden. Gegen den Versuch, eine Airportcity oder eine Airport-Region geografisch zu definieren, setze ich das Bild des Gravitationsbereiches. Das Bild eines Steines, der ins Wasser fällt und seine Wirkungen/Auswirkungen/Kreiswellen hat oder das Bild des Wirbelsturms, der seine Mitte, sein Auge hat. Mich interessiert: was ist das Zentrum und macht seine Energie aus?

Erinnern sie sich noch an James Cook und Christoph Kolumbus und die Indianer? Ich komme zurück auf den Titel der Veranstaltung „from Airport city to Arport region“: dies existiert schon längst und wir sind es, die lernen müssen sie zu sehen.

3 Exkurs Stadtbild Kasarda

Erlauben sie mir einen Exkurs zu John Kasarda und zur „aerotropolis“. Kann dieses Bild uns weiterhelfen? Wie jedes theoretische Modell einer Idealstadt orientiert es sich an einer zentralen Aufgabe, ich nenne dieses zentrale Thema das Primat. Von dem Modell der Siedlung Harmony in 1825 über Letchworth 1902, einem Modell aus 1928 bis hin zur Charta von Athen (hier dem Primat der funktional geteilten Stadt) führt der Weg. Das Modell der Aerotropolis ist eines, in dem der Flughafen das Primat hat.

Dieses Modell auf Frankfurt RheinMain anzuwenden ist zu kurz gegriffen, und darauf möchte ich im Folgenden eingehen.

4 Der Begriff „City“

„City“ in seiner ursprünglichen Bezeichnung war der Ort der Banken in London. Der Begriff wandelte sich in 1944 – Bebauungsplan zum Wiederaufbau von London - und bezeichnete den Ort der zentralen Geschäfte, der Verwaltung und der Banken. Soll City jetzt der Ort des Flughafens sein, oder ist es einfach ein Stadtmodell? Vielleicht bezeichnen wir mit „City“ einfach nur „die Mitte“, nehmen wir dieses Wort als Label einfach nur um „die Mitte“, das Identität stiftende Element zu bezeichnen. Dann steht „City“, „die Mitte“ nur für den Ausgangspunkt der Wellen, für das Gravitationszentrum.

5 Der Kernbereich

Der Kernbereich von Frankfurt RheinMain, der Ausgangspunkt dieser Airport Region ist schnell ausgemacht: vom Frankfurter Kreuz im Osten bis zur Lufthansa-Basis im Westen, von der B 43 im Norden bis zu der Terminalkette im Süden. Innerhalb dieses Umgriffes liegen: die Lufthansa Basis, das Air-Rail-Center und FAC, MAC und Hotel Steigenberger, Gateway Gardens und die vielfältigen Nutzungen zwischen den Terminals und der BAB 3.

Dazu gehören auch die Straßen. Das sind nun keine Straßen, die einfach zum Flughafen hinführen. Sie liegen tangential: die 10 Spuren der BAB 3, die 10 Spuren der BAB 5, die 8 Spuren der B 43. Dazu gehören weiter die S-Bahnen und die Fernbahnen mit ihren Bahnhöfen. In diesem Fall die Grenzen zu finden ist einfach, denn dieses Gebilde ist eingezäunt, ja fast gefangen gesetzt zwischen strengstens geschütztem Wald im Norden und Osten und den eigenen Flugverkehrsflächen im Westen und im Süden. Die Frage nach dem Zentrum der Gravitation habe ich beantwortet, doch was macht seine Energie aus?

6 Reisen

Ich lade sie ein, sich dem Phänomen „Airportcity“ von einer anderen Seite zu nähern, von der Seite des Reisens und der Beziehung von Raum und Zeit.

Bis ungefähr 1830 waren Raum und Zeit in ihrer Wahrnehmung für den Menschen identisch. In Europa war die Bewegung durch Raum und Zeit an die verfügbaren Transportmittel gebunden: das Pferd und die eigenen Füße. 40 Kilometer pro Tag, das war die Normaldistanz. Mit der Eisenbahn änderte sich das grundlegend und diese – auch gesellschaftliche – Transformation war rund 60 Jahre später abgeschlossen.

Um die Dimensionen des Wandels von 1830 bis 1890 zu erfassen hier einige Ergebnisse: nicht nur die Puffer der Eisenbahn waren vereinheitlicht, das Maßsystem war inzwischen normiert und der Meter war eingeführt. Der Kern aber war die Zeit, auch sie war einheitlich.

Die ersten Berichte über das Reisen mit der Bahn lassen die Veränderung spüren:

- Die Geschichte wird erzählt von einem Indianer, der am Bahnhof auf der Bank sitzt. Er ist schon angekommen, aber er wartet noch auf seine Seele, die nachkommt, den sie braucht längere Zeit.
- Die Mediziner, die vor Geschwindigkeiten von mehr als 40 km/h warnen. Jenseits solcher Geschwindigkeiten würde man verrückt werden.
- Und schließlich die Reiseberichte, in denen es wörtlich heißt: vor der Zeit bin ich angekommen.

Die Eisenbahn, oder besser der Waggon, das Abteil, das ist diese neue Raum/Zeit/Maschine. Der Zugang in diese andere Welt, der Ort des Übergangs, ist der Bahnhof. Doch Bahnhof als Begriff zu nehmen ist hier zu ungenau, denn mit Bahnhof umfassen wir alle die Flächen, in der sich dieses Phänomen Eisenbahn organisiert. Der Übergang von der einen Raum/Zeit in die andere ist lediglich das Vestibül des Bahnhofes, hier ist der Schnittpunkt.

7 Frankfurt Bahnhofsviertel

In Frankfurt am Main wurde im Jahre 1888 der neue Hauptbahnhof eröffnet. Drei Länderbahnen wurden in diesem neuen Kopfbahnhof zusammengefasst. Drei große Hallen hatte und hat dieser Bahnhof und in seiner Architektur spiegeln sich die drei Hallen in drei Bögen, die den Eingang zum Vestibül bilden, den Eingang zu den Warteräumen und Schalterhallen und schließlich zu den Bahnsteigen. Dieses Vestibül wurde damals – in 1888 - weit vor die Tore der Stadt Frankfurt gelegt. Dieses Bild steht für die Wandlung, die vor gut 120 Jahren stattfand.

Das städtebauliche Gebilde, das in der Folge zwischen dem Vestibül und der alten Stadt entstand, wurde das „Bahnhofsviertel“ genannt. Darauf möchte ich später noch mal eingehen.

In den 20-er Jahren des 20.Jhd. – also fast 100 Jahre nach der Eisenbahn – kam als neue Raum/Zeit/Maschine das Flugzeug dazu, und wie die Eisenbahn brauchte es 60 Jahre bis die Transformation abgeschlossen war. Weil uns die originären Begriffe fehlen nehmen wir Vorhandenes und formen dies um. Das war schon so beim Bahn-Hof (was ein wenig erinnert an den umbauten Hof mit den Pferdeställen auf der einen Seite und den Remisen auf der anderen und einem Tor davor zum Schutz). Jetzt heißen die Worte Flughafen, Luftschiff, Flugzeug, sogar Flugzeugbahnhof habe ich gefunden. Und eine interessante neue Wortprägung sei genannt: sie nennen Baikonur und Guayana und Cape Kennedy „Weltraumbahnhof“ in hilfloser Ermangelung eines eigenen Begriffes. Auch wenn dort nie einer ankommt, die fliegen doch immer nur weg!

Wie die Bahnhöfe liegen diese Flächen für die Flughäfen zuerst am Rande der Stadt, für Frankfurt Rebstock, in Berlin Tempelhof. Sie wurden mit der Erweiterung ihrer Funktionen vor die Stadt verlegt, wie Frankfurt RheinMain, wie Berlin BBI, wie Paris Charles de Gaulle. Der Schnittpunkt im Übergang dieser neuen Raum/Zeit/Maschine ist organisiert wie der Bahnhof in seinen Anfängen: im Übergang liegt das Vestibül mit der Halle für die Ankommenden, der Halle für die Abgehenden, die Wartesäle.

8 Integration / Desintegration

Das Gebilde solch eines Flughafen-Vestibüls kann in eine Stadt integriert werden, ein Beispiel ist Tempelhof. Der Plan von Speer für die Reichshauptstadt zeigt das auf: der Südbahnhof, der Flughafen, zentrale Versorgung, Regierung, Park und Freiraum, der Nordbahnhof.

Die Gegenbewegung zu dieser Integration wird deutlich am Phänomen „Lehrter Bahnhof“. Lehrte, was ist das? Eine Stadt in NRW, 1800 565 EW, 1900 6.554 EW, heute 44.000 EW. Der Lehrter Bahnhof in Berlin, heute der Hauptbahnhof genannt.

Berlin hatte zur Zeit der Blüte des Kaiserreiches seine Bahnhöfe und wie damals noch üblich waren die Eisenbahnstrecken Verbindungen zwischen zwei Hauptorten, sie begannen an dem einen Hauptort und endeten am anderen jeweils im Kopfbahnhof. In Berlin bekamen die Bahnhöfe den Namen für das, was am anderen Ende der Raum/Zeit/Maschine lag: Hamburger Bahnhof für Hamburg, Stettiner Bahnhof für Stettin, Anhalter Bahnhof für Anhalt mit Leipzig und Dresden, Potsdamer Bahnhof für Potsdam. Und Lehrter Bahnhof für Lehrte? Lehrter Bahnhof

stand für die Verbindung nach Hannover, dem Ort eines damals wichtigen Königs im Deutschen Reich.

Damals war die Eisenbahn verbunden mit Dreck und Lärm, mit Rauch und Gestank, und das rund um die Uhr. Der König von Hannover wollte das nicht vor seinem Schlossportal haben. Also verlegte er die ganzen Infrastruktureinrichtungen der Bahn nach Lehrte – und in Hannover war dann nur noch ein kleiner feiner Bahnsteig zum Ein- und Aussteigen. Darum: „Lehrter Bahnhof".

Mit dem ganzen Flughafen Frankfurt RheinMain und mit seinem Vestibül machen wir es derzeit genauso: die ganze Provinz will den Lärm und den Gestank nicht haben und verbannt das Gebilde in den Stadtwald, zieht einen Zaun drum herum, damit er nicht weglaufen und sich nicht ausbreiten kann, legt drum herum zur Sicherheit noch Naturschutzgebiete und Bannwälder und isoliert so das Ganze.

9 Die Energie von Airportcity

Für die ganze Region Frankfurt RheinMain ist diese Agglomeration im Wald zu einem Ort geworden, an dem sich die Raum/Zeit/Maschinen miteinander verknüpfen: nicht nur das Flugzeug, hinzukommen die Bahn mit dem ICE, die Bahn mit der S-Bahn und das Auto, unsere kleinste individuelle Raum/Zeit/Maschine, die mit der Autobahn (übrigens als Begriff eine Folgeschöpfung von Eisenbahn) sich dazugeschlichen hat.

Das Vestibül dafür trägt noch immer die gleichen Funktionen: der Platz für die Kutschen, der Zugang, die Warteräume, die Schalter und die Steige für Ankunft und Abfahrt. Inzwischen sind sie nur größer geworden: ein Parkhaus für 12.000 Fahrzeuge, Busbahnhof, eine unzählige Kette von Schaltern, Wartezone, Ankunftszone, Abfahrtszone. Noch im Vestibül selber besteht die Umsteigemöglichkeit zwischen den Raum/Zeit/Maschinen Flugzeug – Bahn Auto, der Fahrgast braucht nicht einmal mehr das Vestibül zu verlassen. Dies ist der Kern der von uns so benannten Airportcity.

Das Vestibül steht für ein weiteres anderes Phänomen: das Verschwinden des Zwischenraums. Mit steigender Geschwindigkeit der Raum/Zeit/Maschine – so schon die Beobachtung nach Einführung der Eisenbahn – verschwindet der Zwischenraum. Das Gefühl entsteht, dass auf der anderen Seite des Eingangs zum Vestibül der Zielort liegt: im angenehmsten Fall das Urlaubsziel mit Strand und blauem Meer. Kurt Tucholsky beschrieb so den Wunsch des Großstädters für das Idealhaus: vorne die Friedrichstraße und hinten die Ostsee – ohne den Zwischenraum. In der Astrophysik heißt so etwas ein Wurmloch. Das ist wie ein Kleiderschrank mit Türen auf beiden Seiten. Durch die eine Türe steigt man ein, in

den Schrank oder in das Vestibül, durch die andere Türe steigt man in einer anderen Zeit und an einem anderen Ort wieder aus.

Hamburg nannte sich das Tor zur Welt. Die Airportcity ist mehr: sie ist der Verbindungsort, bei dem auf der einen Seite des Vestibüls die Region RheinMain steht, auf der anderen Seite alle anderen Orte der Welt. Der Zwischenraum ist nur eine Frage der Zeit. Dies bildet auch für viele die Faszination des Ortes, an dem bei Eintritt auf der einen Seite des Vestibüls auf seiner anderen Seite alle Orte der Welt erreichbar sind.

10 Welche Nutzungen zeichnen den Ort aus?

Rudolf Wolters schrieb 1978 über de Entwicklung der Bahnhöfe in Berlin: „Die Eisenbahnstrecken werden zu Erzeugern von Magnetfeldern, die gewerbliche Betreibe und Wohnsiedlungen in ihren unmittelbaren Bereich zwingen."

Im Bahnhofsviertel Frankfurt können wir nachvollziehen, wie dies innerhalb von fünf Jahren geschah. Noch 1888 ging der Kaiser über ein leeres Feld zwischen der Stadt und dem Bahnhof, 1914 standen dort Hotels, Büros, Läden, Wohnungen, Schuhmann-Theater und weitere spezielle Nutzungen. Auf der stadtabgewandten Seite waren die Transportunternehmen, Zulieferer, Dienstleister, Werkstätten, Rohstofflager etc. etc. untergebracht. Während noch 1872 der Friede zu Frankfurt im Hotel Schwanen in der Innenstadt unterschrieben wurde standen die modernen großen Hotels am Bahnhof.

Das gleiche Phänomen entsteht am neuen Vestibül: Hotels, Büroflächen, Gastronomie, Läden, Konferenzräume. Theater wird zur Diskothek, Wellness kommt hinzu und ganz neu universitäre Bildung. Für die Meisten ist es kein Ort zum Bleiben, es ist ein Ort des Durchgangs: pro Tag 350.000 Fahrzeuge am Frankfurter Kreuz, 300.000 Reisende am Fernbahnhof, 170.000 Reisende am Flughafen.

11 Relationen

Zum Abschluss nehme ich noch bezug auf das Feld der Relationen, der Verhältnisse. Während das Vestibül des Frankfurter Hauptbahnhofes mit seiner Stadtseite sich noch in die Stadt integrieren konnte, während das Vestibül des Flughafen Tempelhof – übrigens das weltgrößte Bauwerk – sich noch in die Struktur der Stadt integrierte, fällt das mit dem Flughafen Frankfurt RheinMain um Vieles schwerer. Das liegt an den Dimensionen der Raum/Zeit/Maschinen.

Im Wohnungsbau hat es mich das erste Mal erschrocken, dass – so der Standard des sozialen Wohnungsbaus – für eine Kinderzimmer 14 m² zur Verfügung stehen, für den Autostellplatz 25 m². Das symbolisiert den Relationssprung.

Das Auto als Gerät wiegt etwa 1 t und bewegt sich mit 100 km/h. Bei der Eisenbahn wiegt alleine die Lokomotive 80 t und bewegt sich in der Spitze mit 250 km/h. Das Flugzeug hat Gefährte von 250 t und braucht schon beim Start 250 km/h, um abzuheben. Das Frankfurter Kreuz hat einen Flächenbedarf der gesamten Frankfurter Innenstadt, und es passt mindestens sechs mal auf das Rollfeld des Flughafens.

Auch wenn dieses Vestibül der Raum/Zeit/Maschinen am Flughafen Frankfurt RheinMain ein Teil der Region ist, so sprengt es mit seinen Dimensionen die üblichen Größenordnungen der Siedlungsstrukturen. Aus diesem Grunde liegt es völlig richtig in der Mitte der Airport-Region. In seiner ganz besonderen Ausprägung ist es ein Element der Region Frankfurt RheinMain, es mag auch aus seiner Bedeutung im internationalen Vergleich die Region besonders auszeichnen. Funktional ist die Bezeichnung einer Airport-Region zutreffend, die Bezeichnung aber als Identität für die Region zu nehmen, vernachlässigt die anderen vielfältigen Qualitäten der Region.

Das – was ich als Vestibül umschrieben habe – ist das Schiff in der Bucht, das wir lernen müssen zu sehen. Es ist schon da, schon eine ganze Weile. Gleichgültig wie wir es nennen, welchen Begriff wir darauf schreiben, in der Region und in den Kommunen müssen wir planerisch damit umgehen.

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Airports' catalytic effects

Describing a knowledge gap

Benjamin Buser and Jochen Flinner

Alongside the positive accessibility effects of global air traffic there are also negative effects, especially in the surroundings of big airports. In times of airports' expansion plans, these negative effects are often stressed by the opponents. While negative impacts like aircraft noise are quantitatively already very well analysed, there are still deficits concerning the investigation of economic impacts. This leads to an underestimation of positive economic effects of airports so far. On the occasion of the first international colloquium "Airports and Spatial Development" the authors analysed airport-conditioned added value effects in the airport surrounding. The following pages summarise the essential gist of the lecture presented on this colloquium.

Den positiven Erreichbarkeitseffekten des globalen Luftverkehrs stehen insbesondere im Umfeld von Großflughäfen auch negative Auswirkungen gegenüber. Diese Belastungen sind zweifelsohne vorhanden und werden bei Ausbauplanungen von Flughäfen praktisch immer ins Feld geführt. Während Auswirkungen wie etwa der Fluglärm quantitativ bereits sehr gut analysiert sind, sind im Bereich der Erforschung wirtschaftlicher Auswirkungen von Flughäfen noch Defizite vorhanden, die bislang zu einer Unterbewertung der positiven wirtschaftlichen Effekte führen. Anlässlich des ersten Internationalen Kolloquiums "Airports and Spatial Development" haben sich die Autoren mit der Erfassung und Analyse von flughafenbedingten Wertschöpfungseffekten im Flughafenumland befasst. Die folgenden Ausführungen fassen die wesentlichen Aussagen des im Rahmen des Kolloquiums gehaltenen Vortrages zusammen.

1 Einführung

Die ökonomischen Auswirkungen von Flughäfen sind unbestritten und werden seit vielen Jahren wissenschaftlich untersucht. Dabei konzentrierte man sich lange Zeit ausschließlich auf die Effekte, die durch die Bereitstellung von Luftverkehrsleistungen entstehen. Diese Angebotsseite unterteilt sich klassisch in die direkten,

indirekten und induzierten Effekte entlang von Wertschöpfungsketten. Erst seit wenigen Jahren rücken die nachfrageseitigen Effekte vermehrt in das Blickfeld der Wissenschaft. Diese volks- und regionalwirtschaftlichen Effekte, die durch die Nutzung von großen Verkehrsinfrastrukturen wie dem Flughafen München entstehen, werden häufig als „katalytische Effekte“ bezeichnet. Ein Flughafen wirkt dabei als "Katalysator" zum Anschieben und Beschleunigen von Entwicklungsprozessen. Häufig wird auch vereinfacht von Standorteffekten anstelle von katalytischen Effekten gesprochen. Die folgende Abbildung gibt eine schematische Übersicht über die beiden Wirkungsketten.

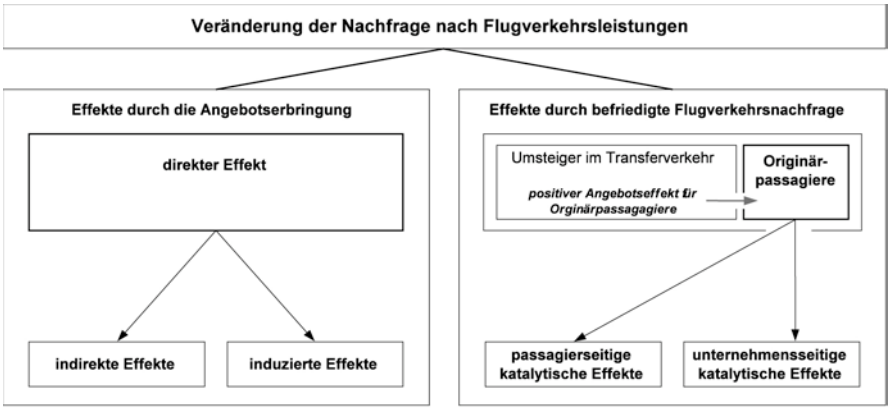

Fig. 1: Schematische Darstellung der wirtschaftlichen Auswirkungen ausgelöst durch einen Hubflughafen

Durch die Angebote im Flugverkehr profitieren Passagiere und Unternehmen von Reisezeitersparnissen, Kostenersparnissen und zusätzlichen Reisemöglichkeiten im Vergleich zur Erreichbarkeit über Schiene und Straße. Insbesondere Direktflüge ergeben für die Passagiere einen hohen Nutzen. Die Unternehmen im Flughafenumland profitieren von einer guten internationalen Erreichbarkeit und einfacher Erschließung neuer Wachstums- und Beschaffungsmärkte. Die Ersparnisse schlagen sich in Produktivitätsfortschritten, Wachstum und zusätzlicher Beschäftigung nieder.

An Flughäfen mit Hubfunktion, wie beispielsweise am Flughafen München, findet eine Bündelung von Umsteigepassagieren zwischen Lang- und Kurzstreckenflügen statt. Dadurch entstehen auch Flugangebote, welche aus Gründen fehlender Wirtschaftlichkeit ohne Umsteigepassagiere nicht für Originärpassagiere angeboten würden. Die Umsteigepassagiere ermöglichen also Zusatzangebote, welche von den

Originärpassagieren und den Unternehmen in der Region als Direktflüge genutzt werden. Die katalytischen Effekte für das Flughafenumland fallen damit rund um einen Hubflughafen deutlich höher als an anderen Flughäfen aus.

Der Flughafen München weist beispielsweise bereits heute mit dem bestehenden 2-Bahn-System und seiner Hubfunktion bedeutende katalytische Effekte auf. Mit der geplanten und derzeit im Genehmigungsverfahren befindlichen Kapazitätserweiterung um eine 3. Start- und Landebahn wird die Hubfunktion des Flughafens weiter gestärkt. Im Zuge der Stärkung der Hubfunktion wird sich auch die absolute Anzahl der Originärpassagiere von / nach MUC erhöhen was wiederum zusätzliche passagier- und unternehmensseitige katalytische Effekte auslösen wird.

2 Forschungsziel und Zwischenergebnisse

Das Forschungsziel besteht darin, die für die Erfassung aller katalytischen Effekte notwendigen methodischen Ansätze zu erarbeiten, um auf diese Weise die Gesamtheit aller katalytischen Effekte sowie ihren wertmässigen Beitrag an die regionale Wirtschaftskraft in einer Region zu erfassen.

Im Rahmen des Forschungskolloquiums vom 9./10. Juli 2009 an der TU Karlsruhe wurden drei Publikationen ausgewählt und hinsichtlich deren Erfassung katalytischer Effekte analysiert:

- Airports Council International Europe (2004): The social and economic impacts of airports in Europe, Brüssel.
- Ernst Basler + Partner AG, BulwienGesa AG (2007): Auswirkungen des Vorhabens 3. Start- und Landebahn auf Wirtschaft und Siedlung im Flughafenumland, Zürich, München.
- European Center for Aviation Development ECAD GmbH (2008): Katalytische volks- und regionalwirtschaftliche Effekte des Flughafens München, Darmstadt.

Die Kriterien für die Auswahl der Studien waren die inhaltliche Relevanz für die Fragestellungen am Flughafen München sowie die Bekanntheit bzw. der Stellenwert der Publikation in Fachkreisen. In einem zweiten Schritt wurden die Studien bzgl. des Umgangs mit der Thematik miteinander verglichen, wobei angemerkt werden muss, dass diese - bezogen auf den Untersuchungszweck - jeweils ganz unterschiedliche Zielrichtungen verfolgen. Die detaillierten Analyseergebnisse und Bewertungen zu den drei Publikationen können dem gleichnamigen Vortrag der Autoren vom 9. Juli 2009 entnommen werden.

Zusammenfassend kann festgestellt werden, dass die Studien zwar verschiedene Aspekte des katalytischen „Spektrums" analysieren und teilweise sogar empirisch bzw. statistisch belegen. Insgesamt bleibt es jedoch bei einer starken Untererfassung des gesamten denkbaren katalytischen „Spektrums". Der Versuch, als

Gesamtaggregat aller katalytischen Effekte den Beitrag zur regionalen Wirtschaftskraft und die Wachstumsdynamik zu ermitteln, wird mangels wissenschaftlicher Durchdringung nicht unternommen.

Die Analyse der genannten Publikationen hat zunächst deutlich gemacht, dass das Thema eine sehr hohe Komplexität aufweist. Insbesondere wird klar, dass zur eindeutigen Bestimmung von Ursachen und Wirkungen (Ursache-Wirkungs-Zusammenhänge) ein Bündel unterschiedlicher methodischer Ansätze zum Einsatz kommen muss. Auch wenn Einigkeit darüber herrscht, dass internationale Großflughäfen in Metropolregionen einen deutlichen Nutzenüberhang für das Flughafenumland herbeiführen, können einzelne katalytische Effekte auch negativ ausgeprägt sein. Die katalytische Gesamtwirkung für eine Region ergibt sich erst aus einer Saldierung von positiven und negativen katalytischen Effekten. Dementsprechend sind die wissenschaftlichen Grundlagen für eine vollständige Erfassung des gesamten katalytischen „Spektrums“ zu erarbeiten.

3 Forschungsfragen

Selbst mit den bereits sehr ausführlichen Untersuchungen für den Flughafen München lässt sich kein Gesamtbild der katalytischen Effekte erstellen. Die Ursachen-Wirkungs-Zusammenhänge katalytischer Effekte scheinen zu verschieden, um eine einheitliche oder zumindest kompatible Methode zu finden. Im Gegensatz hierzu lassen sich mit etablierten regionalwirtschaftlichen Methoden ein Flughafenumfeld insgesamt und mit den Angebotseffekten entlang von Wertschöpfungseffekten auch Teilbereiche des Flughafens sehr gut beschreiben. In Anlehnung an die mathematische Methode des "induktiven Schließens" ist daher die Frage zu stellen, ob die Untersuchung des Flughafenumlandes als auch des Flughafens induktiv der Ermittlung katalytischer Effekte dienlich ist. Ausgehend von diesem Grundgedanken ergeben sich folgende Forschungsfragen von zentraler Bedeutung:

- Welche regionalwirtschaftlichen Methoden sind am besten geeignet zur Erfassung der vergangenen und künftigen Entwicklungsdynamik in einem Flughafenumland?
- Wie unterscheiden sich Wirtschaftsstruktur und Entwicklungsdynamik im Umfeld großer Flughäfen in Abhängigkeit und Ausprägung der Hubfunktion?
- Lässt sich eine statistisch signifikante Korrelation zwischen Umlandentwicklung und Flughafenentwicklung herleiten unter Isolation der relevanten Entwicklungsfaktoren?

- Lässt sich eine statistisch signifikante Korrelation zwischen den Angebotseffekten und den mutmaßlich katalytisch verursachten Entwicklungen herstellen?

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From airport city to airport corridor

Airport and city, sustainability and economy

Maurits Schaafsma

1 Introduction

In the process of globalization, a concentration of internationally oriented urban activities seems to take place in a limited number of highly competitive 'global city regions'. In the Netherlands, Amsterdam has strengthened its position as a centre for finance, services and head offices at the cost of other cities like Rotterdam and Eindhoven. These global city regions are increasingly facing a highly dynamic global competition for economic activities, sports events and cultural facilities. In this competition their position in the networks of city regions is of great strategic importance and is strongly supported by the direct destinations their airports offer; city regions and airports are increasingly tied to each other.

The information infrastructure, air transportation and the global networks of container liners facilitate globalization, the 'global shift' and the information age. Climate change and scarcity of resources could become strong counter-forces to the increasing global flows of people and goods. The global interdependency of city regions however is not likely to decrease and the strategic importance of air traffic could increase further in spite of climate issues having a negative impact on the growth of air transport.

Airports and cities face a huge challenge in positioning themselves in the international competition and do what is within their powers to make the interaction between airport and city a sustainable one.

2 Network developments

The developments in the airline industry and their networks have a direct impact on the position of cities. Deregulation of air traffic has led to the rise of low cost airlines and the formation of worldwide alliances of traditional 'flag carrier' airlines. The latter have organized their networks in global 'hub and spoke' systems with a central role for a limited number of hub airports as point of interchange. These hub airports can offer a truly competitive intercontinental network to their city regions.

Three global alliances dominate the market: Star Alliance with Lufthansa, United Airlines, Thai and Singapore Airlines, SkyTeam consisting of Air France KLM, Delta, China Southern and Korean and OneWorld compromising British Airways, American Airlines, Cathay Pacific and Quantas.

Each of these airline alliances tends to develop only two major hub airports in Europe. Frankfurt and Munich are the main hub airports of Star Alliance, London Heathrow and Madrid of OneWorld. Amsterdam Schiphol and Paris Charles de Gaulle are the European hubs of SkyTeam.

In this way the network developments of the airlines put a limited number of city regions in a more central position, offering them a competitive advantage over other city regions. The interaction between airport and city is however not limited to these hub airports and their cities.

3 Airport and city

Many airports have outgrown their role as just transportation centres. Concepts and brands like AirportCity, Aerotropolis, Airea and Airport Corridor indicate that they have become types of urban nodes. Every airport can generate urban development but the hub airports and some of the other major airports have the most explicit potential for synergy between commercial landside developments and the networks of the airlines. Weather airport city development does take place depends also on factors like the space available on the airport, the location of the airport in the landside infrastructure networks, the economic structure of the region, the institutional setting and planning framework. This last factor is particularly important as can be seen in the differences in developments on the continents. In the USA airports are local affairs. Local authorities own the airports and invest on the basis of contracts with the airlines as users. Airlines have a predominantly operational focus and little incentive for commercial development at the airport. In Europe airports are more independent companies. Their business models rely more on revenues from passengers and companies located at the airport. The result is the airport city, a European invention. Airport authorities are the drivers behind value creation on their own land.

As air transport is more important and matured earlier in the US than in Europe (there is little alternative for intercity transportation), the airports generated more urban development located in the corridor between airport and city. The fact that edge cities are a more common phenomenon in the US and that in many cases there is more land available around the airport also stimulated this development. Dallas, Denver and Washington DC are examples.

In Europe this airport corridor development however is also a familiar phenomenon, like in Copenhagen, Helsinki and Rome. While in Zurich Glattal and Paris Triangle de Gonesse redevelopment of fragmented industrial areas between airport and city into modern corridors is being undertaken.

In Asia in the major global city regions new airports have been built, accompanied by ambitious airport city and airport corridor projects. National and city governments have a big direct or indirect role in these plans. Examples are Kuala Lumpur's Multi Media Supercorridor, Hong Kong and the huge plans in Seoul Incheon and Songdo.

These airport cities or aerotropolises do not yet offer a consistent kind of urbanity. They have become or can become the habitat for the kinetic elite, the global corporate nomads, the expats, offering the most efficient points of interaction. But the real challenge is to make them more than just that.

4 Creating Schiphol AirportCity

At Schiphol the conditions have been favourable for airport city development: space is available at the airport, it is located centrally in the densely populated Randstad area, it is well connected to the road and rail networks and is part of an open economy. "Creating AirportCities" is Schiphol Group's motto. The vision is that the terminal, parking, retail and real estate are seen as spatially and conceptually integrated. Value is created by developing the land and commercial real estate in such a way that they also contribute to the role of the airport as a transportation node. Until now a total of 600,000 m2 of offices (operational and commercial) and almost one million square meters of industrial real estate have been built at the airport. Almost 60,000 people have a job here (at companies located on the airport itself).

The AirportCity that has been developed is not a city in the traditional sense of the word. Nobody lives here permanently and there is not a direct democratic public government. But as far as urbanity is rooted in human interaction, the airport adds a specific milieu to the city region. The market recognises such an advantage and is willing to pay the highest office rents of the country in WTC Schiphol Airport. Spatially, Schiphol as a 'city' can be defined as an archipelago of areas. It comprises a 'city centre' and themed precincts like Aerospace Exchange (Schiphol East) and Cargo World (Schiphol Southeast).

Most value is created where the integration of activities and the integration of flows and spaces are best: at Schiphol Centre. The terminal and the railway station come together in Schiphol Plaza. The Sheraton Hotel, World Trade Centre and Parking 1 are directly connected to Schiphol Plaza and the terminals by a covered passageway.

Real estate that is connected to this passageway is considered to be part of the core of the node.

5 From airport city to airport corridor

In the late 1980's the Dutch government chose to give an impulse to the country's two 'main ports': the port of Rotterdam and Schiphol Airport. They were to be the cornerstones of the strategy to improve the position of the country in the internationalizing world. The historical role of the Netherlands as a nation of international trade and strong international positions of seaports and airports led to this choice. In this context the Province of North Holland, the city of Amsterdam, the municipality of Haarlemmermeer and Schiphol Airport decided to co-operate more closely on the development of a logistic complex around the airport. They founded a governmental forum (Bestuursforum Schiphol) and the Schiphol Area Development Company (SADC). The National Investment Bank was invited to participate as well. This more or less public-private partnership was successful in developing the area around the airport and attracting logistic facilities and head offices from Asia (Japan) and North American companies to it. Bestuursforum Schiphol and SADC still exist but the emphasis of development around the airport shifted from logistics to services, from goods to people.

The proximity of Schiphol Airport to Amsterdam causes issues of noise and safety but also turns out to be a great advantage for landside economic development. Amsterdam decided to develop a new business district in the south of the city, on the ring road and the ring railway at only 6 kilometres distance from Schiphol Airport. This Zuidas development started with the construction of a new courthouse and the Amsterdam World Trade Centre in the 1980's. Head offices of major companies along with financial and legal services have been accumulating here since 1990's. To quote one of the CEOs: "I spend one third of my time with legal advisors, one third of my time with banks and one third of my time I travel abroad. So Zuidas is the ideal location for our company." The proximity of airport and central business district is internationally unique and offers chances to improve the competitive power of the city region.

Schiphol and Zuidas now look into the potential of connecting and integrating Zuidas and Schiphol as top business locations and as transportation nodes. The airport and Zuidas serve the same market of the so called high yield (business) traveller, which is of crucial importance for city. The nodes and the area between both can be improved as an urban corridor with an international focus. The locations within the corridor are to be differentiated in quality and density. SADC offers the governance structure necessary for a coordinated development in this

governmentally complicated situations. With additional infrastructure the Amsterdam Airport Corridor can distinguish itself as an area with a unique accessibility profile, with 'seamless flows'.

6 Challenges

Air transportation and airports have matured as businesses. Looking back, four major airport development stages can be recognized: the first one is the airport as a basic infrastructure; the second, the airport as a main port, recognizing its economic role in logistics; the third, the airport as an airport city, shifting from goods to people, from logistics to services and the fourth the airport corridor, positioning the airport more broadly in society and the region as well as making it sustainable. The challenges now are more specifically:

- Synergy: developing the synergy between the interest of the city region, the airlines and the airport. One of the goals is to improve the position of the city region within global competition and to work together on making airport and airport corridor developments sustainable.
- Spatial integration. Airport cities and corridors are mostly spatial enclaves. To make them more than transit areas and to maintain public support for this kind of development, airport corridors are to be connected physically and socially to the direct environment, which is also a matter of sustainability.
- Governance. To obtain results, stakeholders in the market and in the region have to be involved in the development. Thus development power and (public) support can be organized. Airport corridors, which are neither city nor region, are governmentally difficult. Therefore it is crucial that key stakeholders in the government and the market share the ambition and can participate in its development.

7 Shared values

Traditional planning instruments struggle with the challenges of airport corridors. Seemingly contradictory developments have to be addressed in a governmentally fragmented environment. To improve the environmental performance is expensive and complicated. Michael Porter's Shared Values principle could help airports with an increase of support in society (license to operate) by sharing and improving the economic effects of the airport and by improving the environmental performance. Porter criticizes companies that develop corporate social responsibility programs which are not integrated in the core business, (environmental policies and several kinds of sponsorships for example). Thus corporate social responsibility is a costly,

constraint and charitable deed with little long term perspective. The challenge is to turn it into a source of opportunity and innovation and a competitive advantage. He argues that for a sound long term perspective, both business and society must benefit from the choices. Improvement in sustainability is complicated and expensive and will never be achieved when it is not seen as business (Michael E. Porter and Mark R. Kramer: Strategy and Society: The Link Between Competitive Advantage and Corporate Social Responsibility. Harvard Business Review. December, 2006).

So business decisions and social policies could follow the principle of 'Shared Value'. Two kinds of corporate responsibility are distinguished: responsive and strategic.

Responsive corporate responsibility has to do with good citizenship and mitigate the harm from value chain activities. For airports the regional noise, air quality and congestion issues belong to this category. The strategic corporate responsibility is to transform value chain activities in such a way that they benefit society while reinforcing the company's strategy.

In Schiphol some initiatives of the recent past can be seen in such a perspective. Bestuursforum Schiphol, SADC and a possible participation of Schiphol in the Zuidas might be examples. The airport is actively participating with authorities in the economic development of the region that is generated by the airport. A next step might be a scale increase from the airport region to the whole of the metropolitan region of Amsterdam. A strategic partnership aims at improving the competitive position of the global city region as a location for business, culture, sports, events, etc. Success here will directly generate traffic at the airport. Moreover the real estate and consumer business areas of the airport can find new business opportunities. But this does not address social or environmental issues yet. Two other initiatives of Schiphol include social and environmental aims. One initiative is called theGROUNDS. Schiphol develops a sound barrier against 'ground noise'. This noise is caused by airplanes that do not fly and legally do not exist in the Netherlands. Yet Schiphol will invest in this barrier but as part of a sound business case. Therefore the initiative is taken for an 'open source' approach to sustainability. Schiphol wants to team up with universities, knowledge institutions and private companies in a 'knowledge cluster' to develop the innovation power that is necessary to make the airport sustainable. The ambition is that these parties locate parts of their organization at the airport to work together on solutions that could be applied to other airports later. This approach could be extended to the municipality of Haarlemmermeer, the city of Amsterdam and the water management board. In a shared values approach the people living around the airport might be more directly

involved in these developments that also include recreational amenities and a spotters facility.

The second initiative is 'Schiphol College'. Close to the airport in Amsterdam West unemployment rates are high. Amsterdam and Schiphol work together in educating the predominantly immigrant population and thus helping them to get jobs at the airport where it is difficult to get employees.

With this shared values approach, interpreted as a shared interests approach, the traditional airport business can be approached differently and new business is generated in a better relationship with society.

8 Conclusion

Airports and the networks of the airlines have become strategic assets for global city regions in their international competition. Interaction between airport and city has led to airport cities and airport corridors, signifying that airports have a more mature position in society. To improve the synergy between airport and city, and to improve the environmental performance, Michael Porters shared values principle can be applied.

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This article reflects his personal ideas on the subject

A dialogue forum

Development of the area around Berlin-Brandenburg International Airport

Sabine Sperling

1 Importance of the airport Berlin-Brandenburg International

The Berlin-Brandenburg International Airport (BBI) is the most important infrastructural project currently pursued in the capital region of Berlin – Brandenburg. It will be the impulse for the surrounding cities, municipalities and administrative districts to further develop.

The capital region of Berlin-Brandenburg has been developed to become a dynamic metropolitan region in the centre of Europe. Berlin and the area surrounding it provide the entire region with many special opportunities. Decisions taken here have impact on economy, scientific research, cultural life and on politics. The airport will be an international traffic hub and as from 2011 the entire air transport of this region will be concentrated on one airport. An initial capacity of 22 to 25 million passengers is forecasted for 2011. Depending on the development of the number of passengers the airport can be expanded to accommodate up to 40 million passengers. It is expected that this will create tremendous opportunities for the capital region and in particular for the area surrounding the airport. Many companies in Berlin Brandenburg will benefit from the airport, as this project will create numerous new jobs in the region.

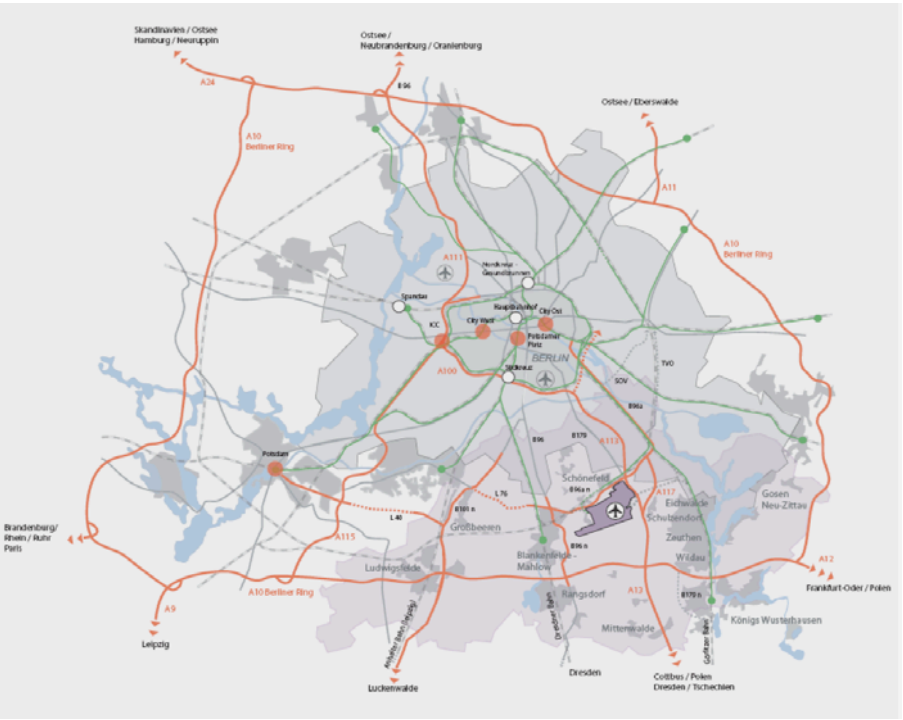

Fig.1: Regional integration

2 Planning criteria

After a long period of planning and searching for a respective location, members of the federal and the state government finally came to the consensus decision to extend the airport in Schönefeld, at the southern border of Berlin City. While Schönefeld will be expanded to establish the new airport, the two other Berlin airports (Tegel, Tempelhof) will be closed.

Following confirmation in March of 2006, by the German Federal Administrative Court, of the resolution to enact the zoning (Planfeststellungsbeschluss), the two federal states of Berlin and Brandenburg established a Joint Structural Concept for the area surrounding BBI Airport along with a guiding principle (GSK FU BBI). In the Joint Development Plan dealing with the airport project, the federal states of Berlin and Brandenburg determined that the area directly adjacent to the airport should be a “focal point for action in developing the area surrounding the airport”. Certain preparations will have to be made in order to ensure that this region will benefit to the greatest extent possible from the potential such a major infrastructural project entails. The state development plan on developing the airport location (LEP

FS) ensures the extension of the airport in Schönefeld in terms of state planning. The planning guarantee involves airport space, transport connections and the restriction of settlement development and of construction heights in affected areas.

2.1 The dialogue forum

The dialogue process began on March 16th 2006 after the judgement of the Federal Administrative Court. The two federal States of Berlin and Brandenburg as well as 3 regional planning associations are involved in the planning process,. Furthermore, it includes the closer sphere of influence of the airport BBI, i.e.12 municipalities in Brandenburg, 3 boroughs of Berlin and 3 administrative districts in Brandenburg.

The dialogue forum has been accompanied by the Joint Spatial Planning Department of Berlin and Brandenburg. It is the task of the Joint Spatial Planning Department of Berlin Brandenburg to support, lead and moderate the institution of a "Dialogue Forum for the Area Surrounding BBI Airport".

The dialogue process aimed at the initiation of a permanent cooperation of the airport with its surrounding municipalities. The affected municipalities of the area surrounding BBI airport had the opportunity to present their interests and their needs. Furthermore, it was their aim to prepare a state-crossing development strategy/ Joint Structural Concept (GSK FU BBI). The results of the Mutual Structural Concept were achieved in negotiations between all stakeholders.

Because the airport's expansion has different impacts on the individual municipalities, the constructive contribution is a significant challenge for each participant .

The following results of the dialogue process must be emphasised:

- constructive cooperation between all stakeholders in the surrounding areas of the airport
- a Joint Structural Concept prepared by all parties involved that offers the municipalities affected by the airport planning improved scopes of planning as well as a jointly prepared programme of measures for the development in the area surrounding the airport as a result of the intensified investigations on the Joint Structural Concept.

The design of the Joint Structural Concept in 2006 was one of the results of the dialogue process under the guidance of the Joint Spatial Planning Department; further results were the Joint Declaration on the Dialogue Forum in 2007 and detailed investigations in 2008.

The guiding principle was developed for the airport region that is determined by its specific profile. The intention is to ensure that both commercial enterprises and residential use can evolve in this region.

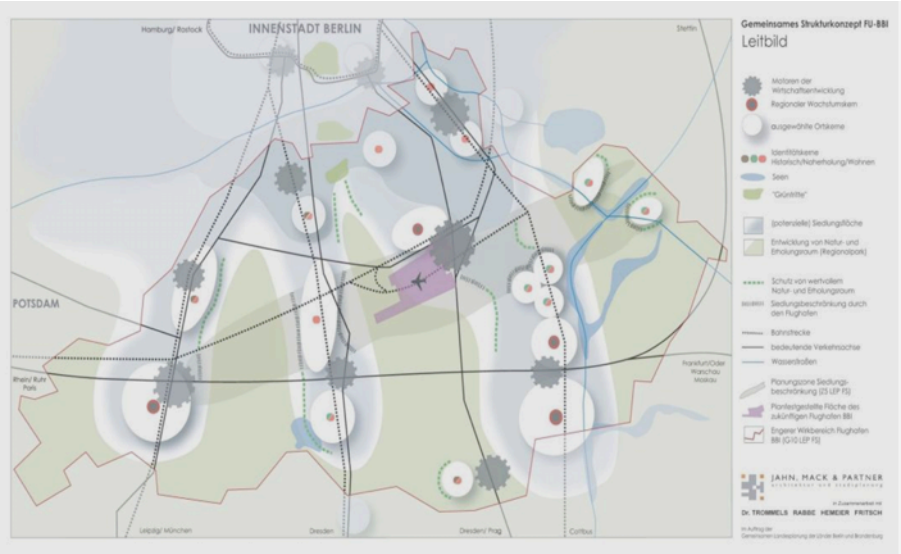

Fig. 2: Guiding principle

The guiding principle for the future development of the area surrounding the airport aims at promoting a unique profile for the region while preserving the special characteristics of each individual location. The area should allow for both commercial enterprises and residential purposes to develop without creating an urban sprawl. This approach is based on the existing local structures, profiles and identities. An efficient traffic network will connect the airport with Berlin and the region; most of this network is already available and in use. Allocated along the "fingers" that spread from Berlin's city centre are areas to be developed for residential and commercial use. The areas between these "fingers" are intended as natural spaces and for recreational purposes. Effectively nature and landscape in the spaces between the axes are very much of significance in order to ensure the quality of open spaces. A respective arrangement of nature and recreation spaces is the aim thereof. The guiding principle will contribute to balancing out the disadvantages caused by air traffic with the advantages of the expected economic dynamics.

3 The joint structural concept

The Joint Structural Concept for the area surrounding BBI Airport creates the framework for successful economic development of the airport region. The settlements are to develop systematically with respect to the dynamic development expected. The concept provides the opportunity for municipalities adjacent to the

large-scale BBI project to enhance their economic profile. Furthermore it enables the development of attractive residential locations set in a lovely recreational landscape. Areas already zoned are available for the settlements, whereas other areas have been designated for the sustainable expansion of existing and future developments.

An efficient traffic network surrounding the airport already exists. This will be supplemented in the next years. The infrastructure offers an excellent basis for the economic development of the airport and the adjoining spaces. Beyond the traffic areas, potential parts for commercial use play an important role. The new settlements will be concentrated in specific locations; the Structural Concept has defined 1,330 hectares as potential commercial areas. In the area surrounding the airport, approximately 450 hectares of land are reserved for residential development. Furthermore, recreation has an impact on planning in this area. Wherever municipalities want to develop into attractive residential locations, they must be sure that the natural space and recreational areas surrounding them are attractive also.

A planning atlas for the area surrounding the airport provides an overview of the plans and concepts.

4 Conclusion and outlook

While the region will benefit from unique opportunities for development as a result of the airport expansion, it will also face strains. All the affected municipalities will have to coordinate their lines of action to ensure their mutual benefits from the project as well as to secure the BBI Airport's position in the international competition with other regions.

It will be of importance to balance out as fairly as possible the advantages and disadvantages the airport entails between the various stakeholders. From the very beginning, municipalities supporting and opposing the expansion of the airport have worked together in the "Dialogue Forum for the Area Surrounding BBI Airport" under the leadership of the Joint Spatial Planning Department. The mutual objective aims at developing settlements sustainably, so that they are compatible with the region and the landscape. With this in mind, it is a prerequisite to overcome the opposition between the stakeholders in a dialogue designed for the long-term. In 2009, responsibility for the "Dialogue Forum Airport Berlin Brandenburg" was transferred to the regional authorities. The dialogue forum has made "transparency, fairness and striving for consensus" to be the principles guiding its actions. The airport and the municipalities have recognized that they all benefit from the dialogue. The most important tasks they will have to deal with in future include general guidance as the Joint Structural Concept is implemented, designing the

processes serving to reconcile diverging interests, taking action required in the area surrounding the airport, and general guidance while the resolution to enact the zoning (Planfeststellungsbeschluss) for the expansion of the airport is implemented.

The municipalities have established a regional, inter-municipal management company called BADC, Berlin Brandenburg Area Development Company, to implement the measures balancing the interests of the various parties involved. Furthermore, the airport enterprise shows great interest in participating in the Dialogue Forum to the region's advantage.

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Frankfurt Airport City

Hub for a future world

Thomas Uber

All over the world airports evolve into airport cities. Parts of the public adore the apparently new urban development, whereas others abhor it. Airports see Airport Cities as a new venue for new sources of revenue, such as retailing and real estate development. But most important, Airport Cities create a new pattern of urban settlement that is primarily due to full flung globalization.

As an attempt of man to extend his clout far beyond physical reach, stretching out over the oceans to other continents, globalization began with Columbus. But unless air traffic had created the current state of regularly scheduled daily connections over the globe by plane, globalization had not lived up to the very sense of its meaning.

Its meaning as well as its driving forces is mobility: of man, of goods and mostly important of knowledge. Markets and productive forces that used to be separated by geography are being put together.

Physical exchange across the boundaries of national economies, i.e. imports and exports, has always existed ever since borders have been identified. Although incorporated in a gadget and therefore restricted to the application of a machine, already then an exchange of expertise had been constituted.

Today conceptual know-how and construction of goods is organized in network-like structures all over the globe. Value creation depends on virtual exchange of knowledge in data chains. Physical transport of parts or the completely assembled good follows suit in supply chains.

Up until yesterday industrial society led to integral concentration of all functions of production – from devising a product to distribution – at gravitational spots, the industrial centres like Detroit in the U.S.A. or in Germany the famous Rhine-Ruhr-Region. Now, a lot of those functions have turned mobile and are being spread all over the globe to various and variable centres of competence that are intertwined by data-connection. Therefore the realization of innovative ideas is located in worldwide networks, of which the substances can easily be changed even on a daily basis. Value creation takes place in a volatile, virtual, mobile environment.

Following these developments, the settlement pattern of innovating products or remodelling producing processes has completely changed. Externalizing innovation

and production in worldwide networks has tremendously invigorated creative energies. And it turns out that transferring knowledge, transporting goods, and the travelling of people follow the same logistic lines over the globe.

In consequence, former industrial centres are weakened whereas the hubs of worldwide mobility gain importance. With globalization and knowledge society, the spatial distribution of technological knowledge is being reorganized, deviating from the industrial centres to the poles of mobility (big hubs of air traffic) within the grid of global network economy.

A virtual space of aggregated knowledge is emerging between airport cities all over the world, which is comparable to that created by the Nordic League of the Baltic Sea at the end of medieval age. The Nordic League cannot be sufficiently described as a cooperation of ports to facilitate the exchange of goods. Perhaps more important was the effect of accruing knowledge in the ports through the constant flow of commerce, that triggered innovation, spurred production and augmented the quantity of merchandise.

A similar development takes place at airport cities and in their vicinity. Real estate development at the airport has a twofold foundation, primarily based on concrete and stone at the very site of the airport and secondly based on knowledge that is being accumulated within the clusters of post industrial technology and application of science.

Airport cities serve as mobility hubs as well as hubs of knowledge. They enrich existing clusters, attract additional ones and even serve as temporary places of instant innovation. Sophisticated knowledge workers have to act within a broader radius than their fellow forerunners of the industrial centres. They need close access to an international airport. Furthermore a growing number of top qualified experts constantly move within the space of global mobility, that is the airport cities, where they come together in order to contrive new products. In that manner, they adapt to markets evolving through abridged cycles of product renewal. In order to set the path for product innovation, designing new products and conceiving their marketing schemes has to speed up and therefore has to take place within global mobility.

Markets itself are no longer enclosed within irrevocable borders but undergo a constant change of configuration. Globalization does not create a single global market but a variety of markets that are even reconfigured by single products. Narrowly focused target groups replace what used to be broad customer markets. National economies no longer set the cultural and design framework of product configuration.

Airport cities therefore have to create new spaces of specifically devised services that cater directly to the groups of experts who do not leave that realm of knowledge and mobility other than to take a recreational pause after weeks of constant

travelling and working. Regions around Airport cities are best advised if reorganizing their spatial patterns catering to the mobility and cultural needs of these sophisticated clusters. By such means, airport cities give an answer to the question that Thomas Sieverts posed with the concept of "Zwischenstadt", the so called "cities without city". He called for a new meaning and functional determination of Zwischenstadt that transcends the characteristics of the former European city.

Sieverts identified urban sprawl as a consequence of increased mobility that enabled citizens to live far apart from their workplaces, thus creating a void lacking urban layout and shape. With global air traffic and the achievement of worldwide aggregated markets, the Zwischenstadt might experience a new teleology, that will lead to a new type of city located in the virtual space of mobile knowledge, floating through worldwide data streams and along the lines of intercontinental air traffic.

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