Accelerated change of Alpine air transport

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Abstract

Despite the controversial debate about road and rail transport proving the high vulnerability of the Alpine region, air transport has almost been neglected in the mobility discussions in the Alps. This raises the question how to assess the increasing traffic in many regions and the changes at the airports in relation to the principles of sustainable mobility and to the Alpine Convention. The increasing number of flights of Low Cost Carriers (LCC) to more and more Alpine destinations plays an important role in setting many local decision makers in an inappropriate euphoria disregarding the need of airport and airlines subsidies and the negative externalities like aircraft noise and induced traffic.

Keywords: airports, air transport, sustainability

1 Introduction

In anticipation of a planned research project this paper, compiling regional examples and making predictions, gives a first overview of the actual and geographically charged process in changing air transport. There are two main questions: First, if spatial effects of increasing air transport contradict the general principles of sustainable transport, and second, if development necessitates more governance by authorities. The consequences of growing passenger transport constitute a central problem. The booming development of Low Cost Carriers (LCC) will increase negative effects like emissions, noise, genesis of new traffic, and need for subsidies.

In the field of Alpine transport public and science mainly refer to road and rail transport and the related conflicts. Intensive research hereunto has differed regionally depending on the national strategies. A scientific examination of air transport and airports in the Alpine region in particular is not available. The only known publication is the short article on "Air transport in the Alpine region – boom at the expense of nature?" (Maystre & Zimmermann 1994). But the dynamic processes in the European air transport have now reached the Alpine region and therefore require a more targeted examination of their spatial relevance, as the intraalpine and perialpine airports are currently undergoing several changes (table 1).

Applying the extension of the Alps defined by the Alpine Convention, the airports with regular commercial transport can be subdivided into ten intraalpine and sixteen perialpine locations in addition to the five circumalpine hubs playing an important role in the development of the Alpine region (table 2). The number and size of the airports decrease from the periphery to the core region of the Alps (figure 1).

Table 1: Alpine air transport's process of change.

Subprocesses	Impacts	Examples
Planned extensions	Regional conflicts	Berne, Bolzano, Innsbruck
Market entry of newcomer airports	Regional conflicts	Bolzano, Cuneo, Memmingen
Discussion about civil use of airbases	Regional conflicts	Buochs, Emmen
Excess demands	Scarcity of slots (temporary)	Innsbruck, Salzburg
Airline bankruptcies	Ad-hoc cancellations of routes	Graz, Lugano
Increased significance of strategic alliances	Monopolisation	Austria, Germany, Switzerland
Market entry of regional airlines	Need for subsidies	Berne, Bolzano, Graz, Innsbruck, Lugano
Market entry of Low Cost Carriers	Genesis of traffic and need for subsidies	Bergamo, Chambéry, Grenoble, Innsbruck, Klagenfurt, Salzburg, Verona
Airport privatisation	Reduction of local authorities influence	Cuneo

Table 2: Passenger numbers in Alpine airports.

Intraalpine Airports*		**Perialpine Airports****		**Circumalpine Hubs**	
Airport	Pax 2006 (1.000)	Airport	Pax 2006 (1.000)	Airport	Pax 2006 (1.000)
Annecy (F)	65	Albenga (I)	***	**Milan LIN** (I)	9.696
Bolzano (I)	76	Altenrhein (CH)	98	**Milan MXP** (I)	21.767
Chambéry (F)	194	**Bergamo** (I)	5.244	**Munich** (D)	30.758
Grenoble (F)	430	Berne (CH)	98	**Vienna** (A)	17.143
Innsbruck (A)	806	**Brescia** (I)	232	**Zurich** (CH)	19.299
Klagenfurt (A)	410	**Cuneo** (I)	35		
Lugano (CH)	186	**Friedrichsh.** (D)	657		
Salzburg (A)	1.878	**Geneva** (CH)	9.816		
Sion (CH)	6	**Graz** (A)	913		
Valle d'Aosta (I)	***	**Linz** (A)	762		
		Ljubljana (SLO)	1.327		
		Maribor (SLO)	****		
		Memmingen (D)	****		
		Nice (F)	9.926		
		Turin (I)	3.260		
		Verona (I)	3.007		

* within the region defined by the Alpine Convention, ** within the 30 min. isochrone (travel time to the Alps), *** no data available, **** regular commercial flights began in 2007.
bold: Airports with Low Cost Carrier movements in 2008.
Data sources: ADV, BFS, DGAC, ENAC, SI-STAT, STATISTIK AUSTRIA

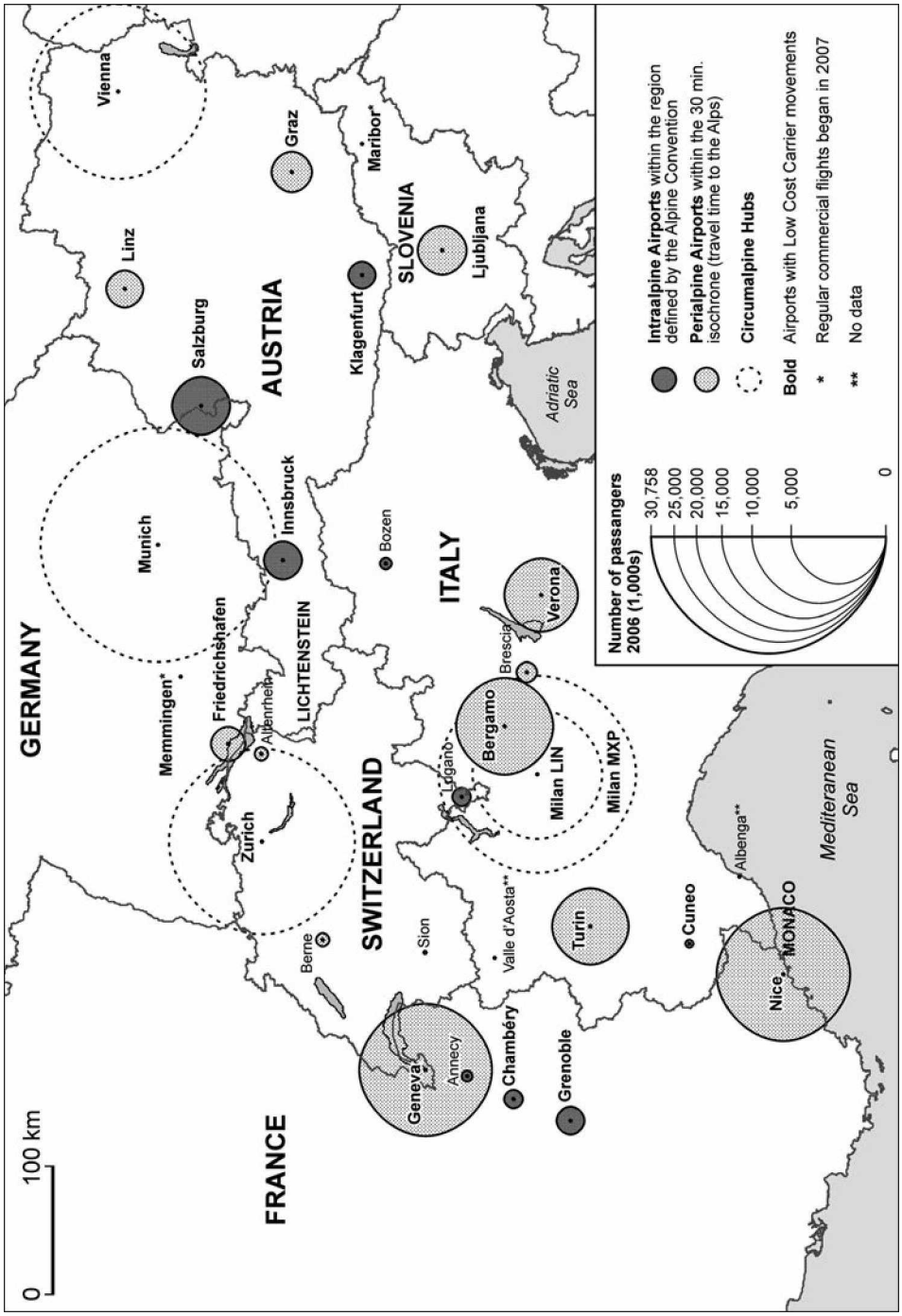

Figure 1: Location of Alpine airports (Cartography: S. Pohl).

In the Alpine region the named processes take place against the background of distinct regional characteristics. Due to its intense multi-functionality between identity strengthening cultural landscape, important transit area, heavily frequented tourism area and structurally weak periphery, the Alps are turned into an extraordinary heterogenic region for living and economic activities. In intensively used valleys noise and land consumption are the main problems of air transport. In addition, the topography induces technical safety regulations. The lack of space also complicates the intermodality of the airports. The role of the Alpine region as a destination for incoming charter flights is another specificacy.

2 Air transport in the Alpine region

Air transport in high mountain regions is technically difficult as the Alps constitute a barrier even for transit flights resulting in higher flight levels in the lower air space. The topography also causes weather-induced difficulties. However, the altitude of the airports in the Alpine region is of no importance. None of the airports offering regular commercial flights lies above 600 m a.s.l. The differences of atmospheric pressure and the thereby required runway lengths are negligible.

The main technical safety parameter of air transport is the obstacle clearance. Therefore the construction of airports in high mountain regions is extremely difficult. Theoretically, only few Alpine locations are qualified. As the valley floors are often intensively used areas including estates, agriculture, road and rail transport, flood prevention or energy supply, the number of adequate locations for airports is limited. Therefore the construction of a new airport is nearly impossible and the extension of existing airports is normally limited by their vicinity to settlements. Even then the runway lengths would neither allow intercontinental flights nor the operation of bigger, fully loaded cargo aircraft. The small-scale location of many airports has been a problem since their building. Lugano Airport is an extreme example. Despite sufficient demand, the short runway and lack of space hamper reliable air transport. On days with high temperatures and foehn winds it may happen that even turboprops with excellent STOL-qualities (Short-Take-Off-Landing) can only carry half of the maximum number of passengers. The lack of space affects storage and maintenance facilities as well. The airports are only suitable as a base for turboprop fleets and not for bigger jets offering more jobs. Land scarcity also hampers the increase of the intermodal airport quality.

Another characteristic induced by the topography and the meteorological situation is that the relation between emissions and immissions in Alpine valleys differs significantly from the proportion in plains. Problems are caused by the amplification of noise emissions due to reflections at the valley sides, influencing the behaviour of the isophones and the near-ground air pollution, especially during temperature inversions in valley basins.

The example of South Tyrol shows the intensity of use in valley floors (up to 1,600 m) having a share of only 6% of the area size with a concentration of 85% of the settlement area and 90% of the economic value added (Bätzing 1991). Within

Table 3: Development of passenger numbers at Austrian Alpine airports.

Pax (1.000)	Salzburg	Graz	Innsbruck	Linz	Klagenfurt
2007	1.946	948	860	774	469
1997	1.187	627	534	666	233
Growth rate	+64 %	+51%	+61%	+16%	+101%

Source: Airport operators.

the last decades the accessibility of the Alpine cities in the valleys has been strongly improved (Bätzing 1998a). They were also the most important locations of the tertiarisation process. Therefore, the disparities between highly developed valleys well-equipped with transport infrastructure and the peripheral areas have been accelerating. However, within the conurbations spatial problems like environmental stress and land consumption increase. Growing air transport will enforce this process. The example of the Austrian Alpine airports shows a fast growth within the last ten years (table 3).

Air transport in the Alpine region has influenced accessibility much stronger than in other regions, as air travel is much faster than other modes of transport. On the one hand the Alps are a highly frequented transit area in Central Europe profiting from constantly advancing travel connections. On the other hand there are also many less developed rural areas with typical transport problems (Nuhn & Hesse 2006). Therefore the population's participation in transport differs vastly. Better travel connections could benefit regions with accessibility problems like the Alps (Nuhn & Hesse 2006) and could strengthen social equity within Europe. An advanced air transport could accomplish this for valley areas. Less developed parts of the Alps benefit to a lesser degree, as good connections to the existing airports apart from the main axes are missing and as no potential airports in this region may theoretically qualify for the network of scheduled air transport. As much as the isochrones widen in the main valleys they still remain unchanged close in regions far away from the main Alpine economic centres. Hence, due to the problems with the hinterland transport system, the catchment areas of Alpine airports may be less profitable than expected.

The Alpine region shows three types of traffic: the dominating regional traffic, the transit traffic and the traffic of tourists (Bätzing 1998b). The airports do not only influence the regional traffic by offering outgoing traffic and trips of their employees, visitors or service providers, but also the tourism traffic by offering incoming traffic especially relevant to the regional economy. Therefore, from the local authorities' point of view, the number of incoming air passengers should be increased continuously. Following an experts' opinion they should charter planes for themselves and offer seats to travel agencies (BMWA 2002).

Scheduled and charter traffic has been often differentiated. Meanwhile, the frequencies state the only difference due to the deregulation. The growing number of sold single seats on charter flights further blurs the definition. Thus, the two types were combined in the following representative destination profile of Innsbruck Airport (table 4).

Table 4: Destinations of Innsbruck Airport.

Schedule	Number	Destinations				
		British Isles	Scandi-navia	"Warm water"	Alpine region	Other
Winter 2007/2008	41	46%	22%	5%	5%	22%
Summer 2008	45	20%	9%	53%	4%	13%

Source: Tiroler Flughafenbetriebsgesellschaft m.b.H.

The example shows the unique schedule characteristics of airports in the Alpine region. As origin of ski tourists the British Isles and Scandinavia represent two thirds of the winter destinations. Hence, temporary slot shortage at the main travel day Saturday could be a problem as there has also been a strong increase in ad-hoc charter flights from Russia. The summer tourism of the Alpine residents is responsible for the dominant part of „Warm water" destinations (Mediterranean, Canary Islands, Red Sea). Flights to intra- and perialpine airports or to circumalpine hubs like Vienna or Zurich are less important concerning number of destinations and passenger numbers. However, they moderate the seasonality as not all other flights take place during the complete schedule periods.

In this context LCC have to be mentioned, whose schedules have been varying seasonally more and more, but mainly are designed as all-year services like the Full Service Carriers. As the Alpine region with its two seasonal peaks seems to be economically promising, the LCC have increasingly offered flights to Alpine airports. As the LCC almost operate narrowbody jets from the Boeing 737 and Airbus A320 families, which require a runway length of at least 1,800 m, only a limited number of airports is suitable. While smaller airports like Annecy, Berne, Bolzano, Lugano, or Valle d'Aosta drop out, others are profiting from the boom. For instance, the LCC share of the offered flights at Salzburg airport meanwhile amounts up to 50%. However, the Ryanair connection to London-Stansted is generating more than 13% of the passenger numbers. In cases like this, the cancellation of a route or the retreat of a LCC could have serious consequences as Klagenfurt, Brescia, and Maribor Airport experienced. The Europe-wide competition forces the LCC to fly more and more to new destinations taking an economic risk in to realise first-mover advantages. The LCC's enormous aircraft orders encourage this procedure. While the British ski tourists' demand will ensure the LCC offers for several years, German winter tourists are the actual target group. TUIfly, connecting Grenoble, Innsbruck, Klagenfurt, Memmingen, Linz, Salzburg and Verona with German airports (Winter 2007/2008), is the forerunner.

3 Sustainability

Motorised traffic cannot be truly sustainable. Nevertheless, the criteria from Nuhn and Hesse (2006), the Centre of Sustainable Transportation (2002) as well as the

Table 5: Sustainability and air transport.

Dimension	Goals	Relevance for Air transport
Ecology	Minimisation of ecological loads	Reduction of emissions and needless traffic
	Do not exceed natural regeneration ability	Optimisation of propulsion technology
Economy	Guaranteeing economic interchange	Volatility abatement, better connections to peripheral regions
	Minimal utilisation of resources	Energy conservation and restricted land consumption
	Commercial efficiency concerning investments and operation	Reduction of subsidies
Society	Social equity	Improvement of accessibility and intermodality
	Minimisation of social loads	Reduction of aircraft noise
	Better acceptance by participation of the population	Implementation of innovative instruments for participation

"Vancouver Principles of sustainable mobility" (Gather 2000) allow the application of general principles to air transport (table 5).

The Transport Protocol of the Alpine Convention includes some detailed demands for sustainable air transport, e.g. reducing the environmental stress including aircraft noise as much as possible, refraining from building of new airports and significant extensions of existing airports, and advancing the public transport system from airports outside the Alps to the Alpine regions (Alpenkonvention, Verkehrsprotokoll: Artikel 12). At present only the TGV offering direct access from the Alps to a high-speed rail network could reduce air transport demand (Thompson 2002).

However, the consequences of growing passenger air transport are counterproductive to sustainable mobility. Even the lasting boom of LCC's produces a rapid increase of negative effects like aircraft noise, unwanted traffic growth and need for subsidies. Whether the incoming tourism with LCC's remains a durable motor of air transport development is doubtful. Findings about other regions show that only low ticket prices significantly induce LCC traffic (Behnen 2003, 2004, 2006). The escalating costs for kerosene and possible emission duties may increase the ticket prices within the next few years.

Enhancing resident's participation is a crucial part of the general principle of sustainability. The Alpine population is sensitive concerning transport topics. This may lead to a successful participation during planning processes about airport extensions. The mediation process in the course of the planned extension of Bolzano Airport gives a good example. Although a prognosis of air transport development in the Alpine region regarding sustainability is difficult, it is more likely that, in contrast to other regions, a strongly exponential growth with corresponding burdens can be avoided (table 6).

Table 6: Sustainability scenarios for Alpine air transport.

Aspects	Worst case	Real case	Best case
Traffic growth	strongly exponential	continuation of actual growth rates	stagnation but qualitative growth
Airport extensions	at many airports	at some smaller airports	only to fulfil legal regulations
Newcomer airports	several	1 or 2 converted airbases	none
Intermodality	dominating motorised individual transport	improved public transport accessibility	dominating public transport
Aircraft noise	massive increase by traffic growth and an increasing number of nightly movements	compensation of legal regulations and technical improvements by traffic growth	reduction by voluntary regulations
Participation	reduced	enhanced	substantially enhanced

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