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Guest editorial

Railway stations and urban dynamics

In most countries the development of the railway system has played an important role in the growth of cities and the evolution of urban systems. In his classical article Colin Clark (1958) sketches some of the major developments. Up to the 19th century the costs of transport of agricultural products were so high that they put a limit on the size of main urban centres such as London and Paris. With the rise of the railways this situation came to an end. It then became feasible to exploit economies of scale in manufacturing production by concentrating production in particular cities and this led to a period of sustained urban growth. Indeed, statistical analysis of the development of population size of cities during that period shows the clear impact of the development of railway networks on the connected cities (Rietveld and Bruinsma, 1998). Cities that were not connected experienced lower growth rates. However, this growth of cities led to new problems since railways had been constructed mainly for long-distance freight transport which meant that passenger transport of the increasing number of workers to their workplaces became a bottleneck. Thus, cities remained compact and limited in size. The emergence of tramways in the second half of the 19th century finally induced a process of spatial expansion of cities (Hall, 1994), and this was further reinforced by the introduction of the electric tram at the beginning of the 20th century. In most countries this marked the end of rail as the main transport-related driving force shaping urban development. The introduction of buses and cars led to a further growth of urban agglomerations, but now this was mainly an increase in surface area, not in population size. Gradients of density and rents started to level off. An extreme example was Los Angeles where the centre-supporting role of rail broke down and a large area with practically homogeneous densities of workplaces and residences emerged.

At the time of writing his paper (1958) Clark expected a similar development for the large European cities: not only suburbanisation of residences, but also of work. However, this expectation did not materialise. Examples of cities where there are still strong concentrations of work in the centres and where public transport plays a dominant role in commuting are London, Paris, and New York. Although a certain trend can indeed be observed of deconcentration of workplaces towards the city fringes, this tendency remained limited in many cases. In addition, it appears that, although in those cases jobs moved towards the fringes of the cities, this often led again to concentrations of employment. For this phenomenon, Garreau (1991) introduced the concept of edge cities. In some countries, the emergence of edge cities was supported—and to some extent also stimulated—by railway developments, an issue addressed by Willigers et al in this theme issue.

In terms of intermodal competition, rail was facing large problems for many decades. For short trips, the car became increasingly popular and affordable for large groups of people, whereas for long trips, aviation became a serious competitor. Hence, from the middle of the 20th century one could observe a period of stagnation and decline of railway services in many countries. These countries devoted a good part of their resources to the development of national highway systems. These led to an enormous increase in capacity, but most countries did not manage to create sufficient capacity to prevent bottlenecks. Hence, gradually the public sector started to develop plans for a major upgrade of the rail system. This led to a new turn in

the development of the railway system at the end of the 20th century. In many countries, large investments are being made to improve the quality of railway systems, in particular the construction of high-speed rail connections (see, for example, Haynes, 1997; Vickerman, 1997). Congestion on the road network makes rail more competitive. In addition, capacity shortages in the aviation network are leading to an interest in using high-speed rail links as an alternative to feeder flights, which also reinforces the position of railways for international trips. Table 1 shows the increase in track length of high-speed train systems in Europe and Japan. In particular in Japan and France there was a rapid growth in the 1980s and 1990s, respectively.

Table 1. High-speed train track length in km (source: International Union of Railways, www.uic.asso.fr).

	Belgium	Germany	Spain	France	Italy	Japan
1981				301	150	1069
1983				417	150	1805
1988		199		417	224	1833
1990		199		699	224	1833
1995		447	471	1220	248	1833
1996		447	471	1278	248	1833
1997		447	471	1278	248	1958
1998	58	636	471	1278	248	1958
1999	58	636	471	1278	248	1958
2000	58	636	471	1278	248	1958
2001	58	636	471	1573	248	1958
2002	120	636	471	1573	248	1958
2003	120	678	471	1573	248	1958

Also within cities there is a tendency to invest in rail. Many agglomerations invested considerably in the development of metro networks to provide an alternative to the car in an effort to solve congestion and parking problems. And where edge cities were developing, this was in a good number of cases accompanied by the development of railway lines and railway stations in these locations. Table 2 shows the number of cities with tram, metro, and/or high-speed rail links. In North America there has been a rapid growth in the number of cities with metro systems in the 1980s and light rail systems in the 1990s. In Europe there has been a steady growth in the number of cities with tram, metro, and/or light rail systems.

These railway developments offer opportunities for the larger cities that had been experiencing periods of decline. And this has led to an increasing attention to railway stations. Railway-related issues, be it the development of terminals for high-speed rail, the construction of high-quality office areas near railway stations, or the introduction of light rail have become important themes in policies to revitalise these cities (see Bertolini and Spit, 1998; van den Berg and Pol, 1999). The essence of these plans is that railway stations are not just considered as nodes where people change from one vehicle to any other, but where, as well as the transport flows, spatial concentrations of high-value activities are realised, having a positive impact on the cities. An interesting coincidence is that, in most of the larger cities, railway stations and railway lines were constructed just before the period of rapid urbanisation in the 19th century. Therefore the railway stations were built close to the old city centres, where at that time there was much open space for urban development. This led to the situation that in many cities railway stations were located close to the historical centres, making them attractive points of entry for workers to the central business areas and for visitors on recreational or shopping trips.

Table 2. Cities with tram, metro, and light rail stations (source: www.lrta.org).

	Type[a]	1980	1990	2000	2005	2010 (projected)
US and Canada	tram	4	4	5	7	8
	metro	1	17	17	17	17
	light rail	6	13	19	23	23
Japan	tram	14	14	14	14	14
	metro	6	10	11	11	11
	light rail	6	6	6	6	6
EU15[b]	tram	87	90	104	113	128
	metro	21	23	27	29	34
	light rail	8	12	13	18	22
EU15 + new member states[c]	tram	113	116	130	139	154
	metro	22	24	28	30	35
	light rail	9	13	14	19	23

[a] We use the classification as given on the website of the Light Rail Transit Association. Other sources may include tramways or metro under the light rail heading.
[b] Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.
[c] Czech Republic, Estonia, Hungary, Latvia, Poland, Slovakia.

The aim of this theme issue is to show how the renaissance of the railways since the end of the 20th century in terms of the development of urban rail systems and high speed rail really affects the cities. Since virtually all cities remain dominated by the car as the main transport mode, it is important to pay explicit attention to competition—and complementarity—between the two transport modes.

We start with the paper of Debrezion et al who use a stylised model for an urban area. This model addresses many of the issues that are relevant for this theme in one coherent setting, such as the existence of multiple centres within cities; the presence of multiple transport modes (rail versus car), and competition between land for commercial and residential purposes. Special attention is paid to the implications of railway developments on real-estate values, and in particular the implications of zoning policies for the development of real estate values in both the residential and the commercial market segment. The railway issues addressed in this paper concern mainly those of metro investments within large agglomerations.

The second paper by Cervero focuses on the impact of railway developments on the location choice of households and particularly on the impact of distance to railway stations on the use of public transport. Transit-oriented development (that is, siting housing, workplaces, and other urban activities within an easy walk of rail stations) is shown to produce an appreciable ridership bonus in California: transit and walk trips will substitute for what otherwise would be private-car travel. Important factors explaining this are residential self-selection (a lifestyle preference for transit-oriented living) and employer-based policies that reduce free parking. The emphasis in this paper is again on policies stimulating public transport within metropolitan areas.

The third paper, by Willigers et al, focuses on the specification of accessibility indicators for modelling the location choices of offices in view of high-speed rail developments. Potential accessibility indicators are formulated, whereby attention is given to the shape of the impedance function and to the role of competitive transport modes in a transport mode's accessibility effect. These indicators are then tested in a discrete choice model on the location of office employment. The accessibility indicators are then used to explore the effects of upcoming domestic high-speed train services

in the Netherlands. The emphasis in this paper is on the impact of accessibility and the presence of railway services on the locational decisions of firms.

In the fourth paper, De Graaff et al pay special attention to the quality of railway station areas and the issue of multifunctional land use in these areas. It is sometimes claimed that multifunctionality of such areas has additional value for visitors, employers, and employees. The authors of this paper aim to make this claim more concrete by presenting the results of interviews with employees in such areas on their willingness to pay for facilities close to the workplace. The paper reports the results of a stated-preference survey which focused on the willingness to pay for facilities (for example, day-care centres and restaurants) at stations. The emphasis in this paper is thus on station-area characteristics: what makes a station area an attractive work location and what employees are willing to pay for the amenities. The latter obviously has implications for the valuations of these locations by employers.

The fifth paper, by Pels and Verhoef, explores competition between modes in urban transport networks and the implication for congestion tolls and infrastructure pricing. The results show how, for example, the rail fare charged by a public railway operator may increase when a congestion toll for the private-car alternative is implemented, so that rail demand may decrease. The reason is that when the two modes can be considered to be substitutes, albeit imperfect substitutes, a welfare maximising regulator will compensate for the absence of a congestion toll by setting the rail fare relatively low, to give road users an incentive to abandon the (congested) road and use the rail alternative instead. It is therefore important to consider optimal pricing for all transport alternatives when rail (station) policy is formulated. This paper thus has a strong focus on the pricing and supply side of (competing) transport alternatives.

To summarise, this theme issue offers five papers which discuss related issues in urban transport planning. Debrezion et al offer an urban-economics-based analysis of investments in metro stations in a large city. Cervero continues the discussion of stations in an empirical analysis of household location choices. Such choices impact on real-estate values, as was analysed in the Debrezion et al model. Willigers et al analyse the location choice of firms. All three papers mentioned so far thus concern location choice and/or real-estate value in relation to transport. De Graaff et al continue the discussion with an analysis of the willingness to pay for railway station facilities which do not have a strict transport function. The first three papers analyse the impact of the availability of transport services on location choices, while the fourth paper analyses the impact of other facilities offered at the station on the total perception of the user value. Finally, the last paper analyses the supply side of stations in a competitive setting: how should railway infrastructure be priced in context of multimodal transport?

We trust that this theme issue brings together interesting work on the mutual relationship between railway developments and urban development, and that it will stimulate further research in this field, and in the broader field of transport and spatial development.

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