TRANSRAPID IN THE CONTEXT OF URBAN AND REGIONAL TRANSPORT PLANNING

Dr. Michael Raschbichler
raschbichler | consulting
Brandaustr. 1-3, D-34127 Kassel, Germany
Tel. +49(0)561.98850988, info@raschbichler.de

ABSTRACT: Highly-specialized national economies like Germany with their division of labour in manufacturing are dependent on efficient traffic infrastructures. The availability of efficient traffic infrastructures is a substantial location factor for a city, a region or a country. Beyond that Germany is characterised by a decentralized concentration of the settlement and economic structures. Many regional middle- and upper-centers form innovative cluster, in which area becomes a sociocultural environment of economic and technological interdependences with networks, where knowledge and information are to be exchanged and the spatial proximity is from great importance. Thus short ways between these regional centers and in particular the availability of traffic infrastructures and their effect on the environment are of special importance.

1 LONG-WAVE-THEORIES AND INFRASTRUCTURES

In an historical review, regional settlement and economic structures with their networks in division of labour in manufacturing and organisational structures are in close relationship with the available infrastructures and traffic systems at that time. Locations for economic acting were originally determined by geographical situations and the availability of natural traffic routes, like water ways. Since the industrial revolution the necessary infrastructures are created artificially by man throughout the different development phases. In each case an appropriate expansion of the radius of action, the acceleration of transport and an increasing cross-linking of the economically acting participants can be seen.

The first traffic routes created artificially by humans were channals, followed by the railway, road construction and in the today's time the air traffic. Each of these traffic systems was on the one hand solution of a specific problem, i.e. the transport of goods and later also from persons. At the same time these systems had however large influences on the regionalization of marketing areas and in consequence of the high investments also on the economic growth. If one regards the growth rates of the individual traffic systems in America, then the cycles are remarkable in the expiration of the development.

These curves are transferable to each industrialized country, only the respective technological entrance data is to be changed. In the expiration of German history this means a transition of many small states, connected by slow tollroads and channels, to the creation of a national state, which was brought in consonance by the co-ordinated timetables of the course books. The construction of an extensive road system opened up surface and with the airplane the national economy was brought into other countries and opened thus new markets.

When the long phases of the world-wide economical development waves (Kondratieff cycles) are overlaid with these development curves of the traffic systems the correlation of traffic systems and economic development becomes clear. After one period of about 20 years after beginning of a long wave in each case the traffic systems had reached approximately 50% of their maximum expansion and continued to push by this high investment activity the new wave. At the apex of the long wave the change of the economic and settlement structure had already progressed so far that the need for a new traffic system and the capital means for the introduction on the market were sufficiently present. The largest growth rates result however again only in the following wave, which was then pushed with by the respective traffic system.

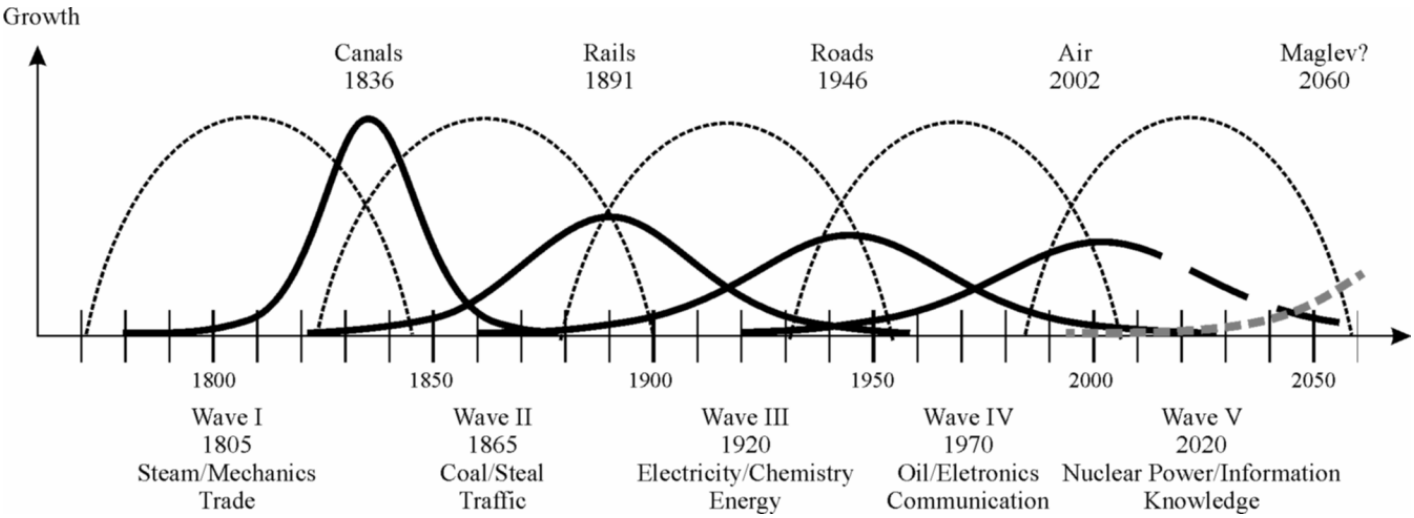

Figure 1: Long Waves of economic changes and growth rates of traffic systems in America

After the internationalization of the economic production, supply and commercial processes, for which the airplane was the suitable means of transport, we stand now before a new phase, in which knowledge and exchange of experience will be crucial in regional innovative environments for the economic development.

2 REQUIREMENTS FOR FUTURE INFRASTRUCTURES

The system of economy with its division of labour in manufacturing internationalized itself in the past decades strongly and extended spatially exponentially. The time factor with the transport of persons, goods and information increases in importance. The requirement profile to modern transportation infrastructures changes, so that no more the spatial, but the temporal distance is determining. Therefore due to the expansion of the interaction areas and simultaneous reduction of the interaction times a superproportional acceleration of the relations is necessary.

Apart from the utilization of regional cost advantages in production or the development of new sales markets, also a strong clearing of the product portfolios of large enterprises took place in the past years. By this concentration on the core competence and the increasing specialization, the organisation in networks, working groups and project companies for the realization of projects are more and more important. These partly virtual organizations are settled decentralized and despite modern communication media the specialists engaged must be centrally united for discussions, coordination as well as exchange of experiences and results.

Parallel to the transformation of the economic meaning of individual regions within the labour devided national economy by the construction and use of new traffic and logistics systems, transportation streams shift increasingly to immaterial goods (information) at the beginning of the 21. century. The required communication infrastructures are under construction. However these systems can be used only for the preparation of decisions. To a certain point one must face each other personally. In addition it comes that the goods „communication“ and „transportation of passengers“ are to be designated rather as complementary than substituting.

Furthermore the current economic development is characterized by acceleration tendencies (in particular in view to the response time to market changes as well as shorter product life cycles), rising complexity of products and processes, increasing specialization, flexibility and individualizing of product requirements. One speaks of an emphasis shift from (Fordistic) mass production to a (Post-Fordistic) flexible production and specialization.

New regional theories still add socio-economic aspects like collective learning processes within innovative clusters. Space and districts will be changed now to a socio-cultural environment of economic and technological interdependences with networks, where knowledge and information and the spatial proximity, as well as personal contacts and informal relations will be of great importance.

The demographic changes and their consequences for the settlement structure as well as the further concentration of the efficient traffic centers on the metropolis regions endanger the innovative achievement potential in the decentralized innovative clusters. Thus, the bottleneck of the modern industrial society will develop in „decision logistics“. Highly-qualified humans as decision and storage mediums must be moved physically parallel to the

information logistics with the same speed between decentralized, highly flexible, specialized, innovative network clusters. Traffic infrastructures for this are missing. Traffic route planning becomes thus an important tool of the active regional and economic planning.

While international traffic will concentrate increasingly on the airplane, the connection to high-speed train networks will be particularly of importance for the development of national locations. Thus it will become ever more crucial for the large cities and condensed regions to be linked to one of the efficient knots of European and thus in the long run also world-wide traffic and communications network and/or to have fast connection to such a knot.

A new system is to be defined, which can transport humans and goods as fast as the airplane and as flexible and surface-effectively as the car in a densely populated country as Germany with short critical point distances between upper and central centers. Additional system conditions are small transportation and operating costs, high availability, security and little impact on humans and nature.

These demands on a future traffic system can be derived from the 1972 locked HSB study, which led as well known to the admission of the development of the Transrapid maglev system. It is to be stated that only maglev systems become fair to these requirements.

3 VISION OF A MAGLEV NETWORK FOR GERMANY

The vision of such a network is comparable with the drafts for a national railway-network of the professor for political economy Friedrich List from Tübingen cunning from the year 1833. Rejected at that time however, his vision became reality in the following decades.

Such networks can be designed for any region or country, like Great Britain, Europe, or densly populated regions in Asia and America.

The model of a Germany-far Transrapid network orients itself at the existing IC/IR network of the German Railway, at the main traffic streams in Germany, further at existing traffic routes like the federal motorways and the regional importance within the system of central villages and towns.

The Transrapid network contains altogether 74 stops, about which 50 are regularly, mostly already used stops of the existing railroad network. Additionally 14 airports are merged into the network and further 10 stops are intended in the periphery of dye areas, better attainable by passenger car traffic. The sketched network could be supplemented with european extensions still around further 14 stops.

The Transrapid network has an overall length of 4,255 km (2,644 miles), whereby some distance sections are used by several lines. Due to the flexible drawing parameters of the Transrapid altogether 3,489 km (2,168 miles) of the network run parallel to existing traffic routes. This corresponds to 82% of the total route network length. 1,770 km (1,100 miles), corresponding to 41.6%, are thus bundled with existing railways and 1,719 km (1,068 miles), which corresponds to 40.4%, with federal motorways.

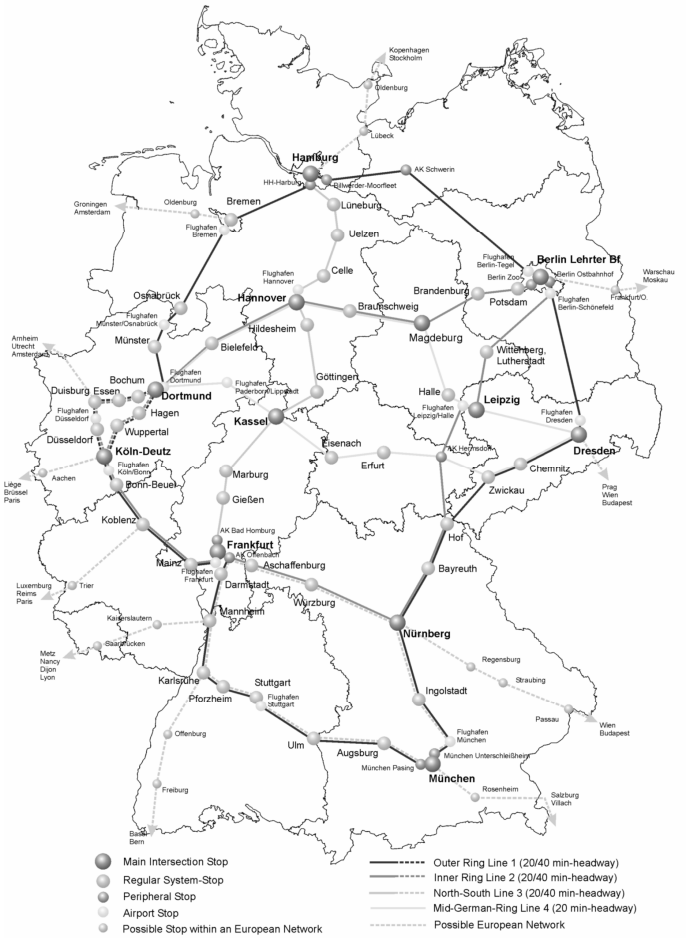

Figure 2: Vision of a Transrapid maglev network for Germany

The lattice structure corresponds to several circle lines, which are supplemented by a north south main course from Hamburg over Frankfurt to Munich. The smallest circle corresponds at the same time the east west course.

In a travel time comparison from city center to city center over all four meanings of transportation and assuming a maximum speed of 400 km/h (249 mph) for the maglev system, in 95% of the cases the fastest travel connection is represented by the Transrapid maglev system. Beside the direct connection between Bremen and Hanover by the German Railway it however exclusively acts around long-

distance trips to Munich or Stuttgart, which can be mastered faster in each case with the airplane.

This network would strengthen smaller regions especially in mid-Germany, but also in the East (i.e. Dresden, Berlin, Leipzig, Erfurt, Schwerin) an in the South (Nürnberg, Ingolstadt, Karlsruhe).

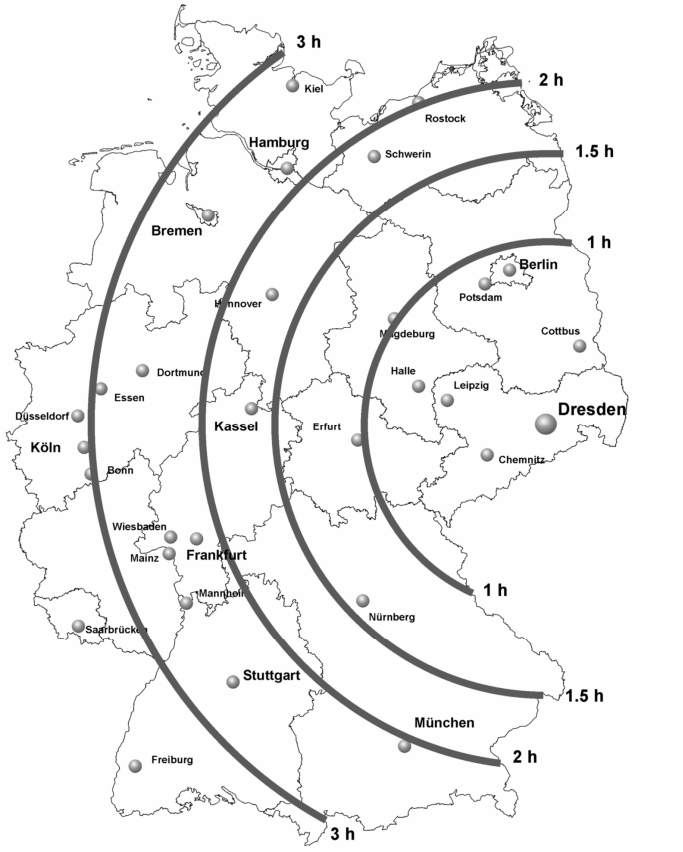

Figure 3: Trip times from Dresden within a Transrapid maglev network

For Dresden the connection to such a maglev-network means the expansion of the directly attainable 1h-region of the innovative network cluster to beyond Berlin and approximately until Erfurt. Even Hamburg, Frankfurt or Munich are attainable directly within approximately 2 hours, which would likewise lead to further linkages and work relations.

4 SO, WHY NOT MAGLEV?

When a new product is developed, one has a clear vision over its later employment. For the maglev system this vision changed and faded through the past years and a clear vision over its future meaning is nowadays hardly more present. Straight at the threshold to a new long wave cycle, the system properties of the maglev systems open however enough new application types.

It is to be foreseen that the operating service of the individualized mobility is energetically no longer futurable on the basis of oil. In Asia large areas are to be connected and in Europe often multiple segmented agglomerations are to be linked in time economics, who call after a uniform solution and connect large routings with short term operating service. Thus created integrated innovative regions are then again in the global competition competitive and thus preserve national competition advantages.

The future will belong to the maglev technology - the question is rather: From which region the innovative impulse will proceed for world-wide realization - Europe, Asia or America.

REFERENCES:

Bundesamt für Bauwesen und Raumordnung (BBR) 2001. *Raumordnungsbericht 2000, Berichte, Band 7*. Bonn

Eck, F. 2000. *Die Bedeutung von Haltepunkten des spurgebundenen Personenverkehrs mit Hochgeschwindigkeit für Unternehmungen in Deutschland*. Aachen/Köln: Shaker

Grübler, A. 1990. *The Rise and Fall of Infrastructures – Dynamics of Evolution and Technological Change in Transport*. Heidelberg: Physica

Krugman, P. 1998. *What's new about the new economic geography?, Oxford Review of Economic Policy, 14/1998*

Marchetti, C./Ausubel, J.H. 2001. *The Evolution of Transport, in: The Industrial Physicist April/May 2001*

Porter, M. E. 1991. *Nationale Wettbewerbsvorteile, erfolgreich konkurrieren auf dem Weltmarkt. München*

Raschbichler, M. 2004. *Die Auswirkungen von Hochgeschwindigkeitsverkehr auf die Erreichbarkeit der Regionen in Deutschland. Kassel*

Schätzl, L. 2003. *Wirtschaftsgeographie1 – Theorie. Paderborn/München/Wien/Zürich, 9. Auflage*