



BOOK OF ABSTRACTS

**NECTAR
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**Accessibility,
Policy Making and
Spatial Planning**

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Friday, 16 October 2009

First Session - Accessibility and Spatial Economics

Chair Andrea de Montis, University of Sassari

Is accessibility still a crucial success factor in location decisions of economic activities?

Bart De Smedt and Ann Verhetsel**, University Of Antwerp*

Within the Policy Research Centre on Regional Planning and Housing in Flanders, we analyze the location of economic activities in order to advice for future planning. A better perception of the transformations and developments in the location choice of economic activities is a key element in this analysis. The aim of the article is threefold. First, we try to reveal which location factors are dominant in location decisions of companies. Second, the research will show whether there has occurred a change in the importance of the different location factors throughout time. Third, it will be investigated if the importance of certain location factors is specific for different economic sectors.

We start with, an overall picture about the location factors that influence a location decision. This literature study started from Healey and Ilbery (1990). They introduced a seven clusters scheme in which the main location factors are ordered. Based on this checklist, a review of papers and studies - that were carried out in Belgium and the Netherlands during the last 40 years - is studied. The outcome of this analysis gives an answer to the research questions formulated above.

As a conclusion we can state that accessibility has always been and still is on top of the list in the location decision process. Furthermore the article shows that, during the last decades, there have been some changes in the way companies decide about the location of their economic activities. For instance the importance of location and building quality, local network effects and agglomeration economies are becoming more important in location choice.

The analysis will form a basis for further research. For instance it would be useful to take a closer look at the influence of different accessibility profiles on the value of a location for different forms of commercial real estate, as for instance offices, retail and logistic warehousing. The analysis can contain a revealed as well as stated preference method. The stated preference analysis will be the result of a discrete choice analysis that is often used in transport research, as for instance the decision making process concerning mode choice for transporting goods and mode choice for commuter traffic. The use of discrete choice models for analyzing location choice of economic activities is rather new (Rietveld, 1994; Hagashi et al, 1986). While the revealed preference methods observe location choices that are actually made by decision takers of commercial real estate (transaction data), the stated preference approach considers the way decision takers would react when confronted with different choices. The discrete choice set will compromise different alternative locations, in which each alternative is being defined by a set of attributes which lead to the fact that the respondents should make trade-offs when choosing. The discrete modeling analysis will be the core objective of my further doctoral research.

Keywords: Location choice, accessibility, economic activities

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Modeling the regional distribution of population, employment and commuting in the Netherlands

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The location of population and employment on the one hand and commuting patterns on the other hand are intrinsically related. If possible, employees choose locations with a good accessibility to jobs and employers choose their firm location close to where the labor force is located. Empirically, these population-employment dynamics or 'do jobs follow people or people follow jobs' boil down to whether employees or employers are more restricted to choose their desired location. Commuting is in this respect not merely an outcome of specific location decisions, it may also influence these decisions. Namely, an improved infrastructure or a larger willingness to commute causes different population and employment dynamics.

This paper first looks empirically into the regional population-employment dynamics in the Netherlands by decomposing Dutch employment into several sectors. Endogeneity and spatial autocorrelation issues are dealt with by using a generalized spatial 3SLS estimator as initially proposed by Kelejian & Prucha (2004). In the second part, we focus on applying these results in a regional population-employment scenario model for the Netherlands where we specifically look at the regional distribution of employment, population and commuting.

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Spatial Spillovers: a methodological framework to evaluate the European value added of TEN-T projects

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The 1994 Essen European Council identified a number of major priority projects which were subsequently incorporated into outline plans adopted by the Parliament and the Council, which provide a basis for EU co-financing of the trans-European transport network (TEN-T).

Many of the TEN-T projects are now under construction and there are only few examples in which their construction is completely finished. Such projects require a considerable amount of financial resources. The EU contribution has proved to be an insufficient aid to the Member States. In fact, scarcity of funds is at the basis of some delays in implementing this policy, together with a slow planning activity and difficulties in reaching a consensus. In particular, the EU faces difficulties to distribute the investment costs for the construction of TEN-T cross-border projects among the countries involved.

Moreover, some of those links of the TEN-T are located in outlying areas and enclaves near the borders of EU countries, where demand is not enough to justify the need for new infrastructure. A delay in providing these infrastructures means that these regions cannot be properly linked. However, these cross-border stretches have a crucial importance from a European perspective, because their construction provides a high European value added (EVA). EVA refers to the extent to which a policy action increases transport efficiency or stimulates new development at the European level, which is above what is seen as a national or local priority.

There is a lack of an integrated approach during the planning, evaluation and funding process of cross-border infrastructure. It is important to acknowledge that the state of the art in respect of the assessment of infrastructure programmes is less well-developed than that for individual projects. In the context of a major programme such as the TEN-T, this creates the potential for difficulties, as conflicts appear between European, national and local impacts.

In this context, our study proposes a methodology based in the concept of spatial spillovers to measure the EVA of TEN-T projects. Spatial spillovers are defined as those accessibility improvements located in one country due to new transport infrastructure built in a different country. Accessibility indicators are calculated in a Geographical Information System (GIS) environment. The validity of the methodology is tested with its application of a selection of TEN-T projects. Each project is split in different stretches and subsequently the EVA of each stretch is measured in terms of its spatial spillovers.

With this methodology we intend to move a step forward in the development of appraisal methods available to assess TEN-T projects, following a perspective focused on the strategic objectives defined at the EU level.

Keywords: Accessibility; European Value Added (EVA); Spatial spillovers

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Reliability of railway services: impacts on travel demand

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Reliability of transport services is increasingly considered as an important determinant of travel demand. One of the issues is the appropriate definition of reliability. In the present paper we consider six different ways to measure unreliability, including the probability of a delay of 3 minutes or more, the average delay, the standard deviation and the difference between the 80 and 50% percentile of arrival times. Data provided by the Netherlands national railway company are used to compute these reliability measures for a number of trajectories. Correlations between some of the indicators are close to zero, but for most indicators, correlations range from 0.6 to 0.9. A novel element in the paper is that the impact of travel time reliability on travel demand is explored by means of revealed preference data. Travel demand is estimated by means of data on trajectory specific season cards. For a set of 288 trajectories we find that the 80-50% percentile indicator performs best among the six unreliability indicators considered. The corresponding elasticity is -0.15 , implying that improving the reliability of railway services has a substantial effect on travel demand.

Keywords: Reliability, railways, travel demand

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Second Session - Accessibility and Behaviour

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Daily travel among elderly

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In an aging society a crucial question is how travel patterns will be affected. The share of trips carried out by elderly is expected to increase, as the number of elderly people is growing in Western Europe and the US. A similar development goes for other industrialised parts of the world, like Taiwan and Australia. In Sweden, it is expected that more than every fourth citizen in the year 2020 will be 65 years or older. A change in demographic composition leads to changes in society at large. A growing number, or share, of elderly will affect the total travel pattern as well as the transport magnitude. It will be a challenge to adjust the transport system to meet the needs of elderly, but also the opposite - to balance the travel needs of elderly to a sustainable transport system.

People tend to continue to live according to their previous patterns and habits. This is reflected by that elderly of today do, in general, have a more active life style than the elderly 20 or 30 years ago. A change of life style among the elderly is an effect of better health and economy and at the same time increased car ownership. The changing life style will increase mobility among the elderly and lead to increased car travelling. An elderly population with resources and habits to be mobile and very often by car raises concerns on environmental impact, congestion, but also on urban physical planning and provision of public transport. The mobility of elderly is also receiving increased attention in countries that are experiencing an aging population.

Mobility of elderly is important for several reasons;

- it is a means to get access to desired places and people,
- mobility means a psychological advantage. The importance of their travel and ability to travel is often related to Quality of Life (QoL),
- it enables physical activity,
- it is a question of participation – Relations and activities are part of QoL, and
- it represents a potential to travel

This paper addresses the needs and possibilities of elderly for daily travel. Based on a Swedish survey directed to 2000 persons aged 65-84, daily mobility patterns among elderly are analyzed.

Questions addressed are:

- Which activities are accessible for different groups of elderly?
- What resources – physical, economical and social - do they have for travelling?
- What activities are desired but not fulfilled due to lack of resources or accessibility?
- Are there alternatives for various activities and trips?

Keywords: Elderly, daily travel, planning

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Changes in individual accessibility in Sweden 1995-2005

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In contemporary society, many would argue that accessibility has reached a peak, e.g. as a consequence of high levels of urbanization. At the same time, however, urban planning has for decades developed towards urban sprawl in many cities. While higher population concentration distances can be expected to diminish, they typically grow longer as the city sprawls.

In this paper, we address the issue of which of these developments of accessibility has taken place in Sweden during a period encompassing the last years of the 20th century and the first years of the 21st century. The aim of this study is to analyze changes in individual accessibility to selected destinations (places representative of specific activities/functions) for the Swedish population between the years 1995 and 2005. The destinations represent a variety of everyday activities (work; shopping; service; commercial and leisure activities), but also some activities that may be less frequent (e.g. seeing relatives).

Key research questions of the study are a) For which destinations accessibility has increased; and for which destinations it has decreased over the study period. b) For which population sub-groups (e.g. age, gender, education, rural-urban) accessibility has increased; and for which groups it has decreased.

Accessibility is operationalized as distance to the closest destination of a particular category from individuals' residential location. The main data source is ASTRID; a comprehensive geo-referenced database comprising all individuals in the Swedish population. ASTRID is maintained by Statistics Sweden. Changes in accessibility found through analysis of the ASTRID data are also put in relation to the importance that individuals ascribe to living close to the different destinations (their 'proximity preferences'), as self-reported by respondents in a 2008 survey. The analytical methods used in the study include descriptive statistics, GIS mapping and regression analysis. The theoretical framework of the paper draws on literature on accessibility; population change; mobility, time-geography and everyday life.

Preliminary analyses reveal that accessibility increased (i.e. distances decreased) between 1995 and 2005 for a large majority of the destinations. Hence, accessibility conditions – measured in terms of proximity – in Sweden have improved over the study period. In some cases the changes were quite dramatic. For instance, individuals' mean distances to the closest university/college; restaurant and post office decreased by on average over 20%. Only in the case of distance to a theatre; grocery store and gym/sports centre did distances grow longer, but these changes were far from as radical as the abovementioned increases.

Juxtaposing the observed changes with individuals self-reported 'proximity preferences' reveals that some of the accessibility increases are relevant to people, since they value distance to the destinations in question (e.g. because they represent important or frequent activities). Destinations related to children's activities (e.g. pre-school; school) ranked the highest in proximity preferences, and have either 'come closer' to where people live (redistributed or increased in numbers); or the population has redistributed and hence come to live closer to the destinations. Apart from the destinations to which proximity is deemed important, however, distances have also diminished to 'unimportant' destinations such as cinemas and certain commercial services. However, regardless of the importance of proximity to specific destinations, the overall conclusion of the analysis is that the Swedes lived under better accessibility conditions in 2005 than they did in 1995.

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The impacts of the Segregation Wall on travel behavior in the Palestinian Territory

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In April 2002, the Israeli authorities started the construction of a Segregation Wall in the West Bank. The wall when completed will isolate parts located between the Wall and the 1949 Armistice Line, forming 46% of the total area of the West Bank. This wall is not only separating Palestinians from Israelis, it is fragmenting Palestinian communities and isolating them from their lands, support networks and other facilities in neighboring towns.

This study deals with a special situation that political decision determined a new fact, the separation wall that closed main roads, divided regions and cities from each other, and cuts off public transportation lines for number of communities which the Wall isolates. Additionally, it blocked access to destinations that exist outside the borders of the west bank especially to Israel where a considerable number of job opportunities exist.

The objectives of this paper are firstly to examine the impacts of the segregation Wall on Palestinian daily travel behavior which include: travel time, number of trips, travel modes, travel destinations and travel purposes. The second one is to identify the changes in the accessibility to the various activities including work, leisure and shopping. The third objective is to examine how changes in mobility and accessibility influence people's standard of living, well being and welfare. The last objective attempts to highlight the travel behavior differences between the Israeli Arab minority which also suffer from Israeli authority discrimination but still have the freedom to move and travel within and outside the Israeli borders (despite most of the Arab countries). For this purpose four Palestinian communities that were affected by the wall construction were selected: Qalqilya, Jayyus, Ayda Camp and Beit-Jala, in addition to Majd-Elcrum which is an Israeli Arab town.

To determine the impacts of the separation wall construction on travel behavior a survey was conducted in these selected communities. The survey includes questions about detailed socioeconomics and demographic characteristics and a travel diary of 24 hours. The sample includes 277 Palestinian households from the west bank and 101 Israeli Arab households.

To understand the impacts of the Wall construction on travel behavior, and to understand the role of accessibility and mobility on individual's travel behavior and on people's standard of living, well being and welfare, a descriptive analysis and comparative method were applied.

The results of the study indicate that significant changes in the Palestinian's travel behavior occurred. Trip distance and travel time have increased, and changes in destination and travel mode were observed. Access to agriculture land and to the Israeli areas was restricted to the Palestinian population and as a consequence limited their accessibility to job opportunities. The wall lead to severe deterioration in the Palestinians quality of life, it restricted their ability to visit their relatives and their friends as well to participate in various social activities.

Keywords: accessibility, travel behavior, segregation wall

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Accessibility evaluation of a new high-speed rail line in the UK

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This paper analyses and evaluates proposals for new High-Speed Rail (HSR) lines in the UK focusing on accessibility, and assessing foreseeable changes to current rail connections. Recently, *Network Rail* (UK's national rail infrastructure company) announced its provisional decision on the choice of a new line among several options.

The main objective of this paper is to provide an initial analysis of the proposed new line to inform the UK debate on HSR with respect to issues like rail connectivity, accessibility and territorial impacts. While the debate and analysis thus far have focused on the national level and connections between the UK's major urban centres, the analysis here focuses more on the regional and local levels. Experience from other countries in Europe that already have HSR services shows that positive benefits from HST can take place from better connectivity between intermediate smaller cities, and therefore a detailed regional/local perspective is crucial to fully explore the potential of a new HSR line. Furthermore, while current debate focuses on London and a few major cities which are likely to be 'on-the-line', we extend the analysis to smaller cities and regions including those who are likely not to be 'on-the-line'.

The analysis will be in two parts. First, an accessibility analysis based on current journey times on the conventional network together with that proposed for the new HSR line will be performed. The analysis will also account for the level of service (current and proposed HSR) and the likely level of coordination between the conventional and HSR network and it will be complemented with commuting indicators. GIS tools are used to draw up accessibility maps that allow to identify 'winning' and 'losing' locations from the new HSR line in terms of accessibility.

Second, we briefly analyse the current socio-economic situation for several localities which are likely to be affected by the proposed HSR line. Drawing from international experience and following successful and failed examples of regional and urban development and territorial impact associated with the construction of HSR. We then set out a series of different possibilities for how HSR might change the UK landscape, at national, regional and local levels, and discuss the most appropriate HSR model for the UK.

We find that a much broader view and account of HSR impacts is necessary and that the UK, in setting up and examining the development of its HSR network, has a lot to learn and gain from European experiences. This broader view must focus as much on the conventional rail network as on the new HSR network, in planning the latter.

Keywords: High Speed Train, Accessibility, Transportation policy

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First session – Accessibility and Networks

Chair Kerstin Westin, Umea University

Equity of urban service delivery: A comparison of different accessibility measures

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This paper evaluates the use of various place-based and people-based measures of accessibility in the context of public service delivery. While place-based measures examine the spatial separation between service locations and the home location, people-based measures are based on detailed observations of an individual's activity schedule and space-time constraints. The aim of this paper is to contribute to previous methodological studies of accessibility by investigating the extent to which utility-based measures relying on the Burns/Miller framework relate to place-based and other people-based measures of individual accessibility. In total, four place-based and six people-based measures that are frequently used to evaluate urban service delivery are analyzed. The relationships between these measures are examined and their implications for the assessment of equity of urban service distribution are evaluated by means of the Gini coefficient. We have found substantial differences between place-based and people-based measures, supporting previous findings in the relevant literature and extending them to utility-based space-time measures of accessibility. We also observed substantial differences within the group of people-based measures. It appears that measures based on the Lenntorp framework are quite different from measures based on the Burns/Miller framework, showing that differentiating on the basis of attractiveness, proximity and possible activity duration is important in studies evaluating equity of urban service distribution. The salience of this difference is also borne out by a detailed comparative analysis of Gini coefficients, indicating that different measures provide markedly different insights into how equally service delivery is distributed among the population.

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Market area of intermodal rail-road container terminals embedded in a hub-and-spoke network

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One of the objectives of the European Common Policy for freight transport is to restore the balance between modes and to develop intermodality. However, the structures of the modal networks and the operation costs are not similar. Consequently, the market areas can be very different from mode to mode.

Among the various types of intermodal transports, Niérat (1997) compared road and rail-road intermodal transport and identified the market area of container terminals, and was so able to define the zones for which each mode is the most competitive.

This paper is focused on the market area of intermodal rail-road container terminals embedded in a hub-and-spoke network (hubs). In some circumstances, this kind of network topology can indeed reduce transportation costs by consolidating shipments at the hubs. The market area of these terminals can be determined by means of a comparison of the road only transport and the rail-road intermodal transport costs.

Another recent paper by Jeong *et al.* (2007) is focused on freight transport by rail between ten European countries. It addresses the problem of a planner who has to identify the best combination of routes, frequencies, volume and length of trains. Limbourg and Jourquin (2009) also used the flows of commodities as input to determine a set of optimal hub locations, with an objective function that includes the costs of pre- and post-haulage by truck, trans-shipment and rail haulage, and an iterative procedure that takes the variation of the trans-shipment costs according to the flows captured by the optimally located hubs into account.

This paper has two main contributions. The first one is to take into account the heterogeneity of space to determine the market area of rail-road terminal. The second one is to compare the hub configurations obtained solving two hub location problems for the whole trans-European network. The first problem is the p -hub median problem which locates hubs and allocates the remaining nodes to these hubs in order to minimize the total transportation cost (efficiency criterion). The hub network design obtained by this method can however sometimes lead to unsatisfactory results when worst-case origin-destination pairs that are separated by a very large distance. Therefore, the objective of the second method, i.e. the p -hub centre problem, is to minimize the maximum (generalized) cost between all the origin-destination pairs (equity criterion).

Keywords: Market area, Terminals, Hub-and-Spoke, Intermodal, Transport

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Accessibility in commuting US network

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Recently practitioners have approached spatial and environmental planning adopting methods and tools drawn from the Complexity Science. The strength of these methods consists not only in its systemic coherence but also in the capacity to consider a variety of components as a whole system. Under this background, the aim of this paper is to extend a methodology, tested for the Italian insular region of Sardinia (De Montis et al. 2008), to the construction of accessibility indicators for commuters in the United States. Location-based accessibility measures are applied to study the level of accessibility for commuters at a county level. The accessibility measurements produced by this model provide an assessment of the accessibility for the U.S. commuters and address spatial planning objectives for the U.S. counties.

Keywords: Accessibility indicators, commuting, spatial planning, complex networks

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Regional labour markets and job accessibility in city network systems in Germany

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Spatial labour markets are subjected to the forces of regional economic activity and competing network effects. Commuting is, therefore, an important equilibrating vehicle in a city network constellation. Cities act as attractors of commuters, as most economic activity occurs in cities, thus providing a high share of attractive workplaces. Cities that are centrally connected in a network may act as centripetal and centrifugal forces in the whole system. The present paper focuses on a so-called City Network approach. A central idea is the accessibility concept, which is interpreted here as the potential of opportunity for interaction, having a positive impact on the economic growth. In our paper, the accessibility concept and the City Network concept are linked together by positioning accessibility in the City Network system. Since accessibility measures give geographic insights into the distribution of economic activities and the related (dis)equilibrium of regional development patterns, the connection with the labour market is evident, and, therefore, a second focus of our analysis.

In an applied setting, our paper aims to investigate spatial accessibility patterns in the main City Network in Germany. The 17 districts which belong to the country's City Network were chosen from the 439 German labour market districts on the basis of three criteria: (a) connection to the high speed railway network; (b) the most accessible districts according to previous results (2002); (c) relevant districts for the German economy. Our applied modelling research concerns home-to-work commuters travelling between the selected districts belonging to the German City Network, for both 2003 and 2007. Here, a comparative analysis of the ranking of the most accessible districts – also for different intra-zonal travel times – is carried out in order to map out the changes in accessibility between 2003 and 2007, especially in the light of new high speed connections and commuting flow dynamics.

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Second session – Accessibility and Sustainability

Chair Aura Reggiani, University of Bologna

Fostering accessibility planning in a regional railway corridor in the metropolitan region Frankfurt/Main, Germany

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Background

The proposal focuses on an accessibility planning approach that has been developed for the research project Bahn.Ville 2, which innovates the implementation of integrated transport and land-use measures in order to improve sustainable mobility in a regional railway corridor (Taunusbahn) with strong relationships to the city Frankfurt/Main. For this project, an accessibility measurement tool has been developed that counts and visualizes accessible activity and services area potentials within a certain resistance budget (i.e. travel time). The method utilizes a regional transport demand model that supplies congested travel times in motorized individual transport, timetable based travel times for public transport, and spatial data to be disaggregated to building block level. The tool is able to consider all transport modes as well as mode combinations and is used to identify accessibility deficits in the region at different spatial scales in order to identify and assess appropriate transport supply and spatial planning measures.

Application strategies

An important issue of accessibility planning in this context is neighbourhood mobility, since a very high share of railway customers is approaching or leaving the station by foot (or by bike). Origins and destinations nearby should be preferred and reached quickly, comfortably and safely. However, planning concepts usually do neither consider non-motorized transport appropriately nor do they refer to existing local knowledge and participation of citizens. Detailed analysis on the local level points out that accessibility can be improved already significantly by very soft measures, i.e. with walking infrastructure providing access to the backward areas of railway stations.

An application that to some extent contradicts the necessity of fostering neighbourhood mobility is the improvement of area wide accessibility of railway stations. Intermodal interchanges to public and motorized individual transport in competition to attractive re-densified utilizations in the direct railway station surroundings provoke considerable land use conflicts. Therefore different classifications of stations according to current and future functions and to accessibility potentials are identified in order to weigh up between both legitimate station development alternatives.

Commuting data shows, that the municipalities along the railway corridor in question are not only the origin of trips to the metropolitan core area of Frankfurt/Main, but offer a remarkable amount of workplaces. The accessibility analysis contributes in finding possible companies for the implementation of mobility management strategies and to identify locations for future business sites development with appropriate public transport catchment areas of possible workers.

Within the framework of an internet based mobility consultancy tool, that makes different effects (i.e. costs, time effort, energy consumption) of long-term mobility decisions (i.e. housing location choice) transparent to the potential user, the accessibility analysis provides visualisations of activity locations on the neighbourhood and on the regional scale. This can be seen as a powerful instrument to communicate the attractiveness of public transport and neighbourhood mobility to potential users that can take in account sustainability issues more appropriate in their long-term mobility choices.

Summary and perspectives

Measuring activity potential within a certain travel time budget, the accessibility indicator that has been developed for the Bahn.Ville 2 project is easy to communicate and therefore fulfils the requirement of being implemented in local planning practice. The experiences show, that such an approach is strongly recommendable and also fosters scientifically valuable contributions from regional politicians and practitioners. Further research requires tests in which way such an easy-to-interpret indicator provides comparable information to alternative approaches (i.e. gravity based indicators).

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Using accessibility indicators to assess spatial equity impacts - Application to the development of high speed rail corridors in Spain

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Equity issues are increasingly included among social impacts of transportation investments. Equity implications take into account the distribution of effects among different societal groups (social equity) or regions (spatial equity). The analysis of the spatial distribution of effects is crucial, as certain transportation investments may contribute to increase imbalances between regions, i.e. negative spatial equity impacts.

The planning process of a new high speed rail (HSR) corridor should take into account these equity considerations. HSR specific features make it a serious candidate to result in negative equity impacts. In particular, the significant differences in commercial speeds between HSR and conventional rail, and the spatial separation between HSR stations, which contribute to the development of more polarized spatial patterns.

This paper describes and validates a methodology to assess spatial equity impacts of HSR based in the calculation of accessibility indicators. Accessibility analysis is a special type of spatial analysis technique which is increasingly used to assess spatial equity impacts of transportation investments. In addition, the potential of accessibility analysis has been recently increased by new developments in Geographic Information Systems (GIS).

The construction of a HSR corridor improves accessibility. However, these improvements are concentrated near HSR stations, whereas intermediate locations obtain limited benefits, i.e. spatial equity may be deteriorated. Hence, there is a conflict between efficiency (economic) vs. equity (social) effects of HSR projects. If the only objective was the maximization of economic growth, the best solution would attempt to improve rail connections between major activity centres. However, this strategy would have a negative impact on equity, as it would lead to more polarized spatial development patterns.

Current transport assessment methodologies lack a common procedure to deal with this trade-off. In this context, the paper develops a procedure to address these conflicting effects. On the one hand, efficiency effects are measured in terms of accessibility improvements. On the other hand, changes in the distribution of regional accessibility values are used to assess spatial equity implications.

The proposed methodology is intended to support transport planners when confronted with the task to optimize efficiency and equity objectives. The validity of the methodology is tested with its application to alternative corridor developments of the Spanish HSR network based on the 2020 scenario included in the Spanish Strategic Transport and Infrastructure Plan 2005-2020 (PEIT).

Keywords: spatial equity, accessibility indicators, transport infrastructure planning

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Accessibility and Transit-Oriented Development

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As large cities seek to expand their transit systems to accommodate increasing travel demand and provide alternatives to growing road traffic congestion, more research attention has been focused on the land use effects of transit, most notably in the form of transit-oriented development (TOD). Some cities are developing transit systems with objectives that include more focused economic development near transit stations and along transit corridors. The theoretical rationale for TOD rests upon the concept of accessibility because the improved access to land parcels that transit provides increases economic value of the land and thus development potential. This paper will explore further the theoretical connection between accessibility and urban land use in the context of transit-oriented development. Specific empirical results will be presented for Denver, Colorado and several other cities in the United States.

Keywords: Accessibility, transit-oriented development

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