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How to plan for regional accessibility?

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Abstract

In order to address some of the shortcomings of traditional urban transportation planning, it is argued that a shift is needed from planning for mobility to planning for accessibility. Accessibility is a well-known and studied concept within the scientific literature. Its use in practice however is limited. This paper explores the ways of using the concept of accessibility in planning practice, with a special focus on the phase of policy design. Using the Amsterdam Region as an example, it is illustrated how simple accessibility measures can help planners with the design of integrated transport and land-use policies that call for different solutions than the traditional approach.

Keywords: Accessibility; Transport planning; Policy design

1. A shift in paradigm

To be accessible or not to be accessible seems to be the question these days. In a highly dynamic globalized economy, adequate access to spatially and temporally dispersed resources (for example, knowledge, consumers, labor, and suppliers) are vital conditions for firms and households in order to thrive or even just to survive (Castells, 1996; Van der Knaap, 2002). Infrastructure networks play a crucial role in providing actors with sufficient access to these different resources. Yet, traditional urban transportation planning often neglects this important role infrastructure networks play and limits its focus on the efficiency of the transport system itself.

As a consequence, in recent years, it has been argued that the time is right for a shift in paradigm towards a new approach in urban transportation planning (Dimitriou, 1992; Banister, 2002; Gifford, 2003). The traditional view of transportation planning as an essential technical ability based on the notion of ''predict and provide'' no longer fits modern society for several reasons (Banister, 2002). First, the systems view to transport, which tries to achieve equilibrium of supply and demand, has been overtaken by the reality. Since the capacity of the network will never increase at the sufficient level needed to match the increase in demand, congestion is here to stay (Downs, 2004). Even if it were possible to invest in expanding infrastructure this is not seen as desirable, for financial and environmental reasons (Banister, 2002, 2005). Second, due to its inward-looking nature, traditional urban transportation planning is not able to explicitly address broader economic, social and spatial goals, which can be served or hampered by transportation developments (Gifford, 2003). Thus, with the supply of infrastructure structurally falling short of demand, there is no ''rational'' equilibrium in reach within the transport system. Instead the desired or acceptable equilibrium should be the outcome of a decision making process which engages the wider community. Finally, the increasing complexity of mobility patterns of persons and goods, and uncertainty about future location choice of households and firms makes predictive modeling of future mobility patterns increasingly more problematic (Banister, 2002; Gifford, 2003; Bertolini, 2007); traditional transportation models often do not account for dynamics in travel behavior and spatial patterns as a result of changes in the transport system, and those that do are often too complicated for decision makers not trained in the theory of these models (Gifford, 2003). These different concerns are not unique to urban transportation planning, but derive from a much broader debate about the role of planning in an increasingly more complex institutional context and market-oriented society.

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In light of the above-mentioned shortcomings of the conventional approach, different ingredients for a new form of transportation planning can be distinguished. In the first place, as was proposed by Banister (2002, p. 158), "planning should move away from trend-based extrapolation to richer social analysis based on linking transport to what people do and how firms operate". Planning should focus on the desired connectivity of places and improvements in the quality of life, rather than focusing on predicting future congestion levels (Banister, 2002). Furthermore, planning should be able to articulate and incorporate the different goals and opinions of all land-use and transport system stakeholders. To address these different planning opinions there is a need for a planning process which engages the wider social and economic community and provides a platform for the generation and discussion of different policy alternatives (Gifford, 2003; Groenendijk et al., 2003). This requires a new set of tools which would focus on the policy design of transport and land-use strategies in a multi-actor environment, as opposed to the relative abundance of tools for analyzing mobility problems at hand and evaluating alternative transport solutions (Bertolini et al., 2005; Hull, 2005). Finally, as Meyer and Miller (2001, p. ix) stress, "the institutional framework for decision making is one of the key characteristics influencing the effectiveness of planning". For planners this means that they have to present information to decision makers in an understandable and useful form and they have to assist decision makers to select interventions, establish priorities and develop planning strategies (Meyer and Miller, 2001; Ben Akiva and Bonsall, 2004). As is shown above, researchers (Dimitriou, 1992; Banister, 2002; Gifford, 2003) have stressed the need for a new approach to urban transportation planning and the aspects this new approach should take into account. However, the actual tools that help planners to implement such a new approach remain vague. The aim of this paper is to contribute to filling this gap, using the concept of accessibility as a planning framework. The way in which accessibility can be used as a practical planning tool and its benefits are discussed in the next section. The paper continues with an example from the Amsterdam Region to illustrate how such an approach could lead to alternative solutions. The paper concludes with some implications for planning and recommendations for further research.

2. Accessibility as a planning framework

Before exploring the possibilities to use accessibility as a planning framework, it is important to clarify what is meant by accessibility. According to Hansen's definition (1959) accessibility is conceived as "the potential for interaction". The potential for interaction is influenced by the qualities of the transport system (reflecting the travel time or the costs of reaching a destination) on the one hand and by the qualities of the land-use system (reflecting the qualities of potential destinations), on the other hand (Handy and Niemeier, 1997). Measured in this way, one is able to understand interdependences between transport and land-use development. The use of accessibility measures is widely adopted in scientific research (e.g. Ben Akiva and Lerman, 1985; Handy and Niemeier, 1997; Geurs and Ritsema van Eck, 2001; Bhat et al., 2000). However, the use of accessibility as a conceptual framework for planning is a far less-developed field of study (Handy and Niemeier, 1997). Its application in planning practice sets different requirements for the use of accessibility measures. More complex accessibility measures, such as utility-based measures, are perhaps more sophisticated from a theoretical point of view; however, they also require more analytical skills from the participants, making it harder to use such measures in practice (Handy and Clifton, 2001). It is important to strike the right balance between measures which are consistent with the accessibility needs of the actors involved on the one hand and what is easy to understand and to communicate by planners using the measure, on the other hand (Bertolini et al., 2005). Another advantage of using a simpler measure is the fact that it does not require much data to provide an analysis. For this reason, this paper uses a simple cumulative opportunities' measure. This measure counts the number of available spatially dispersed opportunities within a given distance of travel time.

Accessibility can be used as a planning framework to tackle some of the problems of conventional urban transportation planning discussed in the previous section. First, this definition of accessibility reflects the actual behavior and perceptions of households and firms. For them it is not the transport system itself that is important, but the fact that the transport system provides them with access to spatially and temporally dispersed opportunities. Accessibility is able to reflect these needs and when defined as the potential for interaction, "the concept of accessibility provides a basis for making trade-offs between land-use and transportation policies that has been sorely lacking" (Handy and Niemeier, 1997, p. 1176). It gives planners the opportunity to assess the effects changes in transport and land-use system have on the "potential for interaction," offered by different places in the urban network. Differences in accessibility conditions could be the subject of a planning debate and planning strategies could be developed to increase or lessen the variety of accessibility conditions within the region depending on the goals policymakers want to achieve. In this way, accessibility can be used as a policy design tool to generate alternative solutions (Groenendijk et al., 2003). Accessibility can also be related to broader economic, social and environmental goals, which are at the heart of present-day urban politics. The need to provide people with access to jobs, or to provide firms with access to skilled workers are just some examples of these issues. It opens the floor to a more normative approach of transportation planning involving different actors. For politicians, citizens and firms it might be easier to discuss the quality of access to education, services and markets than it is to discuss the inefficiencies of the transport system. These various aspects lead to the conclusion that accessibility as defined above has the potential to address some of the flaws of the traditional approach to urban transportation planning.

How could such a planning approach, aimed at shaping accessibility conditions, function? The next section illustrates such an approach using the Amsterdam Region as an example. The regional level is chosen, because the most persistent mobility problems manifest themselves on the level of the daily-urban-system. It is an exploratory example aimed at the use of accessibility as a planning tool. The basic assumptions of this approach relate directly to the drawbacks of traditional urban transportation planning highlighted in Section 1. The analysis is carried out with a simple cumulative opportunity accessibility measure, which makes it easy to communicate the result to planners and decision-makers and is therefore more useful in the policy design phase. Later on in the planning process more sophisticated measures could be used to evaluate the selected transport options. The analysis starts with regional planning goals set outside the transportation domain, in order to show how these "broader" goals can be linked to the concept of accessibility. In contrast with most other accessibility studies (Prud'homme and Lee, 1999; Cervero, 2001; Geurs and Ritsema van Eck, 2001; Halden, 2002) which take individuals or households as a starting point for the analysis, this study looks at accessibility from the perspective of economic actors and economic goals. These goals are chosen because achieving economic goals is still at the heart of most regional planning approaches. The second step of the accessibility analysis shows how the actual behavior of economic actors can be translated into accessibility measures, thus illustrating the development opportunities and threats found at specific places in the urban network. This is done by comparing the spatial patterns of distinctive economic activities with the accessibility conditions identified in step one of the research. The final step of the example illustrates how such an accessibility analysis could be used as a policy design tool to generate alternative solutions. Two current planning debates are discussed to exemplify this step.

The Amsterdam Region is taken as case (Fig. 1). The region has around 2 million inhabitants; Amsterdam is by far the largest city with over 700 000 inhabitants. The main working areas are situated in Amsterdam and around Schiphol Airport. Major new housing developments will take place in the new town of Almere.

3. Linking goals and behavior to accessibility

This study was carried out for the municipality of Amsterdam as a reflection on their current planning practice. The idea is to link economic goals to transport planning. The prime economic planning goal in the Amsterdam Region is to increase the diversity of the regional economy. For transportation planners, the aim related to this roughly defined economic planning goal could be to develop a planning strategy which supports the various accessibility needs of the different economic actors. The first step is to define the accessibility measures which relate to the actual behavior of economic actors. Depending on the scope and functional relationships they have, economic actors want access to different spatially dispersed resources at different geographical scales. To select the appropriate scales for measuring accessibility, a connection is made with different types of agglomeration economies. The latest insights point to the occurrence of a variety of agglomeration economies (Parr 2002; Phelps and Ozawa, 2003). The emerging picture is one where some economic activities still require physical proximity. Scott (1998) states for instance that, "firms whose transactions are small in

Fig. 1. Amsterdam region.

scale, irregular and unpredictable, and dependent on intensive face-to-face contact will probably find it to their advantage to be located in some sort of mutual proximity''. A second group of economic activities appears to be mainly dependent on functional linkages at the scale of the urban region; for example, the quality of access to labor and consumer markets, specialized services and knowledge institutes are important location conditions for economic activities and need to be considered at the regional level. A third group of economic activities operates within a fully relational and accessibility based ''network'' space, increasingly surpassing national borders. Obviously, there are many spatial activities which favor a combination of these different agglomeration economies, as they have functional linkages at different scales. Places in the urban network which provide a combination of accessibilities have proven to be hotspots for spatial development (Van der Knaap, 2002).

The analysis of the accessibility of places in the Amsterdam Region takes these different agglomeration economies as a starting point. The aim of the analysis is to compare places within the region, in turn assessing differences in the development potential of specific locations which could be related to the regional economic planning goals stated above. Accessibility was measured with the use of a cumulative opportunities measure. Table 1 presents the accessibility conditions which were measured at different geographical scales and the travel time thresholds that were used. The limitation of the cumulative opportunity measure is that all the opportunities within a certain threshold are weighed the same. A distance decay measure, which assigns diminishing influences to more distant opportunities (Geurs and Ritsema van Eck, 2001), could solve this problem, but is more difficult to interpret and therefore not chosen in this example.

Research in the Netherlands (Goudappel Coffeng & VHP, 1999) shows that people, who travel for business purposes, on average do not want to travel more than 30 min to their final destination after an international trip. As a corollary, globally accessible places in the Amsterdam Region are simply defined as those places which are within 30 min travel time by car from Schiphol Airport, one of the major hubs in Europe. Regional accessibility is measured by calculating the total number of inhabitants requiring access to and from a particular location within commonly accepted travel times, 30 min by car and 45 min by public transport for home-to-work travel and non-daily shopping trips, based on panel data from the national travel survey (Centraal Bureau voor Statistiek, 2007). The number of inhabitants within reach serves as a proxy for the quality of access to the labor and consumer markets. In future applications of accessibility it could be worthwhile to differentiate travel time thresholds, between different income groups and businesses. In measuring local accessibility, jobs instead of inhabitants were chosen, as the number of jobs accessible within 15 min of travel time illustrates the potential of economic actors to engage in face-to-face contacts with other economic actors. In the Netherlands, little is known about the time people are willing to travel with slow modes for frequent face-to-face interaction. The threshold of 15 min was derived from research on the use of slow modes for daily shopping trip and access to public transport (Centraal Bureau voor Statistiek, 2007). This is still a rather rough attempt to measure accessibility at these different levels, but it already provides more differentiation in accessibility requirements than most other studies, which only seem to focus on measuring accessibility at one geographical scale (see e.g. Prud'homme and Lee, 1999; Geurs and Ritsema van Eck, 2001; Halden, 2002). In addition, it should be mentioned that these measures are used to aid the policy design phase, hence they do not have to cover the whole complexity of economic actor's behavior, but serve merely as a tool to make different policies debatable.

Table 1
Different layers of accessibility

Geographical scale	Access to	Travel time (min)	Transport mode
International	International airport	30	Car
Regional	Inhabitants	30 45	Car Public transport
Local	Jobs	15	Car Bicycle

Using the GENMOD transportation model[1] of the municipality of Amsterdam the global, regional and local accessibility conditions of each location in the Amsterdam Region could be calculated. This was done through combining travel times calculated by the transportation model with spatial data (e.g. jobs, inhabitants located in an area) for each zone in the transportation model. Afterwards the accessibility conditions at different scales were combined in one map (see Fig. 2), enabling an assessment of the combination of the accessibility qualities for each place in the urban network. Fig. 3a shows the differences within the city of Amsterdam in more detail.

Table 2 shows the different combinations of accessibility conditions for each location. For each geographical layer the locations were divided in three classes (high (+),

[1]GENMOD is a static multimodal transportation model used by the municipality of Amsterdam, to model future mobility demand in the region, and assess the implications of a combination of different land-use and transport policy measures on this demand. Data derive from household research and mobility counts. The model is basically a traditional four-step model, which as a by-product can be used for calculating accessibility, since the model calculates travel times, between 933 zones within the Amsterdam region. The model includes for Dutch standards extensive and accurate car and public transportation networks. The public transport system in the model includes the (inter)national and regional train networks, the metro system in Amsterdam and the most important regional bus connections.

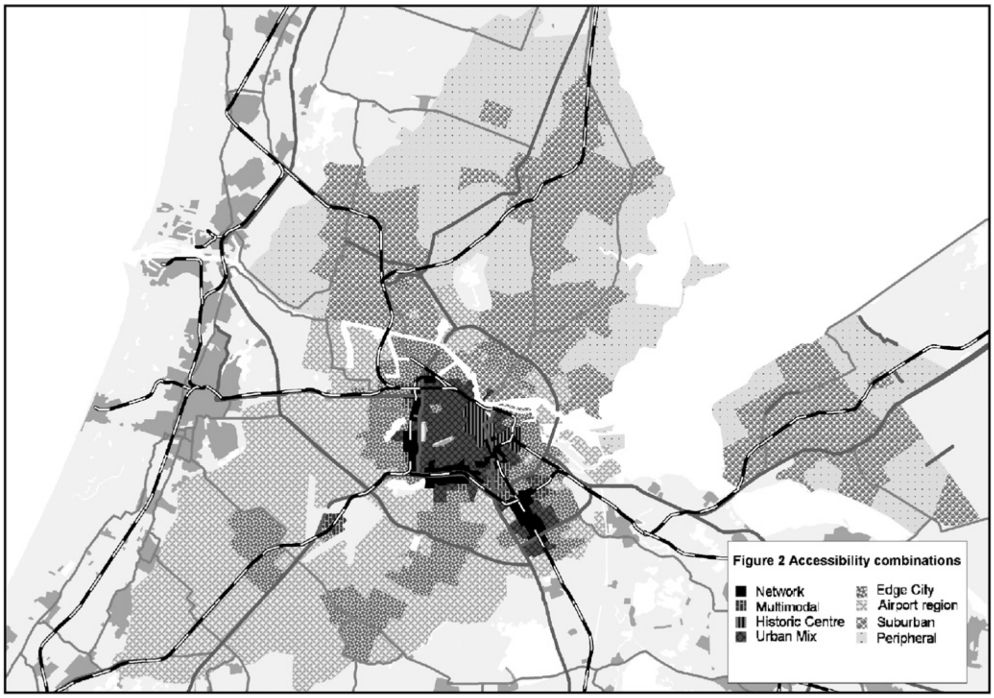

Fig. 2. Accessibility combinations.

medium (0) and low accessibility (−)). Table 1 shows which type of accessibility was calculated for each layer. An ordinal scale based on natural breaks in accessibility scores was used to signal the most important relative differences in accessibility measures. A simple classification was deliberately used in order for the typology to be practical in the policy-making process. The accessibility combinations provide planners with a basis for analyzing the position of locations in the urban network, given their connectivity on different geographical scales. The accessibility combinations were labeled with different names reflecting the position in the urban network.

A "network" location has optimal accessibility at every level, whereas a peripheral location is least accessible on all scales. The other location types are somewhere in between and specialize in certain accessibility conditions. The "network" locations are situated around the western and southern part of Amsterdam's circular beltway and radial motorways, adjoined by regional public transportation lines. This strategic position does not only provide these locations with excellent multimodal regional accessibility, but also with comparatively good local accessibility, as the dense and mixed urban core is still within reach. The historic center of Amsterdam combines excellent accessibility by public transportation, due to the presence of the Central Station, with very good local accessibility, due to a great variety of activities within 15 min by bicycle. However, the accessibility by car is rather limited. Between the "network" locations and the historic center lies what has been labeled the "urban mix" locations. This is an area, which is not well connected on higher geographical scales but has excellent local accessibility, due to high densities and a finely woven urban infrastructure. Local accessibility in these locations can be up to seven times higher than in suburban locations. Multimodal places have excellent regional accessibility by car and public transport, but lack good local accessibility. "Edge Cities" are suburban areas and parts of the urban periphery positioned between the center of Amsterdam and Schiphol Airport. They can be characterized by excellent international accessibility and regional accessibility by car. The "airport region" consists of highly accessible suburban areas, within 30 min travel time of the airport. "Suburban" and "peripheral" locations are scattered in the northern and eastern parts of the region. For these areas, the number of inhabitants within 30 min by car is considerably lower compared to the locations with the highest accessibility by car. These different location types show that the variety in accessibility conditions within a region can be remarkable. Fig. 2 is not a static picture. Changes in land use and the transport system could result in changes in the accessibility conditions. Fig. 3a and b illustrate the shift in accessibility conditions in the center of Amsterdam due to the completion of the new north–south metro-line presently under development. This intervention results in a drastic switch in the typology of parts of the inner-city urban mix locations, becoming a network location well connected on a regional level. On the northern IJ-banks a new multimodal zone arises. Demonstrating the dynamics in accessibility conditions resulting from changes in the transport systems will offer planners the opportunity to assess the spatial impacts of their actions. What these impacts could be is explored in the next section.

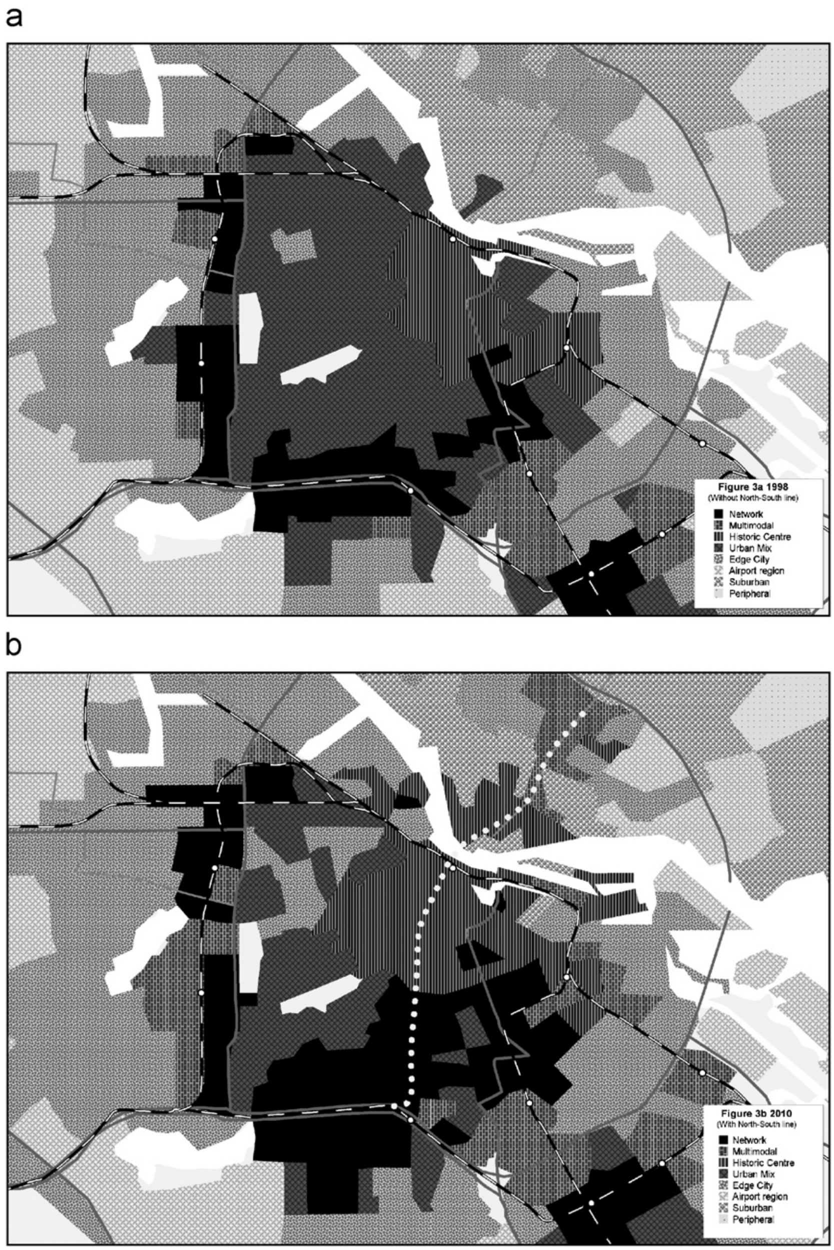

Fig. 3. (a) Accessibility combinations in 1998 and (b) accessibility combinations in 2010.

Table 2
Different combinations of accessibility

Location type	International	Regional		Local
		Car	Public transport	
Network	+	+	+	+
Multimodal	+	+	+	0
Historic center	0	–	+	+
Urban mix	0	0	0	+
Edge city	+	+	0	0
Airport region	+	+	–	–
Suburban	–	0	0	0
Peripheral	–	–	–	–

4. Development potential and accessibility

In order to judge if these different combinations of accessibility are an adequate unit of analysis which can capture the increasing spatial differentiation in the Amsterdam Region, they were compared to the spatial pattern of different economic activities. The spatial pattern of 30 distinctive activities was mapped using spatial data from the Department for Research and Statistics Amsterdam (Bureau Onderzoek en Statistiek, 2000). These patterns are compared in a qualitative way with the combinations of accessibility conditions defined in Section 3. The results, as presented in Table 3, demonstrate that the best locally and regionally accessible locations, such as "network", "multimodal", "historic center", and "urban", also show the highest employment densities, suggesting a positive correlation between accessibility and economic vitality.

Looking at Table 3 in comparison with Fig. 3, the historic center and urban locations seem to live up to the theoretical expectations. The historic center shows a mixture of small and large firms; some have a regional orientation while others choose the center, because of its superb local accessibility. The urban locations are characterized by a concentration of small firms, with a low share of commuters. This includes an important share of home-based start-ups. Especially industries associated with high dependency on face-to-face contact, such as cultural industries, media industries and small size ICT-firms (Florida, 2002), appear to prefer the urban environment of the historic center and urban mix accessibility profiles, as documented in Fig. 4. Given the diversity in accessibility conditions offered by a network location, one would expect a mix of activities at these locations. However, this is not the case. The excellent combination of accessibility conditions mainly attracts large regionally oriented firms (see Fig. 5), especially financial and business services. Competition between firms for these best accessible locations could result in only the stronger and larger firms acquiring these locations. The spatial pattern seems to confirm this assumption. However, it could also be argued that the way local accessibility is defined in this research does not fully capture the differences in development potential between the network locations and the urban locations in an adequate way. Large firms, with a high share of commuters, also dominate the multimodal locations. The edge city locations show a concentration of more car-dependent activities, such as manufacturing activities, transport and distribution services. The international accessibility appears to be an important asset of the Amsterdam Region,

Table 3
Accessibility conditions and spatial differentiation

Location type	Employment density (jobs/ha)	Firm size		Firm orientation	Firm linkages
		No. of large firms >50 employees	No. of small firms <50 employees	High share of commuters >40%	High share of firms dependent on face-to-face contact
Network	+ +	+	0	+	0
Multimodal	+	+	–	+	0
Historic center	+ +	+	+	0	+
Urban	+	–	+	–	+
Edge city	0	0	–	0	–
Airport region	0	–	–	0	–
Suburban	–	–	–	0	–
Peripheral	–	–	–	0	–

+ +: very high, +: high, 0: average, –: low.

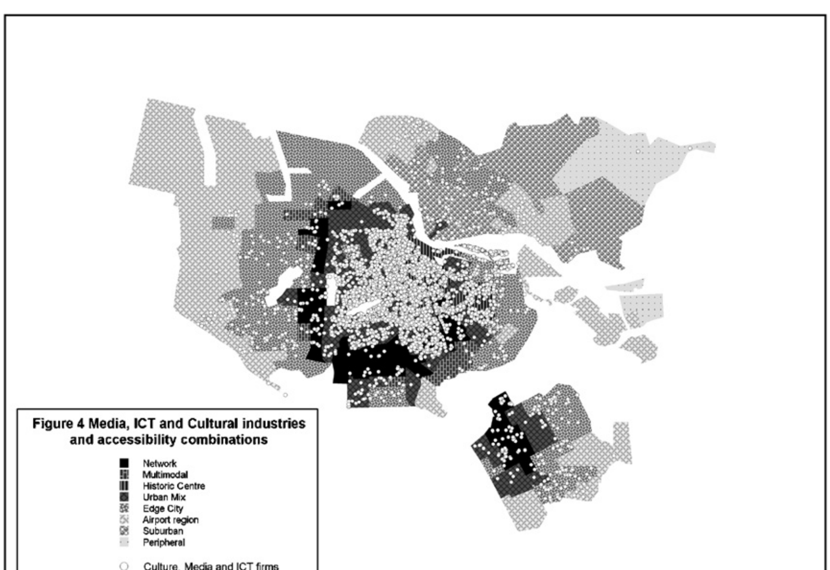

Fig. 4. Media, ICT, and cultural industries and accessibility conditions.

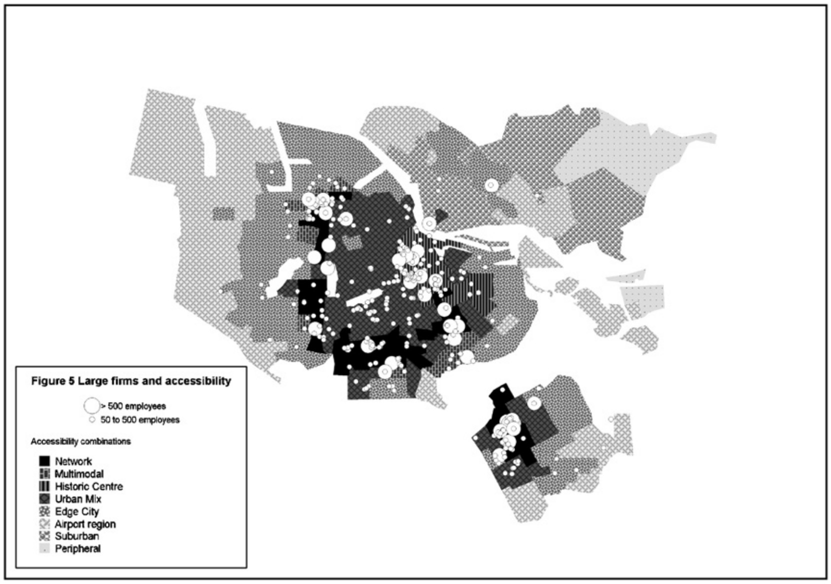

Fig. 5. Large firms and accessibility conditions.

with 75% of all jobs located within 30 min travel by car from the airport.

Due to different reasons, all kinds of inconsistencies exist between the expected spatial activities and the observed spatial pattern. Planners could, for example, block or stimulate development at certain locations. In the Amsterdam Region some of the best accessible locations by car do not appear to have much economic activity, due to planning regulations preventing economic development. The second aspect causing dissimilarities in accessibility conditions and spatial patterns is the slow response of actors to changes in conditions. The orbital motorway in Amsterdam was completed in 1992, but the spatial transformations influenced by this event are still going on today. The final aspect causing dissimilarities in accessibility conditions and spatial patterns deals with the approach itself. This study is a rather crude approach in identifying important accessibility conditions. More research is needed to pinpoint which accessibility conditions are crucial to different types of economic activities. However, it is important to emphasize that the purpose of this analysis is to identify policies and not causality. The overall picture seems to suggest that accessibility analysis can lead to a fruitful discussion about the development potential of places in the urban network as will be shown in the next paragraph.

5. Accessibility—a new way of looking at strategic planning issues?

It is important that planners realize that given their specific place within the transport and land-use system, locations offer a different potential for interactions and thus have a different development potential. Analyzing shifts in accessibility conditions as a result of changes in the transport and land-use system can help planners to understand how the development potential of locations can be influenced by interventions in the transport and land-use system. This could result in more effective planning strategies being discussed, integrating transport and land-use planning and linking transport planning to actor behavior and broader community goals. Two current planning strategies in the Amsterdam Region are discussed to illustrate this point. It is especially interesting to see if the use of accessibility as a planning tool could lead to different conclusions about the appropriate intervention.

5.1. Strategy 1: separate through—and destination traffic within the regional road system

To limit the disruption of interregional traffic by regional congestion, transportation planners in the Amsterdam Region propose to make a distinction in the regional motorway system, specifically for roads designed for through traffic (e.g. high speed, limited number of access ramps) and for roads designed for intraregional traffic (e.g. high capacity, moderate speed, and many access ramps). The orbital motorway A10 (see Fig. 1) around the city center would fall into the latter category, while the emerging second tangential motorway A9 on the south side of the region falls into the first category. This strategy focuses only on increasing the network efficiency of the road network. What are the implications of such a strategy for the accessibility of locations in the Amsterdam Region? Special attention is paid to the accessibility of the emerging urban centers along the orbital motorway. According to the new structure plan of the municipality of Amsterdam, these areas should attract business firms with an international orientation (DRO, 2003). Reducing rush-hour congestion may have a positive effect on the accessibility of these locations at that particular time of the day; however, apart from the rush hour, the reduction of travel speed will have a negative impact on the spatial reach of these locations. Compared with a location that is situated at one of the scarce turn offs of the new interregional expressway system, the locations alongside the orbital motorway are even worse off. In the end, this could result in the re-location of spatial activities from along the beltway to locations at turn-offs of the new interregional expressway system. A trend of firms moving away from the congested beltway to the newer tangential highway is already visible and the policy in discussion would strengthen this effect. Thus, a strategy to relieve congestion problems may have unwanted accessibility impacts on spatial conditions. Such spatial distributive effects are already widely discussed in the scientific community (Giuliano, 2004; Janelle, 2004; Meyer and Miller, 2001) also for the Amsterdam region (Bertolini, 2007), but are hardly being considered in the policy arena. Accessibility could provide a framework for doing this. In this example, a better option could be to change the spatial strategy and develop new centers along the interregional expressway system or to change the transportation strategy in a way it will reinforce the development of current centers.

5.2. Strategy 2: increasing spatial and economic development potential in the new town of Almere

Almere is a large new town (170 000 inhabitants) within 30 km of Amsterdam (see Fig. 1). Planning schemes, aimed at increasing the total population of Almere to 300 000 inhabitants or more, are being developed by the national government in cooperation with regional planning actors. However, the current job growth in Almere lags behind the growth in population, resulting in vast flows of commuters to working areas in and around Amsterdam, causing severe congestion. To address this problem an increase in the number of jobs in Almere is one of the important secondary goals of the planning scheme. Increasing capacity of existing road and rail connections between Amsterdam and Almere is one of the proposed suggestions aiming to make the new town more attractive for economic activities. This would not only result in a better internal balance of jobs and labor in Almere but also contribute to more bi-directional and thus efficient use of infrastructure between Almere and Amsterdam. Fig. 2 shows that at the moment the accessibility conditions in Almere are very weak in comparison to other parts of the region. Following the hypothesis that increased access to opportunities favors new economic development, one could wonder if the expansion of road and rail capacity, between Almere and Amsterdam is the best solution. Notwithstanding the positive effects of cutting down congestion levels, expanding existing infrastructure will not significantly increase the potential accessibility of Almere. Investing in new infrastructure connecting Almere to other neighboring regions to which it is currently not well connected, could have a much greater effect on the total number of available opportunities. Furthermore, it is important to understand that accessibility works both ways, as also Amsterdam would benefit from improving accessibility between the two cities. This could result in existing differences in accessibility remaining more or less the same. A better solution could be to increase the "network" position of Almere by building new infrastructure connection to other parts of the region rather than just to Amsterdam and thus improving both its absolute and relative accessibility. In the end such a strategy aimed at increasing the economic development potential of Almere could even relieve congestion levels, between Almere and Amsterdam and thus increase overall network efficiency.

What does the discussion of these planning strategies tell us? First it shows that looking at the impacts of transport development on the development potential of a given location generates new dilemmas and may lead to alternative strategies. The interventions would not aim at increasing network efficiency, but are aimed at increasing the number of opportunities available within a certain time budget. This would result in two types of strategies. First, interventions in the transport system aimed at creating the right accessibility conditions at locations where particular spatial development is favored. Second, signaling opportunities for spatial development at places in the urban network that already provide favorable accessibility conditions. This implies that planning for accessibility does not only refer to planning for shorter travel distances as it is often interpreted within transportation planning, but also to planning for social and economic interaction.

The accessibility maps provide relatively easy understandable information regarding the possible impacts of policies; thus they help structure discussion around dilemmas and solutions. In a discussion with local practitioners about the outcomes of the above analysis, these points were indeed recognized. They were positive about the approach, but had also questions about why certain accessibility measures were chosen and how they were measured. This might point at the need to discuss and agree with the different stakeholders on the accessibility measures as part of the planning process.

6. Conclusion

Accessibility provides an interesting conceptual framework that can help planners to integrate transport and land-use policies and may lead to quite different policies to be considered. Planning for accessibility signals a shift from a planning which focuses on transportation network efficiency to a planning which focuses on the "network" position and development potential of places in the urban network. The key-question for policy design would be: How can we contribute to the development of places in the urban region that offers people and firms the means to reach *more* opportunities with *less* mobility?

Of course, the type of means and opportunities, which are important to have access to, differ between economic industries and segments of the population. Furthermore, the access to opportunities under consideration could be the outcome of different economic, social or environmental goals. This asks for a differentiated approach to analyzing accessibility, which maps access to different types of opportunities for different modes of transport on different geographical scales. A first qualitative analysis for the Amsterdam region suggests that locations with specific accessibility combinations also show particular land-use patterns. More quantitative research is needed to test this hypothesis.

Planning for accessibility has also implications for the types of strategies to consider. First, interventions in the transport system aimed at creating the right accessibility conditions at locations where particular spatial development is favored. Second, signaling opportunities for spatial development at places in the urban network that already provide favorable accessibility conditions. Linking transport interventions to favored changes in development potential raises all kinds of broader policy design questions. Is it, for example, better to aim for a homogeneous quality of accessibility for each place or is a variety of qualities needed? It seems obvious from this study that some kind of differentiation in accessibility conditions is needed (and inevitable). The question should then be: how far should this differentiation go, and is it possible to design integrated land use and transport strategies to accomplish it?

An obvious (and an already planned) next step in this research is to perform an accessibility analysis together with the regional stakeholders. This requires the use of accessibility measures that on the one hand have to be theoretically sound in the sense that they reflect the social and economic behavior of the community and, on the other hand, they have to be easy to use for planners in a policy environment (Handy and Niemeier, 1997; Bertolini et al., 2005). The ongoing focus on increasingly more complex accessibility measures may not seem very practical from this perspective. A collaborative accessibility analysis could also reveal more information about the potential for translating broader goals into transportation planning issues and which policy design questions could be addressed. The need to engage stakeholders to link accessibility planning to broader objectives is something which is also stressed as a crucial factor for success by the Department of Transport in the United Kingdom (DHC & University of Westminster, 2004).

In the end, accessibility analyses could turn out to be an important tool for urban transportation planners, aimed at raising policy design questions and generating alternative solutions in the earlier phases of the planning process. Such interventions will fill the gap in their existing toolbox, which at present mainly consist of system efficiency indicators and ex-ante evaluations of transport solutions with the use of sophisticated models.

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