urban structure and transport approaches in sweden

Inga-Maj Eriksson looks at recent experience of – and methodological developments in – urban transport planning in Sweden

In Sweden, as in many other countries, there is considerable interest in how urban and spatial planning can contribute to reducing the need for car use in cities. An overview report of Swedish and international research on the relationship between urban structures and transport-related impacts on climate change[1] published in 2012 by the Royal Institute of Technology (KTH) in Stockholm concluded that if car use in cities is to be reduced, accessibility to various functions and destinations in the built environment by walking, cycling and public transport must be better than that offered by the car. And in reducing car use, not only is the physical system – the networks and the configuration of the built environment – important, but various policy instruments will also need to be used to guide users in balancing transportation choices.

The Swedish Transport Administration (the government agency responsible for the long-term planning of the transport system) pays considerable attention to these issues, and the significant knowledge base of its urban planners is evident in their interactions with municipal and regional agencies. And 'Strategic Choice of Measures'[2] – a new methodology used within the Swedish transport sector and in collaborations with other stakeholders in society – is based on a wide range of approaches to problem solving, in which urban planning may be included within solutions to transport and traffic issues.

This article highlights selected Swedish research results and experience, as well as methodological developments in urban transport planning, including those related to issues of urban density, mixed urban functions and regional structures to oversee society's transportation patterns, with a particular focus on passenger transport.

Increasing, and using, knowledge

Urban structures cannot be modified quickly, and changes, both sought and unwanted, take place over a long period of time, with land use affecting transportation and transportation affecting land use. Efficient public transport requires clear and efficient design and operation of the infrastructure network, a condition that – without heavy investment in tunnelling – is difficult to achieve in an existing urban structure developed without regard to public transport.

Many small everyday decisions in urban planning are of long-term importance in adapting land uses to help improve the effectiveness of public transport and in better facilitating walking and cycling. Spatial planning decisions affecting urban structures and their uses have a vital role in promoting sustainable development and liveable cities. A study carried out by Swedish consultants WSP[3] has suggested that urban planning accounts for more than 10% of the measures and actions required to reduce travel needs, change travel patterns, and influence travel mode choice. Consequently, an overarching system of transport demand management is urgently needed if the Swedish 2030 objectives for carbon dioxide emission reductions are to be achieved.[3]

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Public transport in Stockholm

Measures to adapt cities to public transport and related initiatives such as minimising the amount of space available for car traffic and parking are everyday issues for urban planners. A standard Swedish text on the subject[4] underlines not only the significance of policy measures but also the fundamental importance of formulating effective, easy-to-communicate, local goals in conformance with national and European policies. The example of Karlstad is often cited for its effective local policy goal, set in 1995 in response to air quality problems, aimed at a reducing car traffic by at least 30% by 1999 (however, at the of 1999 the reduction was measured at only 20%).

This car traffic reduction goal became a driving force behind many other measures taken within the city's traffic system, and strategies in line with this policy goal still remain in effect Karlstad today – for example, a bus link has been designated to become a 'bus rapid transit' (BRT) line. These types of bus or tram lines need to be associated with so called 'transit-oriented development' (TOD), providing both a sufficient population (both daytime and night-time) and the uses and functions necessary to support a frequent public transport service, balanced and efficient over time and direction. The example of Karlstad has been studied by Stojanovski[5], who undertook density analyses related to public transport.

And looking further afield, Switzerland works hard to link spatial plans and related goals at national, regional and local levels, and its planning system is becoming more co-ordinated after evaluation and advice from international experts.[6]

One source considered to by the KTH overview report[1] is a survey carried out for the regional planning office of Stockholm County Council[7] on the relationship between urban quality and apartment prices. The study – conducted in collaboration with the municipalities of Stockholm, Nacka, Haninge and Lidingö – investigated people's willingness to pay for various urban and locational qualities. Extensive analysis identified eight parameters as significant (with a 90% certainty) in explaining the variation in the price of apartments, seven of which are connected to residential-environment characteristics, with six of these seven concerning accessibility (or proximity). Socio-economic indices on income and education levels in the residential area complete the list of parameters. The seven urban qualities identified are:

- proximity to the city centre;
- proximity to a station (metro, commuter train, tram);
- access to the walking/street network;
- access to 'urban' activities (shops, restaurants, culture, schools, etc.);
- access to parks;
- proximity to areas of water/water environments; and
- block form.

Swedish municipalities often ask for simple rules for creating urban quality. A practical question raised

by many municipalities relates to the level of urban density (population density and building density) needed to support public transport lines running to a 10-minute – or better – service frequency. The recently published KTH report *Bus Rapid Transit (BRT) and Transit-Oriented Development (TOD)*[5] covers the Swedish and international contexts, offers examples, and investigates requirements for increasing service frequency by modifying urban density; but as prerequisites differ in different municipalities particular knowledge also needs to be developed for each town and city.

Understanding systems and improving practice

Environmentally adapted housing projects are certainly of merit in meeting carbon dioxide reduction goals, but they do not in themselves constitute a recipe for transforming towns, cities and regions in terms of reduced energy consumption and transportation demands.

Cities and transport systems and the interactions between the two are very complex. Public transport systems need to be managed both to take into account people's transport needs and to encourage people to choose to use the transport on offer. Travel guidance information systems and pricing systems are important tools in this context, and can also serve an educational function.

Urbanisation is a significant phenomenon in today's Sweden, offering opportunities to influence people's travel behaviour – for example by concentrating the population around railway stations or other public transport services. On the other hand, municipalities also need to consider the capacity constraints in the railway and road systems, and the interlinking effects of measures taken to influence travel modes, as well as any possible drawbacks. The effects of changes in one part of the transport system (and of changes to nearby land uses) on the system as a whole need to be carefully considered and analysed.

The creation of compact, attractive, low-energy and cost-effective urban environments is a topic of great relevance in Sweden, and municipalities, national administrations, national government, and private developers alike are seeking to increase their understanding of ways forward.

Urban densification is occurring, usually through new residential housing in central and attractive areas, but other activities, such as workplaces and shopping facilities, still sprawl in the outskirts. The transformation of existing towns and cities from areas of functional separation to multi-functional urban places is clearly a difficult process; but transportation and traffic planning policies at the local level have a very important part to play. In Sweden the concept of 'Traffic Strategies'[8] has been developed and applied to provide a foundation for taking transport issues into account within a process of comprehensive urban spatial planning.

Today's successful new urban sustainable developments are often showcased to international visitors, but these are rather isolated cases rather than a reflection of the wider picture. We know that sustainability strategies need to be long term to produce the desired outcomes, and experience from cities such as Freiburg in Germany and Portland, Oregon, in the USA, show that comprehensive transformation processes take time to establish and need stable strategies over time.

Accessibility in urban areas is likely to fall within the area of the Swedish national objective of a 'good built environment', but, although the Swedish Transport Administration has issued information on the importance of measuring accessibility,[9] a specific indicator and way to measure accessibility connected to this objective has not yet been generally applied. Many municipalities in Sweden and in other parts of the world would be interested in a system of benchmarking covering the proportion of inhabitants of towns and cities for whom the car is not necessary for access to basic services.

The European Commission has sought to support cities dealing with the problems of unsustainable development and the lack of instruments to implement carbon dioxide emission reduction policies – for example by producing action plans on urban mobility. It has set out its expectations of member states and their cities in EU transport policy,[10] which advocates the alignment of mobility plans with integrated urban development plans. But are we moving in the right direction?

Density and accessibility

The essential condition for reducing the need for car transport in cities is that accessibility (i.e. nearness and ease of access) to various functions and destinations should be better (faster/perceived as easier) by walking, cycling and public transport than by the car. This commonly requires a sufficiently large population and a built environment that is suitable for public transport – usually associated with a relatively dense and functionally mixed environment. However, good accessibility does not automatically correlate with density, since travel behaviour depends on a wide variety of factors, including transport and land use policy decisions, socio-economic factors, etc.

Accessibility to local services and other destination points is important for both people and companies, so meaningful and understandable local goals and targets can be set for accessibility, while indicators can be used to describe it in terms of distance or time. The desired accessibility within a town or city can then be reached with a variety of building and population densities. It is important to bear in mind that higher building densities can also have negative consequences, such as a lack of

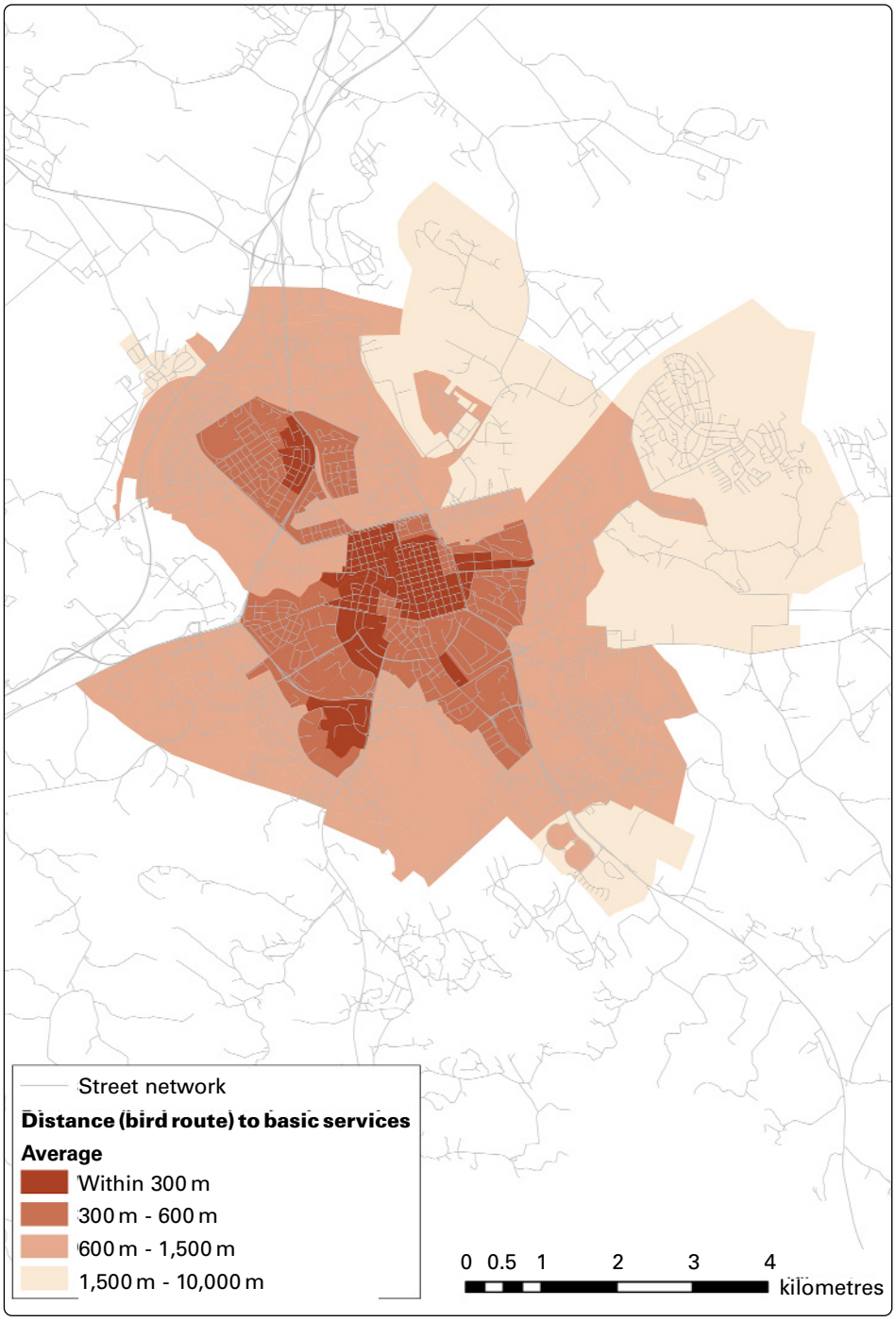

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Fig. 1 An example of an accessibility map

green space, so urban plans should be based on short- and long-term analyses covering:

- the density sufficient to support the desired urban qualities and services;
- the density sufficient to support the desired bus, tram, light rail or metro services;
- the consequences for transport modal split and induced travel;
- the consequences for energy use and carbon dioxide emissions; and
- the consequences for traffic noise levels and air quality.

In Swedish national transport policy there is a greater focus on transport connections between and within regions for access to work, studies, etc.

(through an 'enlargement of regions' approach) than there is on local access to basic target points, such as services. In a national and regional context, reduced traffic congestion in the biggest cities (related in large part to providing shorter travel times for industry and business, and for travel to work) is an often expressed goal. However, it is well known that the easier and faster people can travel, the more journeys they will tend to make, and the longer journeys will tend to be.

Policies for access to target points within urban areas are seldom discussed in the national and regional context, while there is a greater focus on issues such closures to schools, garages, grocery stores and in the mail service in very remote areas. Little attention is being paid at a national level to the continuing general reduction in walking distance accessibility to grocery stores within urban areas – a most important service for a growing number of inhabitants who do not have access to a car or do not want to depend on the car for food shopping.[11]

A recent Swedish research report[12] has touched upon the issue of the conflict that sometimes arises between facilitating the development of an efficient transport system for regional and inter-regional accessibility on one hand and the provision of local access to basic services on the other: improvements in regional accessibility (through new regional transport provision or shopping facilities etc.) may create physical barriers for local accessibility and may also reduce the level of local of services in residential areas.

'Locations near public transport and attractive urban environments (with good accessibility) have become more and more important. And more people would like to be able to answer the question: Can I live here without using a car for good access to basic services?'

To counteract such trends, the Swedish Transport Administration encourages the use of accessibility mapping (see Fig. 1), and, in collaboration with the Swedish Energy Agency, has tested and published possible indicators and measurement methods for accessibility to basic target points in urban areas.[13]

Accessibility planning was established at fairly local level several years ago in the UK, as a means of safeguarding the public's access to basic services, and the UK system has been subject of a PhD thesis by a student from Sweden studying in UK.[14] Currently, Swedish municipalities' shop location policies are not usually clear in terms of accessibility, and, following the UK example, they should formulate policy and ambitions for good accessibility to basic services, preferably expressed in terms of distances or times to key target points. A maximum of 15 minutes to basic service points, preferably by walking, cycling or public transport, is often cited as a possible standard.

The value of long-term accessibility information

Long-term information on accessibility is vital to important decision-making for a vast array of people and organisations. People need long-term information on future accessibility when deciding on taking a new job, undertaking a period of study, or moving their place of residence. Companies need long-term information on future accessibility before deciding on the location of a new business venture, offices, shops, etc. Locations near public transport and attractive urban environments (with good accessibility) have become more and more important. And more people would like to be able to answer the question: 'Can I live here without using a car for good access to basic services?'

Any whole-city transformation needs to be holistic, long term and target oriented, covering both existing and new physical systems and structures. For example, a public transport link planned as a tram or light rail in the long term could, in the short term, be used as a bus line. Similarly, buildings could more often be planned and constructed so that their use and content could change over time.

Information on the development of train, metro and tram lines is usually readily accessible and easy to understand. These travel modes are very efficient, but their attractiveness can see them quickly become congested and thus difficult to use. For this reason, some cities encourage people not to use the metro for very short journeys. But there is potential to make greater use of the capacity of bus systems – for example by providing better overviews of the bus network and better information to inform people's choices of travel mode and travel times.

In central urban areas, public transport services – and hence information on timetables and routes – are usually stable over time, but services for commuters from, for example, remote parts of a region may not be so stable, and so long-term information on services may not be available.

Strategic Choice of Measures – solving transport and land use problems

Collaboration between local municipalities and regional bodies, among others, is a common feature of the day-to-day operations of those working within the transport sector in Sweden. Towns and cities or

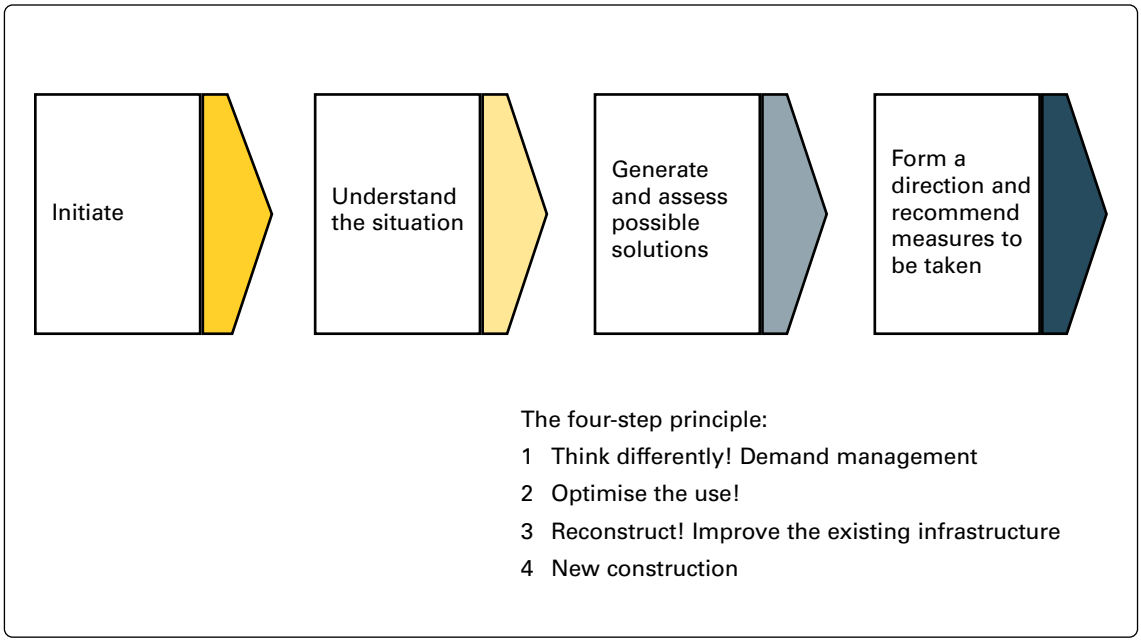

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Fig. 2 Strategic Choice of Measures – methodology

city-regions provide the major focus for most of the work undertaken on transport issues. Traditionally, in addition to its maintenance role, the Swedish Transport Administration and its forerunner bodies have focused on the development of road and rail. But most of today's problems now need to be handled within the existing transport system (including aviation and water).

The Strategic Choice of Measures[2] methodology is now recommended by the Swedish Transport Administration as the basis for deciding on proposed transport measures (either in drawing up principles or in implementing concrete measures) – see Fig. 2. Studies undertaken within the Strategic Choice of Measures approach should ensure that all transport modes are considered, as well as all types of policy measure, including demand management.

It is recommended that options should be considered under the so-called 'four-step principle' – under which measures are analysed within a hierarchy of desirability, with actions within 'earlier' steps – if suitable – to be adopted before those within subsequent, more expensive steps (particularly step 4):

- Step 1: Measures which affect the demand for transport and the choice of transport modes.
- Step 2: Measures that make more efficient use of the existing transport infrastructure network.
- Step 3: Infrastructure improvement measures and minor construction.
- Step 4: New construction and major reconstruction measures.

The town of Kivik in Skåne (Southern Sweden) provides a recent example of where a Strategic Choice of Measures study identified a smart solution once it was understood that the bypass proposed in the town's comprehensive land use plan would not in fact solve its traffic problems. Through collaboration between the various stakeholders involved, including the municipality, a combination of minor traffic management measures provided a solution without the likely significant negative effects of a bypass (such as increased urban sprawl), which was removed from the municipality's plan.

Support for the transport sector from active urban planning

One of the main problems for the transport system in Sweden, as in many other countries, is that it is a big consumer of energy and a big producer of carbon dioxide and other harmful emissions. To counter or mitigate global climate change, large reductions in carbon dioxide emissions and the use of fossil fuels are required. Urban/land use planning clearly has a role to play here, and planning for urban development must help to reduce development activities negatively influencing emissions and energy use.

In Sweden's towns and smaller cities, congestion problems are usually related in large part to car use by their own inhabitants and/or generated by the town or city's own commercial activities, and so can often be solved by the municipality acting together with users within a town or a city. In the

larger metropolitan regions, commuter trips significantly contribute to congestion and emission problems, requiring each municipality within a region to co-ordinate their planning and policies so as to avoid exacerbating the problems in the central areas.

The Swedish Transport Administration expects municipalities to improve the way that they consider the traffic and transport consequences of housing options and residential densities. And the whole range of municipal strategies, actions and policies, as well as formal plans, must contribute to attempts to increase the modal share of walking, cycling and public transport trips. Goods logistics must also be taken into account.

The contribution of urban development to meeting desired transport outcomes must be monitored in a way that is easily understandable by professionals, politicians, businesses, and the general public alike. There are already tools for assessing and auditing how municipalities manage these issues, including 'Trafikalstringsverktyg', a tool for assessing and considering the traffic impacts of urban planning, available from the Swedish Transport Administration's website.[15] And new auditing tools have been developed within the EU 'EcoMobility SHIFT' research project,[16] in which Trivector Traffic from Sweden was one of the partners (see, for example, the 'City Profile Factors' tool within the EcoMobility SHIFT system).

Conclusions

Accessibility-based urban planning is central to the development of attractive, sustainable and liveable towns and cities. Accessibility analysis highlights the basic needs of all of society, not only in relation to planning decisions but also as a base for private and public decision-making on locational issues. Stronger accessibility-based planning needs to contain a combination of formal spatial/physical urban plans on the one hand and target-oriented policies and strategies on the other. Today, Sweden is only beginning to integrate accessibility to services into urban planning and policies, and there is still a need to learn from best practice elsewhere.

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