Towards Sustainable Urban Transportation

Environmental Dimension

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EXTRACT
I. The challenges of urban transportation

1.1 Trends and features

In all modern societies, for a number of reasons, people tend to increase their mobility. The functioning of a modern society puts heavy demands on the ability of individuals to be mobile. Economic, political and social factors affect both the total volume of passenger transportation and its different modes. The worldwide increase in urban mobility since 1960 has been the direct result of increased affluence and the consequent improved access to private motor vehicles, as well as population growth. Cameron and his team (2003, 2004) investigated the cause of increased urban traffic in world cities between 1960 and 1990, and concluded that population growth, urban sprawl, increased car ownership, and decreased vehicle occupancy are the key factors causing the steep rise in vehicle kilometres (vkm).

In a broader sense, the increase in mobility can be illustrated by five main tendencies:

- longer distances covered in each trip;
- rapid growth of travel by car;
- increased importance of leisure-time activities;
- spatially more complex travel patterns;
- diffusion of mobility from a few groups to the broad majority of the population.

Mobility development in Sweden may be traced back to the beginning of the last century. Around 1900, the average distance travelled per person per day was roughly one kilometre. In the 1950s, mobility grew fast and increased to an average of more than ten kilometres a day. At the end of the last century, in the population as a whole it amounted to 35 kilometres per individual. Therefore over the course of the century people’s ability to cover distances and interact with other places has increased by about 35 times (Tengstrom, Thynell, 1997).

Cities and towns act as engines for progress, often driving much of our cultural, intellectual, educational and technological achievements and innovations. However, today’s trend of urban development results in increased consumption of energy, resources, transport and land, thereby raising greenhouse gas emis-
sions and air and noise pollution to levels that often exceed the legal or recom-
mended human safety limits. This development, of course, has affected the life-
styles and daily activity patterns of most people, as well as the structure of cities
and land-use in general. However, the ability to be mobile is not evenly distrib-
uted over the population. We can also observe that, in recent years, mobility has
not grown as fast as has previously been the case.

Urban freight transport has to respond to changes in industry structure: in de-
veloped countries, it has had to adapt to high value-added production. This
means increased value added per unit of weight, and consequently greater demand
for more efficient transport. In addition, improved production technologies and
management, as well as shorter production development cycles, tend to minimize
inventories. Advancements in production and consumption have required smaller
shipments and more frequent freight transport. The increased competition brought
about by deregulation has stimulated higher quality services responding to these
needs. Consequently the actual unit load carried per vehicle and trip has decreased
(Nakamura et al., 2004).

However, mobility ought to be measured not only in terms of daily distance
covered but also taking into account trip-frequency and the amount of time spent
on travel. Daily trip-frequency is a crude measure of social interaction; that is,
the number of out-of-home activities of a population. Travel-time per day reflects
the role of transport in the daily time-budget; that is, how much time we can devote
to travel considering everything else that has to be done.

Experience of development in most European countries suggests that mobility
considered as trip-frequency does not change significantly in the long term. This
means that people do not travel more and more often: they travel greater and
greater distances. A similar observation applies to the travel time budget. People
do not devote more time to travel: they travel faster. If people have the opportunity
to choose, they generally use the fastest mode of transportation.

For a long period, commuting between home and work was the main purpose
of travel and structured traffic-flows into regular patterns in time and space. But,
at least in the more wealthy European states, during recent decades leisure trips
have shown the biggest increase (defined as visiting friends and relatives, or
other social/recreational activities). These “free time” trips now account for be-
tween one third and one half of total trips and daily distance covered. So we can
see that change in the location of home and work, or the *suburbanization* of city
life, represents only a minor part of the evolving mobility pattern. Another aspect
of developments in mobility is an increased geographical distribution of activities,
in addition to the growing complexity of spatial relations. After a first wave of
suburbanisation – spatially concentrated, close to old city centres and well served
by public transportation – new patterns have emerged. A second wave has meant
an increased attraction for low-density areas – rural places, small towns, outer suburbs – for housing developers. At the same time, there has been a suburbanisation of jobs, shops, and healthcare and leisure services. Many of the new places are not easily served by public transport, and this has engendered new and complex spatial relationships with regard to travel. Traffic within and especially between suburbs (“tangential” trips) has increased, while the old patterns of regular trips from suburbs to city centre (“radial” trips) has stagnated. Conurbations are also attracting commuters from increasingly large catchment areas.

Suburbanisation in the US was proceeding rapidly, with more workplaces being progressively relocated to the suburbs of large cities. This resulted in a phenomenon called suburban gridlock, in which traffic congestion occurred not only in the city centres but also in the suburbs. In Europe, where cities are frequently very old, there are many cases where urban areas are very compact. Since it was difficult to construct new trunk roads in such localities, urban traffic policy with regard to motorisation was focused on improving pedestrian spaces and public transport facilities: for example by the construction of transit malls and LRT (Light Rail Transit) lines. Although underground railways were also constructed, most cities opted to continue with the operation of trams, and increased their efforts to make these more convenient and agreeable.

One final significant feature of mobility development is the spread of mobile life-styles from few to many segments of the population, and to different social groups and households. This includes aspects of age and gender. The mobility of the elderly has increased thanks to the simple fact that the first generation of car owners is now reaching old-age. The entrance of women into the labour market during recent decades has of course increased demand for travel among women. But the most important factor by far is that, in the wealthiest countries over the last fifty years, almost 80 per cent of all households have been able to buy a car.

Experiences from most countries show that by far the most important factor in mobility level is car ownership. In countries like Denmark, Germany, Finland and Sweden, the car accounts for 70 to 80 per cent of the total daily distances of passenger travel. Car ownership is largely influenced by household income; other influences include, of course, the cost of buying and then using and maintaining the car. Differing levels of political control, taxes on fuel and vehicles, and charges such as import duties influence demand in different countries.

Is there a saturation level in car ownership? It is hard to give a straightforward answer to this question. In Sweden, there is on average one car per household, which may seem a plausible point of balance. However, in the United States this figure had already been reached in the 1950s. Today there are almost 0.7 cars per person in the US, which means that there is more than one car per licence-holder. But economic factors – such as the price of petrol, the structure
of cities and value systems, and general culture – differ. In Europe, there are clear signs that the car is regarded as a source of individual mobility, rather than a commodity related to the household in general. This individualisation of car ownership and use is certainly one possible impetus for further mobility expansion in the wealthier nations.

Regions with high densities of population and settlements tend to have fewer cars per capita and thus lower mobility levels than regions that are sparsely populated and with dispersed settlement patterns. At the same time, the tendency for cities and activities to spread out over large areas is a result of the increased mobility of the population.

Another important factor – at least in densely populated areas – is the standard of public transportation. Areas served by public transportation of high quality – high frequency, high speed, well-integrated routes and networks that are secure, comfortable and reasonably priced – have proportionally lower car ownership levels. If public transportation cannot live up to such relatively high standards it runs the risk of entering a vicious circle. More people turn to the car, leaving public transport to a diminishing group of people who, for various reasons, cannot use other modes: these are the so-called “captive riders”.

### 1.2 Towards sustainable urban transportation

Traditionally in transport policy, three main types of policy instruments have been used to implement concrete measures:

- technical development;
- urban planning;
- economic incentives.

However, it is also important to consider that traditional policy instruments are insufficient to realise the goals of sustainable mobility. Other political measures include legal framework, making information available to the general public, and education. At the same time we should consider that there are a lot of powerful actors – for example oil companies, among others – who are opposed to any significant move away from the present fossil-fuelled car, be it through the introduction of biofuels and/or a change of vehicle concept.

Technical improvements can be discussed on two different levels: long-term technical potential and short-term possibilities. The potential for passenger transport is generally greater than for cargo transport. Improved transport technologies are challenges for car manufacturers. Current technical solutions are geared towards decreasing specific energy use or specific emissions (per vehicle kilometre).