New roads generate new traffic

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There is widespread ignorance concerning the generation of additional traffic

Introduction

Traffic planners and policy makers argue that new roads are required to meet an increasing demand for transportation. It is claimed that the improvement of the road infrastructure contributes to economic progress, helps the environment by relieving congestion-related air pollution and amends living conditions in residential areas. In addition it is frequently argued that the improved rail and bus infrastructure will further contribute to the relief from environmental pollution as motorists are provided with a fast and thus attractive alternative to using the car.

A simple and fundamental principle of economics is that consumption increases as goods become more attractive to the consumer. If transportation is viewed as consumable goods, then transportation infrastructure will partly determine its attractiveness to the potential user. Improving the overall attractiveness of a transportation system will increase traffic and therefore ultimately lead to more traffic-related pollution.

Apparently, one of the most important features determining attractiveness and thereby controlling the demand for transportation is the speed of travelling. Faster transportation systems allow for longer distances to be covered and thus for more or further distant destinations to be reached, while the time spent in traffic remains constant. This simple fact is bluntly ignored by most traffic planners and politicians. Rather, the standard paradigm of traffic planning presumes that speed influences the choice between different modes of transportation, but has no effect on the choice of the destinations and the total distances covered by individual travellers.

New roads generate new traffic

New roads are frequently built on the grounds of shifting traffic from congested arterials to areas where pollution and noise affect less people. Such new roads accelerate the traffic and the motorists save time. The question then arises of how the motorists spend the time saved. The answer to this question is surprisingly simple but is a key to understanding the increase in traffic. The time saved is used to join more traffic which results in additional traffic. This traffic is ignored by conservative traffic experts, although – apart from the direct impacts on the landscape – it is the most important impact of a new road on the environment. There is a technical term for this kind of traffic. It is called induced or generated traffic.

The phenomenon that people tend to spend a fixed amount of their time for travelling is known as the law of the constant travel time budget. The travel time budget is the average time a person spends in traffic each day. The law of the constant travel time budget is well established (John Allard and Frank Graham & Partners, 1987; Herz, 1985) but is rarely, if at all, applied in the context of transportation planning and impact assessment.

The travel time budget depends on demographic and sociological parameters. For example, it has been found that employees have a greater travel time budget than housewives or pensioners (Herz, 1985). Progress in transportation, for example the invention of the bicycle or the motor driven vehicle, has not changed travel time budgets considerably. Although nowadays there is a tendency to spend more time in traffic as a result of increased leisure time and reduced working hours.

It is not known whether the law of the constant travel time budget also applies to the transportation of goods. However, there is a close connection between the improvement of transportation infrastructure and economic globalization (Norberg-Hodge, 1994). Thus, it appears that as infrastructure is improved, goods are being shipped over longer distances. This is particularly true if companies are allowed to externalize most of their transportation costs owing to massive direct and indirect transportation subsidies.

The acceleration of public transportation also induces traffic. Interestingly, while the induction of motor car traffic through improved infrastructure is consistently

World Transport Policy & Practice, Vol. 1 No. 1, 1995, pp. 29-31

ignored, the increase of ridership in systems of mass transportation as a result of improved services is widely praised as a means of protecting the environment. It is usually implied that one traveller more on the bus or on the train corresponds to one motorist less, Because of this widespread superstition, an alleged reduction of motor car traffic resulting from the improvement of public transportation is often simply stated without backing by appropriate survey data.

Few studies have been published on the interdependence between the improvement of public transport systems and the amount of motor car traffic. In Stuttgart, Germany, a new light-rail line (S-Bahn) opened in 1985. The new rail allowed for faster commuting, and a survey was conducted to demonstrate the expected effects of the new rail on road traffic. The following quotation, which summarizes the result of the investigation, is taken from Younes (1990):

> The Stuttgart case study of a new S-Bahn linking the city of Stuttgart with the industrialised region of Böblingen has some surprising findings. Based on in depth surveys and studies carried out by both the city and the local public transport authority, it is clearly shown that the growth in motor vehicle traffic along the corridor of the new S-Bahn has increased substantially since it was opened and that this increase was significantly more than the increase in traffic for all roads in the city.

The basis of cost/benefit calculations is nonsense

In Germany, road projects are evaluated according to standardized cost/benefit procedures. In the course of the cost/benefit analysis, a monetary value is attributed to the following potential benefits of a road:

- improved accessibility;
- reduced operating costs of vehicles (reduced fuel consumption);
- improved safety;
- environmental benefits.

Time savings for road users are evaluated within the improved accessibility criterion. Typically this criterion contributes significantly to the alleged benefit of a new road. It is worthwhile to note in this context, that new roads tend to be designed for high speeds in order to claim high accessibility benefits. However, since travel time budgets are constant there are no overall time savings and thus there should be no benefits with respect to time budgets alone.

The most drastic error of the cost/benefit analysis is made when fuel savings and the reduction of other vehicular operating costs are calculated. In Stuttgart 2km of a four-lane urban highway are projected to relieve a bottle neck. Motor car traffic on the new road is predicted to be about 80,000 vehicles per day. Allegedly the project will result in a daily fuel conservation of about 8 tons (Stadt Stuttgart, 1987). Calculations of reduction in fuel consumption were based on the assumptions that traffic from other routes will be concentrated on the new highway and that motor vehicles, driven at a speed of 50 to 100km/h, will consume less fuel per distance than vehicles in congestion. Not surprisingly, the rule of the constant travel time budget was ignored in the calculations. The calculations are therefore wrong. Similarly, calculations concerning traffic accidents and air pollution are also wrong, because induced traffic generally is ignored.

Road construction contributes significantly to traffic increase

According to the German Ministry of Transportation and the private institutes largely funded by it, traffic demand does not increase with improved road infrastructure. Rather it is claimed, that improved road infrastructure and promotion of public transport systems both reduce fuel consumption thereby contributing to environmental protection. This is like the idea of a corpulent person eating more food in order to slim down.

No attempt has been made as yet to calculate the amount of traffic induced by the construction of new roads in Germany. However, based on the law of the constant travel time budget, a coarse quantitative estimate of induced traffic can easily be obtained.

For the four-lane highway projected in Stuttgart an overall time saving of 5 million hours/year was calculated (Stadt Stuttgart, 1987). Altogether motorists spend 93 million hours/year on Stuttgart roads and car traffic in Stuttgart consumes 302,500 tons of fuel each year (Ministry of Nutrition, Agriculture, Environment and Forestry of Baden-Württemberg, 1986). The highway project therefore would boost road traffic with respect to the overall traffic in Stuttgart by as much as about 5 per cent. Fuel consumption would increase about 44 tons per day.

Since it can be suspected that official calculations overestimated actual time savings within the framework of the cost/benefit analysis, the actual increase in traffic and fuel consumption is probably less than 44 tons per day. But without any doubt, fuel consumption is going to increase as a result of the new highway. The decrease in fuel consumption claimed in the cost/benefit analysis is nonsense.

Extrapolating from this one road project in Stuttgart to all road projects under consideration nationally, we estimate that annual traffic growth induced by road construction presently is about one-third of the total growth in traffic in Germany. Improvement of the road

infrastructure is thus one of the major causes of traffic increase in general.

Conclusions

Based on the law of the constant travel time budget we argue that the improvement of infrastructure contributes significantly to the general increase in traffic as it allows for faster transportation. Standard cost/benefit analyses neglect traffic induced by improved infrastructure and therefore are faulty. Traffic induced by the improvements of infrastructure can easily be estimated from the time savings for motorists as a result of a construction project.

Any measure that makes road traffic faster, induces new traffic. Any measure that makes road traffic slower, reduces traffic. Therefore, the most important objective of environmentally oriented traffic policy must be the deacceleration of road traffic.

Systems of mass transportation can contribute to environmental protection only if improvements in public transport are paralleled by measures to deaccelerate motorized traffic, thus allowing for changes in the modal split without increasing overall traffic.

References and further reading

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