

The effect of transport models on road infrastructure, traffic management and behavior on transport system users with special focus on vulnerable road users

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The importance of transport models

Transport models are important since they indicate how people in the transport and traffic sector think, what assumptions they have about the transport system behavior, what they care for and what they don't care for. Transport models are therefore reflecting the "mental structure" of people in the transport and traffic field.

Nice introduction – but poor content

The most common kind of transport model is the language. People see what they are talking about. And the reality is rather far away from theory. "Traffic is the movement of motorized vehicles, un-motorized vehicles and pedestrians on roads" is the common introduction in transport text books. This definition already shows a contradiction to the historical development of the transport system. That means of transport, which is older and more important should be mentioned first.



Fig. 1 Public space in urban areas was the space for free movement of nonmotorized transport system users

Traffic was for millennia the movement of pedestrians on roads before the first un-motorized and later the motorized vehicle was invented and came in use. Today car traffic is dominating the media and very few is reported about public transport and nearly nothing about un-motorized transport system users in the Western society. The common transport model is therefore car-biased. It draws a picture in which vulnerable road users are not visible. Since politicians are normally common people and have no deeper understanding of the transport system they are following this kind of mental model and put most of the money into carriageways for cars.

Transport models for cars and mechanical modes

During the last 50 years traditional transport models used by traffic and planning experts are in general focused on car traffic and to a certain extent on public transport – at least since about 15 years. The effect of this kind of mental and professional models can be seen everywhere in the world where traditional transport experts have made planning, expertise for decision making and traffic management: They do what they have learned, they recommend to built motorways.

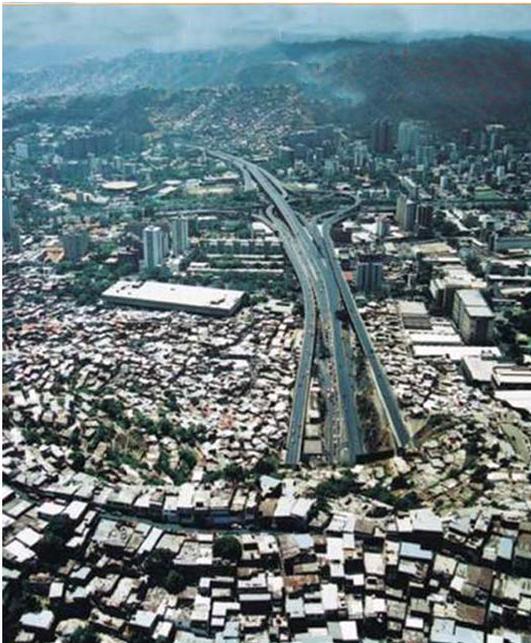


Fig. 2: Example of transport models and transport planning from the 20th century

Transport planners are not doing what is good for the society, the future needs and the local economy. Traditional transport models do not take care on real human behavior. They make assumptions how people should behave because engineers are not very well trained to understand and model real human behavior. The effects can be seen everywhere in the world: The recommendations coming out of these models are: build more roads, more underground and more provision for motorized transport.

The outcome of these activities, which are very costly are: increasing congestion, increasing air pollution, more accidents, increasing subsidies for public transport, damage of local economy and finally unemployment of people beside increasing environmental and social problems. It seems that traditional transport models are totally in contradiction even with the system effects of the transport system they have been made for but also in contradiction with the laws of nature and the rules of the human society. Instead of strengthening local economy this kind of transport systems they are planning and operating damage local economy. Instead of supporting city life these models do not take into account the effects of the transport system on the urban structures. Therefore they damage the urban structures by providing opportunities for urban sprawl on the one side and uncontrolled concentration

of economic activities on the other hand. Quality of life is damaged by the application of this kind of transport models and vulnerable road users are put aside. They are not in the core of this kind of transport models, in general they are forgotten.

Wrong assumptions in transport modelling

Traditional transport models are not representing the real transport and urban or national system behavior. They are built on the extrapolation of personal experiences to the whole system. The basic unit in traditional transport modelling coming from the United States is the PCU (the person car unit), an artificial unit which can not be converted into public transport or cycles or pedestrians. If the basic unit is totally wrong, the results of this kind of models are also totally wrong. This was for decades the base for traditional transport modelling.

The main mistakes of common transport models

1) purposeless mobility

With increasing car ownership experts have observed an increasing number of car trips in the transport system. These observations have been extrapolated to the future by different kind of forecast models and called "growth of mobility". They have not asked "What is the purpose of mobility? And where does it come from?" Mobility outside of a house is necessary to compensate deficits at the place where the people are coming from by trying to fulfill the needs in a certain destination. Each trip in the transport system has a purpose. If this purpose can be satisfied with one mode it can not be satisfied with another mode at the same time. Since the number of purposes in the society is constant there is **no growth of mobility in the transport sector**. If the number of trips in one mode is increasing, the number of trips in other modes is decreasing. An increasing number of car trips is therefore nothing else than the decrease of number of trips of pedestrians, cyclists or public transport. If car trips have other destinations compared to the other transport system users, the second group will lose its destination, because the new destination of cars is in competition to the old one. Shopping centers out of the city can only be reached by cars. They absorb therefore the money of all car users which is then missing in the local shops. In the 2nd half of the last century most of the European cities have lost about 80 % of local employment and shops due to the effect of car traffic and its new car oriented shopping structures. When local shops are closed people have to use the car which reinforces the increase for motorization and makes people car-dependent. This kind of transport system with positive feedback is destroying the local economy, the local culture, but is a advantage for big international corporations mainly from the United States. They are exploiting the local economy since the experts have not understood that the number of trips, the mobility in a society, is constant. There is only a shift of mobility from one mode to the other possible. Socially, economically and environmentally acceptable modes are pedestrians and cyclists and to a certain extent public transport. Socially not acceptable is the car traffic but it has the greatest short time advantages.

2) The second mistake in traditional transport modelling was the believe that time savings occur if transport speed is increasing. It seems obvious that this happens if the transport speed is enhanced since everybody can make this experience. Unfortunately nowhere in the world time saving has been observed in practice. All empirical findings show that increasing speed has no effect on travel time (daily traveltime budget).

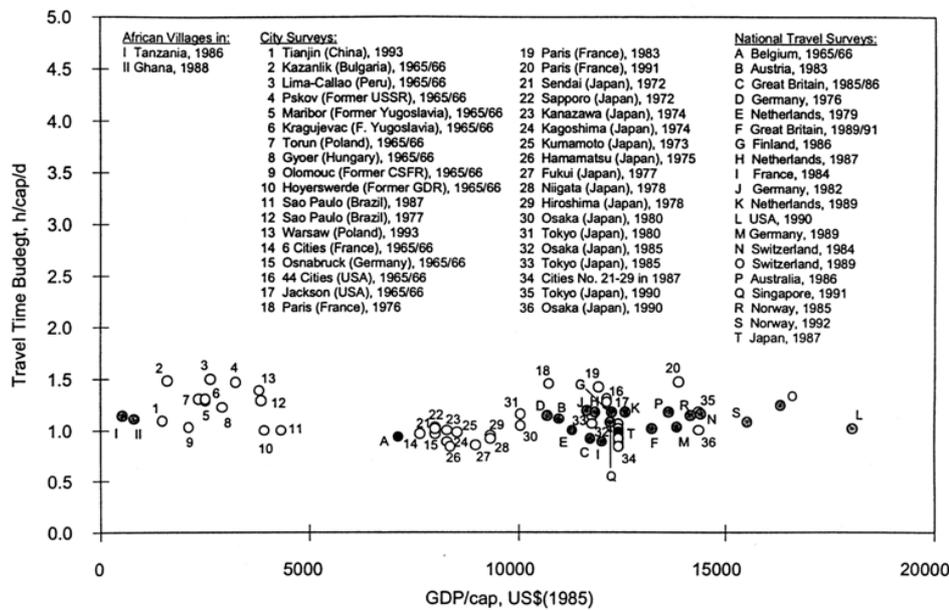


Fig. 3: Nowhere in the world time savings has been observed by increasing travel speed

Average daily travel time remains constant everywhere in the world. If speed is increasing distances are increasing. This is the only effect in the transport system since motorized transport is changing the physical structure of cities, regions and states. If distances between human activities are increasing vulnerable road users like pedestrians and cyclists are losing their destinations. What they need is not accessible any more for them. This is even more difficult for them since this kind of transport modelling, which is totally in favor for mechanical modes, produces terrible barriers for vulnerable road users everywhere where it is allowed to work. The short direct trips of pedestrians and cyclists, the living network of a society and a city is cut off by these ignorant transport modelers, who plan wide carriageways for the so-called fast traffic of cars, pushing away the life supporting mobility of the human society existing from pedestrians and cyclists. Underpasses and overpasses for pedestrians and cyclists are terrible barriers against human mobility. Since more than 20 years each student in my courses has to experience at least one hour wheel-chair riding to get an impression how traditional transport modelling and transport planning was. Sidewalks, underpasses, overpasses are barriers, not only for physical handicapped people, but also children, women with prams, cyclists and elderly people. They exclude the majority of the population from free movement in an urban environment. If somebody has to change the level it has to be the car. Vulnerable road users must have the opportunity to use public space in a safe and convenient way. This means that sidewalks, if there are some, have to be extended across the intersections and cars have to reduce the speed down to the pedestrian speed with the help of ramps or humps. In urban areas vulnerable road users must have the priority since they support local shops, local employment, local tax payers and local quality of life. More and more roads in the European cities are converted therefore into pedestrian areas with strong positive effects on local economy and quality of life.

3) Parking, the key element for a future oriented transport management

The main mistake in the transport system was the prevailing organization of parking. If people can park their cars where they live, they work or shop, they have no chance of choice because they are captured car drivers. At the same time they destroy the quality of mobility for all other transport system users. Parking at home makes all other transport system users to vulnerable victims of car users. Parking at home is also the cause of all the congestion problems, economic problems and the damage of public

transport in all cities with higher degrees of motorization. Since traditional transport experts and modellers have no clue about real human behavior, they have not understood what happens, if parking is allowed everywhere.

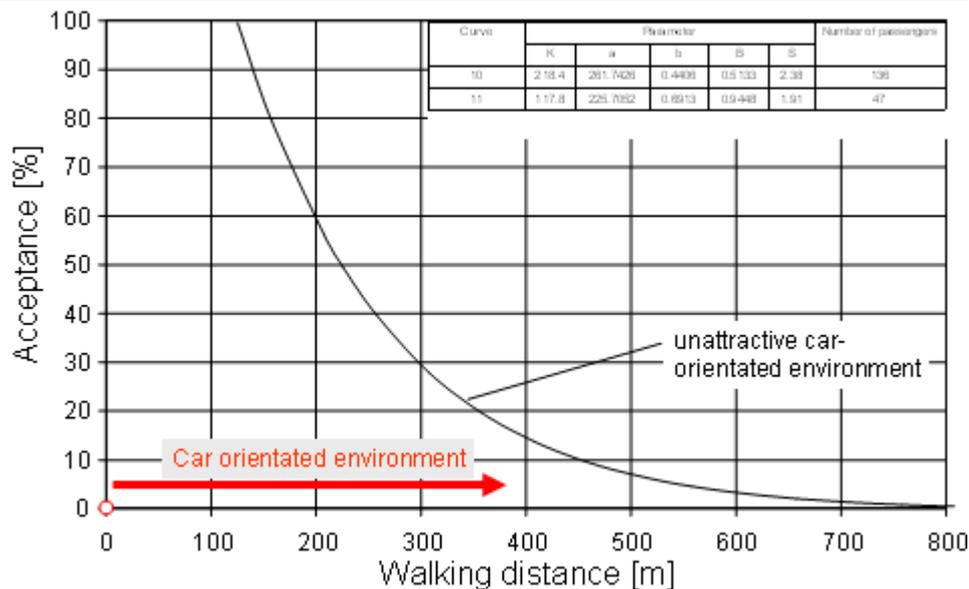


Fig. 4: Acceptance and Walking distance

The acceptance of a pedestrian trip is decreasing with increasing walking distance. This is the reason why public transport is not accepted any more, if car drivers can park at the origins and destinations. To give people a chance of choice at least between car and public transport, the walking distance to the parked car must be at least as far as the walking distance to the public transport stop. Therefore a new organization of the parking regime has to be implemented: Nobody is allowed to park anymore where he wants. He has to put his car into a garage which is provided by the society on a place which is at least as far away from human activities as the next public transport stop.



Fig. 5: Precondition for the solution of urban transport problems – reorganization of parking

This means that in a city the number of garages, where the people can park their cars, can not exceed the number of public transport stops. A good organized city should have about half of the number of garages compared to the number of public transport stops. The problem of so-called vulnerable road users is in this case disappearing for the most part.

More than 70 % of the urban streets become free from car traffic. Vulnerable transport system users are no issue anymore in these areas, because people such as pedestrians or cyclists meet each other in the public space as it was the case in the urban tradition everywhere in the world during the last 7.000 years and Chinese urban tradition is one of the oldest one. Based on this physical structure the society has to introduce a financial structure to repair the mistakes from the recent past. People who want to park at home have to compensate the society for this privilege. They have to pay a high fee to the society, if they do not accept the new organized parking place in the centralized garages. This fee must compensate the society for all the harm caused by cars.

Conclusion

Traditional transport models are based on assumptions which are unreal. These assumptions do not represent the real system behavior. Traditional transport models are dealing with traffic flows and not the causes of the traffic flows. Therefore they produce recommendations which are increasing transport volume, economic and social problems continuously. The more the mistakes become visible, the more traditional transport modellers and decision makers are increasing their faults by building more of the wrong infrastructure instead of solving the problems. In doing so, they damage the city, the local economy, the environment and the future of the society.

Proper transport modelling has to take care on the real system behavior. The real system behavior is based on human behavior which has to be analyzed and studied. Taking into account real human behavior traffic flow of cars is not a core area anymore. Traditional transport modelers and models have been blind for the real behavior of the system. They have seen the symptoms (e.g. congestion), but not the causes itself. They have not understood this new artificial system behavior.

The underlying cause of all the transport problems of today in the Western and even in the Eastern society is the wrong organization of parking. It has not been understood, that the parking place has the same function like a public transport stop. If this is understood it is obvious that the number of parking places in a region or a city can not exceed the number of public transport stops. Therefore cars have to be stored in centralized garages at least as far away as the next public transport stop. In cities the number of garages for the car should not exceed half the number of public transport stops. Under these circumstances over 70 % of roads are becoming car free. They are not a problem for vulnerable road users anymore. The remaining 30 % of roads have much less car traffic and can be organized in a much better way to make the life of vulnerable road users much more convenient and safe. This is the precondition for a sustainable city of the future. A sustainable city of the future must be environmental, social and economic acceptable – in the long term but not in the short term like the intermediate period of fossil fuel wasting driving machines, the cars. If we protect the vulnerable road users, we prevent vulnerable cities, vulnerable economies and vulnerable basis of human life for the future.

New models are necessary

To be able to develop urban structures in transport systems for sustainable cities it is necessary to develop new kind of models. These models have to be based on real human behavior and not on assumptions.

They have to represent first of all the base of all people and goods movements: pedestrians and their needs. Accessibility for people: pedestrian have the first priority in urban and transport planning.

The second step of the models has to represent cyclist behavior. Their needs have the second highest priority and have to be integrated into the basic network of pedestrians.

The third step of the model is modelling public transport taking into account the whole transport chain from origin to destination including accessibility for pedestrians and cyclists.

This is the core structure of a future-oriented transport and urban model system which satisfies the needs of the population of any city of any size. Modelling car traffic is an additional part of such a future oriented model, in which the location of parking is the key element which has to be integrated into the basic model structure in such a way that conflicts with the other transport system users are minimized or prevented.

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