Abstract

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Topic: **Impact analysis of the measure „city speed limit of 30 km/h“**

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The measure "city speed limit of 30 km/h" is a hotly debated issue among politicians, associations and organizations for a long time, which came to a head again, especially in the last year. Thereby are the proponents, who seek a greater road safety and minimizing air pollution and noise emissions impact, compared to the opponents of this measure, who fear a slow-moving traffic with traffic relocations in calming residential areas.

Triggered was the discussion already in the 80s, in which extensive model tests with zone limited expulsions of speed limit of 30 km/h were carried out and due to the significant decline in accident rates, the measure to classify 30 km/h zones was added to the (road) traffic regulations (Highway Code).A later StVO amendment led to a rapid, partly community-comprehensive, increase of the 30 km/h zones, because for communities were the classification of these zones facilitated. The claim of the German Association of Cities to set down a general "city speed limit of 30 km/h" instead of zones was not fulfilled up to now, nevertheless, this idea is to date still present in the minds of many scientists.

One by Swedish experts for traffic in the late 20th Century resulting idea which, for example, envisaged the designs of the road space to ensure safe speed in order to prevent the risk of killing in case of collisions between road users, has developed into a vision, the so-called "Vision Zero", to reduce the number of deaths to a minimum or even to reduce them to zero in the future. In 2011 the European Parliament adopted this vision in their report to the European road safety thereby gave rise to the current political debate on the measure "city speed limit of 30 km/h".

To describe the effects of the measure, first the impact on the need for mobility, economy, road safety and environmental pollution, which are referred to as well as functional domains, are under examination in this thesis to transfer and to investigate in the next step these effects on an existing transport system, the quality of the urban environment and the acceptance of individual road users and local residents. In the functional domains arises from the measure out a great deal of gains in road safety.

Reduced velocities are due to lower collision speeds, the most effective solution in order to reduce the severity of accidents. Moreover, the perception of the driver for the faint of road users will be more sensitive and the responsiveness is thus increased. As children under ten years are not able to properly assess a vehicle speed of more than 30 km/h, they are further protected by the measure. The most important parameter to observe the speed limits, however, is the acceptance of the individual vehicle driver. While it implicates an acceptance increase simply by a comprehensive expulsion of 30 km/h, but there is a need for faster general compliance with the measures of well-organized public relations. This promotes the awareness of drivers and may cause a change in behavior of the social environment, which even will influence the individual vehicle driver to change their behavior faster. A change in behavior can be related to the acceptance to comply with speed limits of 30 km/h, meant for others the change from the MIV to the environmental alliance. Thus it can be assumed that the proportion of the environmental network in the modal split will increase if any possible alternative means of transports are available. Therefore, different changes in behavior can be detected between core areas and rural

areas. So even MIV-bound drivers from rural areas could be due to extended travel times and without the public transport transfer possibilities, prefer a change of residence to compensate for the handicap. With the noise emissions reveals comparatively to road safety a clear picture. Slower driven speeds emit less sound pressure, causing the noise level, perceived as noise, decreases. These sound pressures arise, for one of the engine (engine noises) and the vibrations from the tires (rolling noises) and the other from the air resistance at high speeds (aerodynamic driving noises). Depending on the speed a type of noise is more dominant than the other. In reducing the driven speed of 50 km/h to 30 km/h largely rolling noise can be reduced, however, below 30 km/h is the engine noise dominant, so lower speeds than 30 km/h do not have significantly lower noise emissions further. A maximum speed of 30 km/h is therefore a useful measure to reduce noise emissions and depending on the road surface and car it can contribute to a noise reduction of four decibels. No accurate statement can be made about the air pollution emissions, which are also counted among the environmental impacts. During test drives was measured that a constant speed of 30 km/h produces more emissions than a constant speed of 50 km/h. Decisive for the final pollutant emissions of a route at different speeds, however, are the frequencies of the acceleration phases, because in this phase the fuel consumption and thus also the air pollutants are considerably higher than at constant speeds. With route lengths of less than 250 meters length arise for a maximum speed of 30 km/h less emissions than with a maximum speed of 50 km/h. Thus in areas with node distances less than 250 meters can be assumed from a reduction of air pollutants, for longer distances, especially on main roads with right of way, increases in air pollutants are expected. However, the air pollutants in addition to speed, the amount of acceleration phases, are dependent on the slope of the road and the current traffic situation, whereby a precise statement can not be made conclusively. Generally, nevertheless, a constant speed causes less air pollution as an acceleration phase, whereby the pollutants could be significantly reduced alone by a steady flow of traffic or one or more adapted to the traffic flow light signaling system (green wave), if not previously been available. The measure "city speed limit 30 km/h" with even a small decrease in fatal accidents can be considered as economically, because approximately economic damage of one million euro arises on a dead in road transport. Increased economic losses due to an increase in environmental pollution are hardly significant, which is to say that by lower speed limits the decreasing noise emissions have a positive impact on the economic costs. The reduction in economic costs could be used for public relations and the expansion of construction measures on roads, in order to make it difficult, for example by road narrows, driving on the road at a high speed. An affordable narrowing of the roadway may be partly ensured by prohibiting parking on pavements. The expansion of the pedestrian and bicycle network to increase the attractiveness of means of transport for the choice of a means of transport would be covered by the savings of the economic costs. The increased attractiveness could also have a positive impact on the model split, which in turn creates a huge potential saving for the economic costs, because by reducing the car proportion of the modal split the air pollution and noise emissions are reduced as well. Through the interplay of all four functional domains can a shift from road transport to more environmentally friendly modes of transport arise by increasing acceptance, road safety can be improved and the environmental impacts can be mitigated.

The impacts on an existing transport network, depending on the municipality, can vary greatly.As environmental pressures at constant rates are lower than in acceleration phases, to protect against environmental pollution it is necessary to create a network of priority roads, the so-called priority network. This priority network should be selected so that as many areas of the city can be reached quickly, but the safety of all road users is to be ensured at all times. Decisive is the fact when choosing the priority network that the burden of proof is reversed. It is now no longer justified why on a road the speed limit should be reduced, but why the speed limit should be increased. This reversal also shows the new primacy of safety and environmental pollution vice the unfettered drive for the MIV. In principle, however, should especially overriding roads due to heavy traffic remain main roads, but it should not contain too many roads in order to counter not to the effect of general reduction of traffic. The interests of the public transport are still to be considered in the road network, because it is an environmentally friendly means of transport, whose attractiveness should not be diminished. The urban environment will gain from the reduction of speed limits on quality of life, particularly the residential quality. The road noise is reduced and traffic safety is increased. The acceptance of individual road users and

thus the overall compliance with the lower speed limit are heavily dependent on the public relations. Thus, an acceptance of about 80 percent could be achieved in Graz. Using the norm activation model is shown in this thesis that increasing acceptance can be achieved only through a comprehensive introduction and public relations especially must be used as supportive to accelerate the process of increasing acceptance.

In the case study Darmstadt a traffic network is in accordance with the measure "city speed limit 30 km/h" created. It is clearly shown by the creation of this that for road users a very clearly structured network arises and more road signs, especially speed limit 30-zone signs, from the road network can be removed, must be placed as new, which is not borne out fears of signs forest. The public transport lines in Darmstadt can thereby largely exist without travel time losses further as they already were traveling largely in 30 km/h zones. The designation of traffic signs 301 (right of way) to prioritize public transport at junctions is still possible and is also used. Total Darmstadt obtained by introducing an easy to understand road network, which still has a lot of potential for pedestrian and bicycle traffic. Thus, for example bicycle roads are set up to also get a good network of cycle paths. With a noise reduction is to be expected in many areas, minimizations of air pollutants are also possible.

The measure "city speed limit 30 km/h" made in the field of road safety and the environmental impact good results, it can deflect the need for mobility on more environmentally friendly transport and is to be welcomed for the economy. However, the priority networks should always be tested for their capacity and the driven speed limits, to exclude any other priority roads from the priority network. It is advisable to carry out a comprehensive model test with monitoring of speeds to put the functional domains previously in a realistic test to the proof. The public should be involved to a great extent in order in advance to ensure a good acceptance of the measure. The reduction in accident numbers and of environmental pollution are fundamental objectives and understandable for everyone.

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