

## Lessons to be learnt?

*When writing a National Road Safety Plan for Central and East European Countries*

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*When writing a National Road Safety Plan for Central and East European Countries*

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## **Abstract**

It is to be expected that a sharp increase in private motorised traffic in Central and East European Countries will lead to an increase in road accidents and casualties. Furthermore, it is to be expected that road safety measures could reduce road accident casualties even under the condition of mobility growth. Therefore, action plans to improve road safety are needed in these countries.

Based on the policy pursued in highly motorised countries and using present knowledge, it is possible to indicate what could have happened in the past in order to achieve better results. CEEC's could judge for themselves what is applicable for them.

The formulation of a National Road Safety Plan in Central and East European Countries needs to go hand in hand with the establishment of an organizational structure that is responsible for the initiation, preparation, implementation and evaluation of the actions planned.

A politically sanctioned National Road Safety Plan can make a significant contribution to improving road safety, based on political will, on a proper organisation and making use of existing knowledge on the most effective and efficient measures. 'Ten commandments' for a national Road Safety Plan are presented.

## **1. Introduction**

Central and East European Countries (CEECs) are faced with the enormous task of implementing political, economic and social changes in converting their centrally controlled planned economy to a market economy. Transport and infrastructure are of vital importance in bringing about these changes and achieving economic growth. Economic growth will lead to increased prosperity and to a rise in the number of private owned cars. Once economic growth is established, this will also result in increased mobility: more transportation of goods, including transport by road, and higher mileages by private motorists. Unless the road system is expanded and the quality of the existing road system improved, major problems will arise: capacity problems that lead to less efficient use of the infrastructure and hence to economic losses and problems relating to nature and the environment, various difficulties (such as through traffic passing through small towns and villages, city centres congested with cars) and more accidents and casualties.

Following the Second World War, highly motorised countries were confronted with similar problems. Here too an explosive increase in mobility was accompanied by an enormous decrease in road safety. Hence, the annual number of road deaths in the Netherlands rose from 1000 in 1950 to almost 3300 in 1972. Thereafter the annual figures dropped to less than 1300 in 1992. During the same period

mobility increased more than tenfold (measured in terms of the number of kilometres travelled by motor vehicles). A similar development has taken place in other countries (Oppe, 1991). How can this apparently remarkable development of a threefold increase between 1950 and 1970, followed by a decrease of over 50% in the next twenty years, be explained against a background of an explosion in mobility? And could countries that are possibly on the brink of such a development - such as CEECs - learn from others that have already experienced this kind of development?

In this paper it is assumed that this is in fact the case. Without in-depth analysis of road safety and of the developments that affect it in the countries mentioned and without knowledge about their administrative system and administrative culture, one should not be tempted to formulate recommendations as to how road safety can best be improved in these countries. It is possible, however, to indicate the extent to which the policy pursued in highly motorised countries has helped the improvement of road safety. For the most part this will need to be a qualitative evaluation. It is also possible, using present knowledge, to indicate what could have happened in the past in highly motorised countries in order to achieve better results. Both of these aspects are examined in this paper: what policy has been pursued in highly motorised countries and what is the result of this and also what could have happened that would have produced better results. CEECs could then judge for themselves what is applicable for them.

## **2. The road safety phenomenon**

Let us look at an account of a road accident at random (Wegman, Mathijssen & Koornstra, 1991). An 18 year old youth has just passed his driving test. One Saturday night he is driving his friends home from a disco. The teenager has recently bought a second-hand car. The way home takes them over a winding dike beside a river. It is raining. The teenager misjudges a bend. He is driving too fast so he cannot adequately correct for the bend. The car drives into the river. Because the youths are not wearing a seat belt, they are thrown out of the car and drown. The following morning a passer-by discovers the accident.

Cause? A young, inexperienced driver, not wearing a seat belt, driving at night in the rain along a road without a barrier, an unexpected sharp bend, bald tyres? All of these factors could have contributed to the accident and to the outcome. Often a critical combination of circumstances is involved (OECD, 1984). Pointing to one single cause, finding one culprit for an accident, does not do justice to the complex reality and - unnecessarily - limits the real opportunities to prevent accidents. Research reports in the United States and the United Kingdom (cf. Rumar, 1985) have concluded that 95% of accidents are due to human error, 30% result from faults in road-design and 10% are the result of mechanical defects. One conclusion that is sometimes drawn from this is that education (information, police enforcement, training) is the most important way of preventing accidents. This conclusion is erroneous and researchers have warned often enough about drawing such a conclusion. Is it not the case that road improvements, for instance, are intended to prevent human error? Information about the 'single' cause of accidents does not logically lead to a conclusion about the most effective way of preventing accidents, not counting the cost of measures. It is also possible to draw erroneous conclusions if one relies on police reports in which the question of guilt is settled. One of the people involved in the accident has always violated the law in some way: traffic regulations are so strict. However, this does not say anything about the most effective or efficient way of preventing an accident.

It is advisable to use a phase-model of the accident process when analysing road accidents and formulating measures. Figure 1 shows an example of a simplified model.

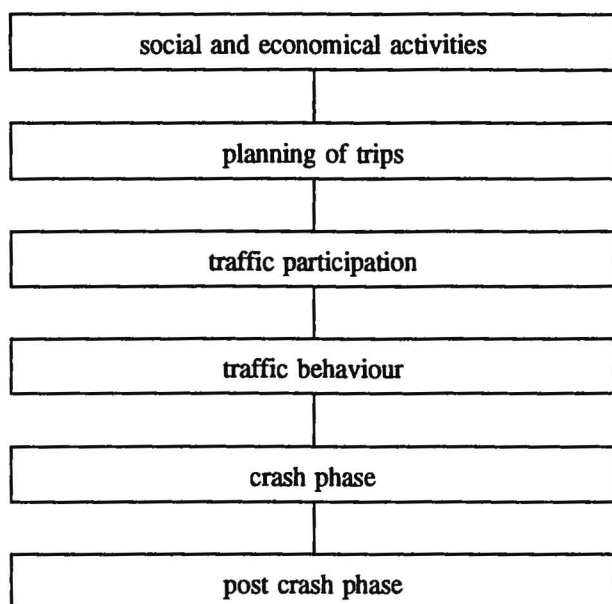


Figure 1. *Phase model of the accident process*

There are many opportunities to intervene in this process. The earlier the intervention, the more structural and effective it will be. In the end road users themselves will have to prevent accidents and behaviour always plays a part in this. Others, though, (road authorities, road safety organisations etc.) can influence circumstances such that the risk of human error is reduced. Preventing accidents or lessening the seriousness of the outcome is not only the responsibility of the individual road user but also of collective decision makers (authorities, private organisations, industry etc.).

Furthermore, people should realise that when it comes to decisions about road infrastructure and about the vehicles that use it, there are more arguments involved than road safety considerations alone; these include physical planning and land-use policy, transport and traffic policy, environmental considerations, public health policy, etc (OECD, 1984). This means that road safety is just one of the criteria used in decisions of this kind. It very often happens that road safety is not considered to be the main objective, though decisions are made that may have consequences for road safety. Road safety is one facet of these other areas of policy. This may mean that, unfortunately, insufficient or no importance is attached to road safety, something that can happen consciously or unconsciously (Wegman & Oppe, 1988).

### 3. Developments in road safety in CEECs

A number of reports have been written recently that give an indication of the road safety problems in CEECs. For example, the World Bank and the European Community commissioned an initial survey in Hungary, Poland, Bulgaria, Rumania, the Czech Republic and Slovakia. The Nordic Road Traffic Safety Council has also issued a report on the road safety situation in the Czech Republic, Slovakia, Hungary and Poland (NRTSC, 1992). The Technical Research Centre VTT from Finland has published a study on road safety in Estonia, Latvia and Lithuania (Segercrantz, 1992). In all of these reports an analysis is given of the developments in road safety, the conclusion is drawn that these countries compare unfavourably on an international scale and it is anticipated that there are many opportunities to improve the situation. At the end of 1992, the OECD organised a seminar on 'Technology transfer and diffusion for Central and East European Countries' in the area of roads and road transport (OECD, 1993). One of the themes of this seminar was road safety and the major conclusion drawn was that "Traffic safety is a major concern and targeted and integrated actions

should be taken as soon as possible in order to reduce drastically the high economic costs incurred by road traffic accidents".

In order to give an indication of the economic scale of the problem, reference can be made to estimates prepared by the World Bank expert group. This group estimated that at present between 1.3 and 2% of the GNP is lost through costs incurred by road accidents.

Representatives from the countries themselves have also made revealing statements: "In Russia, the problem of road safety is currently of vital importance. According to statistics, almost all absolute and relative indices of accident rates have been increasing" (Federov, et al., 1993). The (draft) Road Safety Plan of Hungary states: "Compared to earlier national data and to international data, the number of people who have died or been injured in road accidents has increased, while discipline in traffic and observance of regulations are at their worst level ever".

In various papers, Koomstra and Oppe have established a relationship between the development in mobility and road safety (cf. Oppe & Koomstra, 1990 and Koomstra & Oppe, 1992). On the basis of empirical data from various countries, they came to the conclusion that on a macroscopic level the annual number of road deaths can be expressed as the product of mobility (motorised kilometres) and the fatality rate (deaths per kilometre). Both factors can be expressed in terms of monotonic trends: a logistic, sigmoid trend in the case of the number of kilometres that approaches a certain saturation level and an exponential curve in the case of the fatality rate (Figure 2.). A cyclical fluctuation should be added to this. It emerges that if the fluctuation in the increase in mobility leads to a sharper increase than that based on the monotonic trend, the reduction in the fatality rate is relatively minor. This is disadvantageous for the development of road safety on two counts: the sharp increase in mobility and the moderate drop in the fatality rate. From the point of view of road safety, this calls for a controlled increase in mobility and should this mobility be high, for example due to strong economic growth, then extra attention needs to be devoted to road safety measures with the aim of further decreasing the fatality rate.

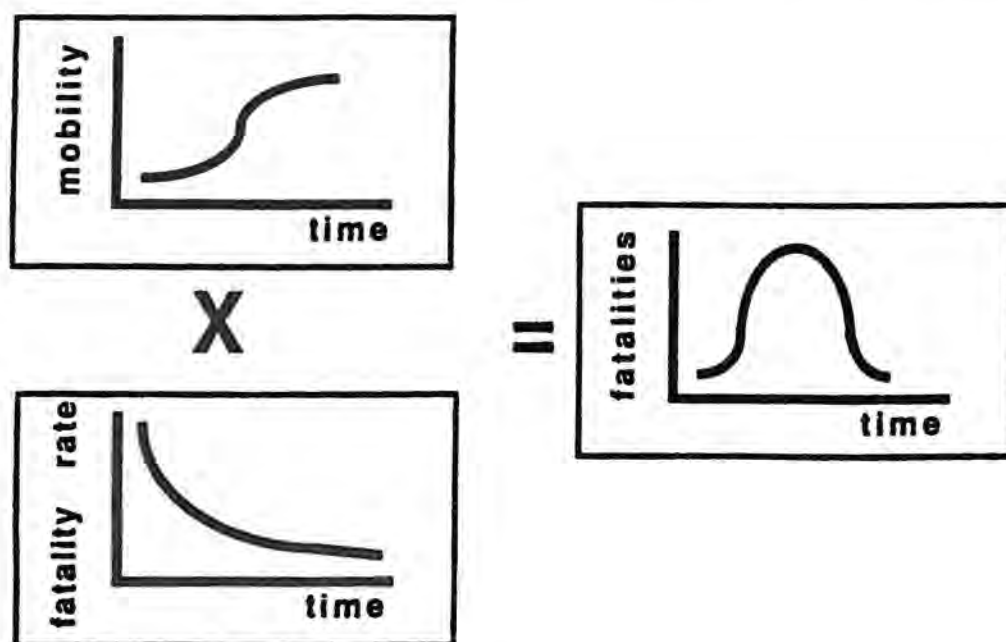


Figure 2. Trend in fatalities as result of trends in mobility and fatality rates

	Fatalities per 100,000 population	Fatalities per 10,000 motor vehicles
Estonia	29.4	-
Hungary	20.5	8.8
Latvia	32.9	-
Lithuania	29.1	-
Poland	20.7	10.9
Russian Federation	30.4	18.4
Czech Republic	15.6	5.4
Austria	19.9	4.0
Belgium	18.7	3.9
Denmark	11.8	2.9
Finland	12.6	2.8
France	18.5	3.9
Germany	14.2	2.6
Italy	14.0	2.4
Netherlands	8.5	2.0
Norway	7.6	1.5
Spain	22.6	5.6
Sweden	8.7	1.7
Switzerland	12.4	2.1
United Kingdom	8.2	1.6
Australia	12.2	2.0
Japan	11.6	2.2
New Zealand	18.9	2.9
USA	16.4	2.2

Table 1. *Fatalities (within 30 days) per 100,000 population (personal safety) and per 10,000 motor vehicles (road traffic safety) for highly motorized countries (source IRTAD) and Central and East European countries (1991)*

If it is assumed that the recent political and economic changes in CEECs result in (tremendous?) economic growth and thereby in a further increase in mobility (a 'catching up' action), then extra effort will be needed to decrease the fatality rate. The extent to which this succeeds will determine the developments in road safety in CEECs. However, present indications give cause for concern. The number of casualties has risen in the last few years in the various countries. In the Czech Republic the number of road deaths increased with 42% between 1988 - 1991, and in Poland the increase was even 63%. In the Russian Federation the increase amounts between 1980 - 1991 136%.

Compared with highly motorised countries CEECs score badly on various indicators (number of fatalities per inhabitant and per number of vehicles), as can be seen in Table 1.

#### **4. Road safety: a social and political problem**

Road use fairly seldom results in an accident for a road user. On average a road user in the Netherlands gets involved in a fatal accident every 10 000 years. It is understandable that the risk of an accident occurring is virtually of no importance in the daily driving experience of a road user. Looked at in this way, road safety is not a problem.

However, because a great many people live in a country and use the roads and because there are a great many streets and junctions, a completely different picture emerges. Viewed collectively, there is indeed a problem. Every year tens of thousands of people die in road accidents in CEECs (compared to 50,000 per year in the EC), including many children and young people. In addition, hundreds of thousands of people are injured in road accidents, which makes heavy demands on the health service as many accident casualties are permanently disabled. All this results in substantial economic losses (1 - 2% of the GNP).

In addition to the factual, objective consequences of accidents, road safety has another, more intangible and subjective dimension. Responsible citizens complain to the government about hazardous situations: people drive too fast or a crossing is dangerous. There are parents who are bothered by the feeling that something could happen to their children in traffic. These are objective and subjective aspects of the same problem, a problem that, individually, results in tragedies, a problem that incurs enormous economical costs for society as a whole.

Yet road safety does not seem to be perceived as a major social problem; nor is it perceived as a major political problem. If a society does not appear to take road safety seriously, it is extremely difficult to gain public support for road safety measures, either from institutions or from individual citizens and road users. A form of social mobilisation is involved here, the first phases of which are problem identification and problem recognition. Public support based on public awareness is no static concept, but rather a dynamic one. Public support can be created and if it exists one day, it can diminish the next. The result is that 'maintenance' is needed. In addition to establishing an effective organisational structure, achieving public support is one of the first activities that could be carried out within the framework of an (intensified) road safety policy.

Influencing social norms of behaviour in traffic follows naturally from this (Evans, 1991). Hence in the Netherlands, drunk-driving has been reduced not only as a result of more intensive police enforcement, but also because a successful policy has been pursued to reduce the social acceptability of drunk-driving. This campaign fitted in with a more general campaign to discourage people from drinking alcohol ('alcohol ruins more than you think' and 'enjoy, but drink in moderation'). It appears that these forms of behavioural influence are also effective in other areas (smoking, healthy diet, physical exercise) and can be effective as well in the field of road safety.

An approach known as social marketing has recently begun to play a part in Dutch road safety policy.



It includes phases of analysing the 'market', determining the needs and requirements of the target group, formulating clear objectives, strategies and implementation programmes (OECD, 1993). There is an impression that if this approach had been adopted earlier, certain policy objectives would have been achieved earlier and at lower cost. This conclusion is partly due to the fact that the belief in legislation and subsequently in the enforcement of legislation has diminished in the Netherlands, and in other countries as well. This option does not appear to lead to the objectives set or else would involve prohibitive costs.

This does not mean to say though that no legislation would be required for some issues. There is sufficient evidence (Wegman, 1992) that legislation and the associated enforcement of legislation has positive effects on behaviour and on accidents (speed limits, wearing a seat belt etc.). What is in fact meant here is that legislation should not be the start of a journey that leads to a change in behaviour, but rather it should be the end of the journey. Legislation would only be introduced when (a considerable proportion of) road users have seen the sense of changing their behaviour and have demonstrated the desired behaviour to a certain extent. This approach will probably result in less discussion about the content of legislation and in better legislation!

Now that there are signs of regained freedom in CEECs, manifested by an unwillingness to obey traffic regulations etc., it might be interesting not just to react by introducing new and stricter legislation in this area, but to follow this social marketing approach.

## **5. Road safety: a policy problem**

For years countries have had the task of improving road safety and many, if not all countries in the world will make an effort in some way. Politicians and policy-makers in positions of responsibility call road safety a serious social problem yet it does not seem to be taken seriously as a policy problem. The following statements have all been made at some point:

- The yardstick used is inadequate. Accident records are incomplete and those accidents that are recorded occur throughout the entire road system, seemingly unsystematically, there is nothing that can be done about it.
- Road safety measures encounter opposition, especially those that restrict individual freedom.
- The effects of measures are debatable and unknown in advance. With regard to the cause of and remedy for accidents, different opinions are fairly often expressed and it cannot be proved whether these are right or wrong.
- The effects of measures are not subsequently 'measurable'. It often proves difficult to make statistically sound judgements because the effect of measures is often difficult to 'isolate' from other influences and because chance fluctuations can play a major part.
- Central government cannot do everything alone. Tackling the issue of road safety requires effort from many bodies. This means that good collaboration is essential. It is difficult to achieve good collaboration and a lack of it can be demotivating.
- There are doubts about what authorities can do. It is difficult to determine the effects of measures taken by authorities in terms of a reduction in accidents and at first sight the effects are not apparent. As a result of this the view can - mistakenly - take root that a government policy makes no difference.
- Understanding of road safety problems is not adequate, whereby common sense and personal experience as a road user sometimes determine the view of individual policy-makers and politicians. This situation in itself leads to disputes as regards content and policy.
- There is a lack of administrative precedent and experience in implementing measures. Tackling the issue of road safety - particularly where road safety is a facet of other areas of policy - has virtually no administrative precedent.

More than enough reasons for coming to the conclusion that formulating and implementing a road safety policy is no easy task. Quite apart from the 'usual' problems such as inadequate funds and a lack of sufficiently qualified personnel, whose numbers are, moreover, dropping, due to government cuts. In policy and administrative terms the improvement of road safety is a persistent and tricky problem requiring a great deal of inventiveness and decisiveness and involving a real risk of failure. To put it briefly, the improvement of road safety is not a subject for timid politicians and policy-makers who like to play it safe.

## **6. A National Road Safety Plan**

A National Road Safety Plan is an important means of getting and keeping this subject on the political agenda. What is more, a plan of this kind can also act as a reference for implementing policy. First and foremost, the plan should include a philosophy about how road safety is to be improved, in the short term and in the longer term. The plan should therefore open up possibilities and indicate frameworks.

A plan is not enough in itself. Conditions must be established that the plan will also be implemented. In the Netherlands, quantitative road safety targets (minus 25% casualties by the year 2000) have proved to be an effective way of seriously monitoring the implementation of a plan and are also a good means of achieving a more effective policy.

In the Netherlands, a great many policy plans have emerged in the past in the area of road safety. Based on this experience, it is advisable to devote some attention to the following 'ten commandments' in a road safety plan:

- raise awareness and support in society and create public acceptance of safety measures;
- integrate with other areas of policy;
- create network of well-educated professionals and interested citizens;
- use know-how when implementing policy;
- check quality of implementation;
- combine long-term strategy with short-term successes;
- start with well-known and simple cost-effective measures;
- reduce chance of human error by increasing predictability in traffic, making traffic more homogeneous, reducing speed and separating road user categories;
- improve vehicle safety;
- improve emergency services and hospital care.

## **7. Organisation of a road safety policy**

A former Dutch Minister, who was responsible for coordinating the road safety policy, once wrote: "As Minister of Transport, Public Works and Water Management, I am responsible for the national road safety policy. I do not shirk this responsibility. However, I would stress once more that a Minister alone can accomplish very little. Road safety is a matter that directly concerns half of the Cabinet, but also, and particularly, administrators of provinces and local authorities, not to mention over 14 million other Dutch people" (Ministry of Transport, Public Works and Water Management, 1991). The following conclusions were drawn from this:

- attach more importance to coordination within the Cabinet;
- more targeted collaboration by all of the organisations that have a role to play within the context of road safety;
- persuade citizens to obey traffic regulations that are vitally important.

Attaching more importance to coordination within the Cabinet means first and foremost making a

statement of political will. A statement of this kind, supported by the Cabinet, legitimises activities relating to harmonising policy in various areas in the context of the improvement of road safety. The 'competitive position' of road safety is reinforced by the quantitative terms of reference which have been in existence for some years now: 25% fewer casualties by the year 2000 and before 2010 50% fewer deaths and 40% fewer casualties than in 1985 (Ministry of Transport, Public Works and Water Management, 1991).

Over the years it has proved necessary to have a separate unit within central government where road safety policy is coordinated and specific aspects of the policy can be implemented. Due to the complexity of road safety problems, some countries have opted to house this 'Road Safety Agency' within the offices of the Prime Minister (Japan, France). Other countries have brought a unit of this kind within a specialised department, usually the department that is responsible for transport and/or infrastructure. This agency organises (formal) discussions with other ministries. In addition, discussions and consensus with other organisations and institutions, that are of relevance to road safety, are very important.

If, in addition to coordination, a unit of this kind is also allocated executive tasks, two risks should be combatted. First of all that other departments within central government (in the field of physical planning for instance, the health care system or the police supervisory organisation etc.) think that, because a road safety unit exists, they can be less involved. It might also happen that the dynamism of the road safety unit takes the initiative away from other bodies.

To summarise, an attractive type of organisation is a separate unit or agency which combines coordination of policy (road safety seen as a facet of other areas of policy) and implementation of policy (particularly within the road safety sector, such as driving lessons, road safety campaigns). This unit should have sufficient direct access to a Minister in order to be able to aim at an effective policy. The unit has a relatively modest budget to enable policy to be implemented by others based on the idea of 'setting a sprat to catch a mackerel'. In addition to carrying out its own tasks efficiently, the unit will lay great emphasis on coordination by facilitating the activities of others, by providing encouragement and by making it attractive for others to contribute to improving road safety.

Neither one Minister alone nor central government alone will be capable of pursuing an effective road safety policy. In 1993, there are doubts about a 'makable society', but the view that central government could make a society finds little support any more. Other sections of government and private organisations are vital links. Local and provincial government in every country in the world has a crucial role to play in physical planning and in the construction and maintenance of road infrastructure, where they enjoy a relatively large degree of policy freedom. The more active these administrative layers are, the more knowledge that is available, the higher the budget allocated to improve road safety, the more effective the efforts made in terms of a reduction in the number of road accident casualties. Perhaps this is one of the most important organisational provisos for a successful road safety policy.

Another effective means appears to be to allow private organisations to participate in formulating policy and to involve them in implementing aspects of the policy. What is more, private organisations need to work together and reinforce one another rather than hinder one another. The road safety unit has an important part to play in this process. Private organisations and organised interest groups that are working together must be considered capable of exerting social pressure and creating public support within society. A road safety parliament or a road safety council might be seen as a formal expression of these views.

## 8. Content of the road safety policy

Since the beginning of the fifties a great many measures have been taken that have resulted in a substantial reduction in the risk of having an accident and have also led to a decline in the annual number of casualties. It seems that for the Netherlands, as well as for other countries, it is not possible to give a satisfactory explanation for the actual development; it is, however, possible to give an expert opinion on the basis of research findings.

### *Legislation and enforcement*

The first generation of road safety measures in many countries concerned laws and rules: first and foremost a Highway Code that included aspects relevant to road safety. In this context the following can be mentioned: speed limits, alcohol legislation, compulsory wearing of front and rear seat belts etc. The experience in many countries is that legislation is unavoidable, although it is much more important that there is public support within society for a particular law and that the government is seen to be taking its own laws seriously. The latter aspect is apparent from the lengths a government will go to in order to make the police enforce the law. Furthermore, it has proved useful to consider legislation as one of the elements of a process that leads to a change in behaviour and accidents (Wegman, 1992). The weakest link in the whole process determines the degree of effectiveness and a great deal of information can be found in the literature about how to maximise the gain in road safety while minimising the cost.

### *Infrastructure*

The sixties and seventies saw a great deal of investment in road infrastructure, also in the Netherlands. This resulted in a considerable expansion of the motorway network and in through traffic being diverted away from built-up areas. Comparison of the fatality rates for various types of roads reveals that the traditional roads (main roads within built-up areas and dual carriageways outside built-up areas, to which all traffic is admitted) are among the most hazardous in the Netherlands (Figure 3). The fact that the proportion of safe types of road (calming areas and especially motorways) in the total length of infrastructure has increased, and that the proportion of mobility on these roads and streets has increased even more sharply, has certainly contributed to the drop in the fatality rate by some 6 to 7% since 1950.

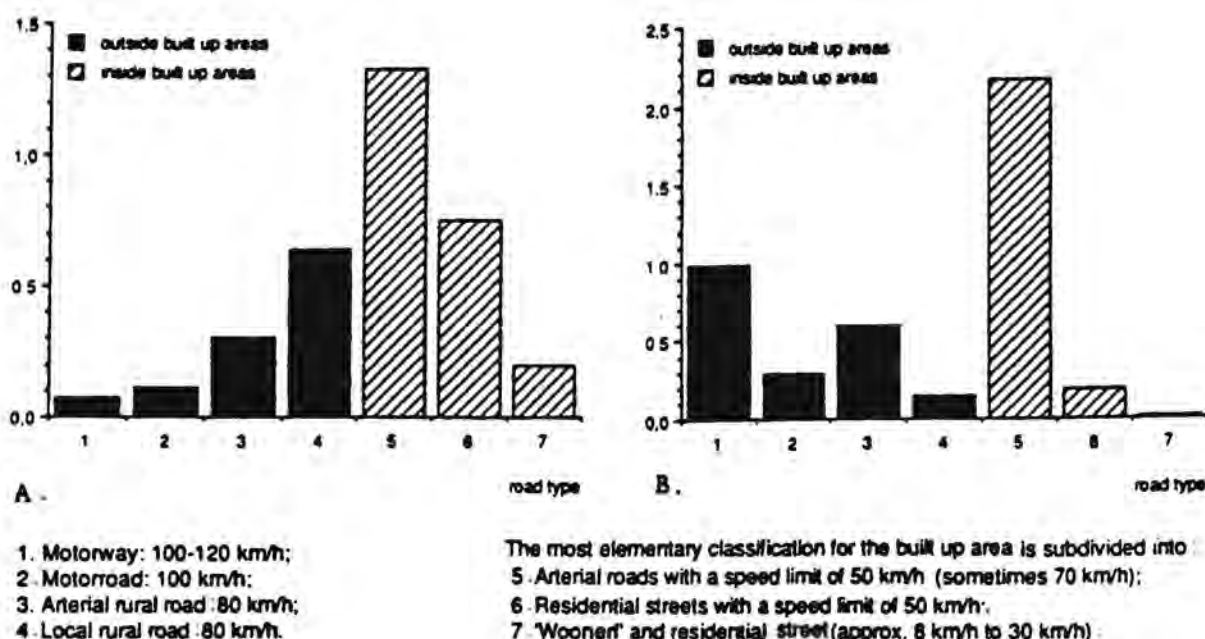


Figure 3. Injury accidents in the Netherlands (1986).

A: per million motor vehicle kilometers; B: per kilometer road length

A large part of the present Dutch road system, however, is still that roads and streets are expected to fulfil several incompatible functions at the same time, where the road user has generally to guess what to expect from the road traffic situation and is presumed to guess what others expect from him, where road users can and do drive at relatively high speeds, where large differences in speed are possible and do in fact occur, and where encounters with other road users coming from different directions are possible (SWOV, 1993). These factors explain the relatively high risks on these roads. There is some talk of a road system that has all the characteristics of gradual adaptations (not geared to one another) of the increase in mobility. There are three principles which, if they were adopted systematically and consistently, would result in a substantial decrease in the number of casualties. These three safety principles are functional use (preventing unintended use of the infrastructure, related to the function of the road), homogeneous use (preventing large discrepancies in speed, direction and mass at moderate and high speeds) and predictable use (preventing road users from experiencing uncertainty).

If these principles were to be adopted, three functions of the road system would be clearly discernible for the road user: the flow function (rapidly processing with through traffic), the access function (making residential areas and districts easy and rapid accessible) and the property and residential function (making homes and shops accessible and at the same time making the street a safe meeting place). The design of the roads should be adapted to the allotted function; combinations of functions should be excluded as far as possible. A number of scientific institutes in the Netherlands have elaborated this concept further and have found that for about 100,000 km of road an investment of 60 billion guilders (over a period of 30 years) is required. It would have been advisable when constructing and expanding the road system to adopt the principles mentioned as far as possible, which would have meant that such large investments were not necessary (in retrospect). For that, a reference plan for the whole infrastructure would have been needed in which a hierarchically designed road system should have been the starting point. Furthermore, there would have to have been design guidelines in which road safety formed an important starting point and where (legal?) steps were taken to prevent deviation from the required design quality.

Now that CEECs can expect an increase in mobility and expansion of the infrastructure, it would be advisable to speak out in favour of such an approach instead of acquiring a higher degree of road safety at a later date at a much higher cost, as is the case in highly motorised countries at present.

This does not mean though that no further improvement of road safety could be achieved in the short term with infrastructural measures. On the contrary, it is advisable to take low-cost measures at locations where many accidents occur. The SWOV has started work on a manual that could be used in CEECs (Slop, 1993). In this manual, knowledge of the so-called 'black spot approach', resulting in low cost engineering measures, in highly motorised countries will be combined with the specific problems in CEECs and the existing expertise in this area.

Furthermore, highly motorised countries have amassed a great deal of knowledge, which at present is termed basic but which has been built up over many years, about the effect of road design, road construction and materials on road safety. Examples include the use of marking and signposting, road surfaces, road side safety and winter maintenance. From the point of view of harmonisation it is also advisable for CEECs to adopt the general course of action of becoming a party to international treaties and conventions in this field.

### *Road users*

Safe participation in traffic is complex and is something which has to be learnt. A person who has just obtained a drivers licence has a traffic risk of approximately 3 times that of an experienced driver. Safe driving is only possible when drivers have gained practical experience in traffic. Drivers

need 50.000 - 100.000 km driving experience before an 'expert level' is reached. Considering the large number of young drivers involved in the total accident problem (in CEEC's there is a question of a large influx of novice drivers) a high quality initial driving course combined with the possibility of a provisional drivers licence is of great importance.

Police enforcement and information (also on police enforcement) seems to be an effective measure if the following conditions are observed. The enforcement should fit into a totality: legislation, education, enforcement and judicial procedures, it should have a permanent character, should have sufficiently high perceived probability of detection, should be directed towards for road safety relevant and clearly visible behaviour (speed limits, drinking and driving, seat belts, crash helmets). Enforcement should be carried out by well trained, motivated police personnel with good equipment.

### *Vehicles*

Vehicle flaws and defects contribute to the cause of about 10% of the accidents in highly motorized countries. The expectation is that in CEEC's the percentage will be higher. Defects on brakes account for about the half and tyre defects cause about a quarter of the accidents. Developments in the active safety of vehicles both in vehicle design and through periodical technical inspections have certainly contributed to improvements in road safety. Vehicle inspection could - for safety considerations - be directed towards brakes and tyres.

Besides, the cars that are now in production are better in the area of passive safety (improvements in crash worthiness of cars, cage-construction, seat belts, and airbags) than those of 10 years ago. In turn these are better than the cars of 20 years ago. The degree in which these developments have contributed to improvements in road safety is difficult to assess on the basis of research on road accidents, if only because the behaviour of drivers of vehicles can be influenced by the presumed increase in vehicle safety. Estimates in the USA show that the 'better vehicles' have led to 15-20% less occupant fatality risk. (Evans, 1991).

A target for CEEC's could be to achieve as soon as possible the 'western quality' in the area of vehicle safety by adopting international (EC) regulations and through an adequate organization of vehicle inspection.

### *Post crash management*

Proper treatment of the injuries of road accident casualties is vital to prevent the - unnecessary - death of any injured parties and limit the seriousness of the injuries, thereby minimising the risk of permanent injury. Apart from the human dimension, this also has implications for the economical costs of road accidents. This involves minimising the delay before treatment is administered and making professional help available as quickly as possible. This is an organisational problem (communication systems to enable an accident to be reported quickly, conveying doctors and nursing staff to the scene of the accident, transferring casualties to hospitals and proper treatment). All of this is particularly important for multi-trauma patients. The first hour after an accident is crucial.

In the area of assistance for road accident victims, as a rule the health service infrastructure will have to be used. One telephone number is therefore in operation in the Netherlands to report emergencies. It took an (unnecessarily) long period of time to establish this number because it was replacing existing local and regional systems. Since it may be assumed that a national system is the most efficient, the question arises why it is not immediately adopted. With regard to conveyance by ambulance and the quality of ambulance personnel, it is less a question of organisation and more one of costs and training.

## 9. Conclusions and recommendations

1. If it is assumed that the recent political and economic changes in Central and East European Countries (CEECs) result in economic growth, there will be an extra increase in mobility which, unless road safety measures are taken quickly, will lead to a decrease in road safety in CEECs. The increase in the number of road accident casualties in recent years proves that this expectation is correct. The number of casualties per 100,000 inhabitants and per 10,000 vehicles is (substantially) higher in CEECs than in highly motorised countries.
2. It is realistic to expect that an effective road safety policy in CEECs will result in a smaller increase in road accidents and casualties, as was the case in highly motorised countries until the beginning of the seventies.
3. With the knowledge that is presently available about the developments in road safety and the effectiveness of measures in highly motorised countries, the approach adopted in these countries could perhaps have been different than was the case in the past. CEECs might consider learning from this.
4. Road accidents usually occur as a result of a critical combination of circumstances and seldom have just one cause. There appear to be many opportunities for preventing human error that brings about road accidents (cf. the so-called phase model of the accident process). This could be used as a starting point when formulating a road safety policy. This means that thoughts and arguments with regard to road safety have to play a role in decisions concerning physical planning and urban development, in traffic planning, in policy concerning education, the police and justice system, the health service etc. This calls for integrated road safety programmes and requires the government to be organised in such a way as to reflect these. An agency or unit with the important task of coordinating policy is a vital aspect of this organisation.
5. A politically sanctioned National Road Safety Plan, that is based on the starting points formulated above, is 'owned' by the entire road safety community, can count on the support of (large sections of) the public, is based on a clear analysis of road safety and contains clear (quantitative) targets, can make a significant contribution to improving road safety. The implementation of this Plan should be monitored and the evaluation results of the monitoring should, if necessary, and in view of the targets to be achieved, lead to additional efforts being made.
6. The improvement of road safety should be situated in the long-term perspective of development towards 'sustainable' safe road traffic. Such a long-term perspective (20 years or more) should include concrete short-term goals. Steps should be taken to prevent measures being taken that jeopardise long-term targets: making compromises hinders the achievement of long-term targets and leads to extra costs being incurred. Short-term successes are most welcome.
7. Based on political will, on a proper organisation and making use of existing knowledge on the most effective and efficient measures, road safety can be improved. The chain is as strong as the weakest link. Improvement of road safety is an organisational and management problem in which the role of the government is crucial. Financial resources - or rather the lack of them - should not so much determine targets, but rather should only affect the speed at which the targets can be achieved.

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