

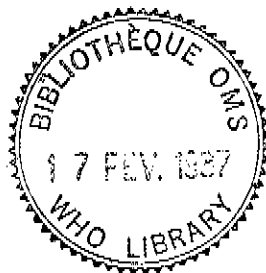


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ROAD SAFETY POLICIES: A BASIC FRAMEWORK

by

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ROAD SAFETY POLICIES : A BASIC FRAMEWORK

by

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1. Unsafety is the main negative aspect of increased mobility and transport development. It is a malfunсtion of the system associating road networks and traffic, the latter with two components: the road users and the vehicles.
2. Because accidents are critical events in a complex and interactive system, they always result from a combination of causal factors, related to the different system elements (road infrastructure and environment, road users, vehicles), and to their interactions (influence of environmental features on behaviour, use made of certain types of vehicles, compatibilities or oppositions between network design and different types of traffic etc.). It is essential for accident prevention purposes to get thorough understanding of accident causation processes.
3. The basic assumption in traffic safety work is that accidents can be prevented by eliminating or reducing the causal factors (or associations of factors) that have repeatedly appeared in past accident processes. Traffic safety policy objectives as well as types of preventive action should therefore be defined on the basis of a thorough safety diagnosis, drawn from past accident data (or valid surrogates) and any background information that may be necessary to clarify causal factors. This obviously requires reliable procedures for data collection and treatment, as well as some specific research.

4. Because unsafety results from both human and technical factors, the means to fight it will belong to several fields of action, some of them aiming at improving traffic environment or vehicles, others at influencing road user behaviour. Accident prevention is thus a multidisciplinary activity, including for instance urban development, public transport management, road design, road improvement or maintenance, driver training, child education, information of the public, emergency rescue system, emergency medical treatment, laws and regulations, and enforcement.

5. Because accident factors are not independent and interact with each other, the various actions proposed to eliminate or reduce them should be designed as a set, in order to enhance each other and create maximum effect at minimum cost. In general, coordinated safety programmes should be preferred to the successive application of individual countermeasures.

6. For an integrated (or coordinated) safety programme to be applicable, it is essential that there should be some opportunities for communication and coordination between the decision makers responsible for the various fields of action. This may mean creating specific traffic safety bodies, for instance at the national level, gathering the heads of the relevant government departments, or at the local level, in large cities or in regions, gathering the potential safety "actors", whether elected representatives, members of a technical staff, policemen, or private groups.

7. Integrated safety programmes should primarily be designed at the national level, at least as a reference framework for action. But integrated safety programmes may also be designed and implemented at the local level (for instance in regions, districts, or cities), either to relay national policies,

or to complement them with specific actions carried out in closer contact with the road users themselves. Local safety work can be encouraged at the national level by providing funds, incentive programmes, technical manuals or training seminars, and research results. The amount of decentralization best suited to any country is related to its specific historical and socio-economical situation.

8. In terms of socio-economical, physical and psychological background, developing countries are somewhat different from most of the countries where traffic safety work has currently been carried out for several decades. As a consequence, accident patterns and trends are not the same, priorities are different, and the acceptability of some countermeasures applied with profit, in Europe for instance, cannot be guaranteed. Accident prevention in developing countries should therefore be partly considered as an experimental activity, leaving a large place to innovation, and opening the way to new approaches, both in terms of organization or structures, and of countermeasures.

9. Where there is innovation and experimentation, integrated safety programme should include a follow-up scheme, in view of assessing the effects of the measures taken, both quantitatively ("has safety been improved, and by how much?"), and qualitatively ("did the countermeasures work as expected? If not, what went wrong?"). This requires detailed definition of follow-up studies, including planning, data gathering and treatment. Again, a minimum of research will be necessary to carry out this task. There is no other way to build up new knowledge.

10. Because of the experimental aspects of accident prevention in developing countries, much has to be gained from international cooperation, both at the policy level, in order to compare different types of organization for traffic safety management or to initiate comparable countermeasures, and at the scientific level, to pool evaluation results, and thus widen the opportunities of gaining knowledge and "know-how".

ROAD SAFETY POLICIES : SOM FUNDAMENTAL QUESTIONS

by

N. Muhlrad

1. Status of national policies and programmes on traffic safety

Past experience in traffic safety has shown that preventive action is possible only when it becomes a priority at national government level. National administrations play an essential part in collecting basic accident and traffic data, promoting research, initiating experimental programmes, setting laws and regulations, providing technical and methodological tools where and when necessary, informing the public, and coordinating actions carried out in different fields or in different parts of the country.

Large scale accident prevention thus requires national policies and specific organization at the central level. But it does not follow that all safety action should be carried out at the same level: a certain amount of decentralization may be reasonable, and even in some contexts necessary, for the design and implementation of countermeasures. Decentralization offers some specific advantages:

- at the local level, traffic safety may be integrated to a set of objectives or practice, in order to treat the accident problem in a systematic way and at low cost (in some cases even with no additional cost of its own);

- at the local level, it is easier to get in touch with the road users, through direct contacts for instance, in order to inform or educate them; existing organizations working at neighbourhood level (such as health officers, schools, etc.) may be interested in cooperating in accident prevention;

- some additional funding for traffic safety action may sometimes be found at the local level, due for instance to specific actors or large commercial firms settled there, and aware of the importance of accident prevention;

- giving some traffic safety responsibilities to local authorities should in the long range generate a large number of safety professionals, thus increasing the potential for innovative action and new knowledge in the field.

The amount of decentralization suitable for any given country largely depends upon its historical and administrative background, as well as the local economic conditions. There is no simple model of traffic safety organization, but several possibilities, which can be illustrated in the following examples picked up in Europe and in America:

- a) The most decentralized pattern is found in federal countries, like the USA or West Germany for instance, where most of the traffic safety measures are decided and implemented at the local level (the state or land, and sometimes the city), and where even laws and regulations may not always be national.

b) The most centralized pattern is usually found in relatively small countries, where operations can easily be controlled from the top, and where even road maintenance is entirely programmed at the national level; in Europe, Ireland for instance is in this category.

c) Intermediate levels of decentralization exist in other countries. The main identifiable patterns are the following:

- the sources of funding remain centralized, which means that the national administration retains control of whatever action is finally carried out in the field, even if the responsibility for operations is actually delegated to local authorities;
- local authorities (city or county governments for instance) have their own means of funding some traffic safety action in particular fields, such as urban traffic management, road maintenance, child education, etc. Decisions are then taken locally, although some fields may remain the responsibility of the national administration (laws, regulations, driver licensing, etc.).

It is clear that the most decentralized traffic safety organization is, the most difficult it will be to coordinate what is done in the field (suggestions having to replace standards for operations), and to collect information at the national level on local safety activities; but also the greater the potential for countermeasures well suited to the local context, and the chances of raising public awareness of the importance of accident prevention. The final choice should in the end be specific for each country.

2. Policy issues concerning transport development and traffic management in relation to safety

Particularly in the larger cities, but also in smaller urban areas and on rural highways, organization of daily trips, modal split, and adaptation of infrastructure to the kind of traffic that uses it, have a distinct influence on accident patterns and numbers. The safety factor should therefore be kept in mind when working on transport development or traffic management.

Past experience in European cities shows for instance that public transport vehicles have a much better safety record than private cars, and even more so than two-wheelers: any urban public transport system operated under similar conditions and providing a suitable alternative to cars, bicycles, mopeds, or walking, can therefore be expected to improve overall safety; this implies however, first that the local road network can be reorganized for suitable public transport operation (or else that the latter is based on rail or other specific infrastructure), and second that pedestrians are taken into account in traffic planning and road improvement, so that trip ends, from and to the public transport system, are safely made.

When planning an urban transport system, it would be advisable to take traffic safety into account in its economic assessment, evaluating the safety gains expected in the new situation as compared to the old one; however, this is a difficult task as there are yet no studies available, quantitatively relating accidents to trip patterns and modal split: research is still needed in this field. In the present state of knowledge, only an empirical approach adapted to each particular traffic and accident situation can be advocated. This applies both to urban and rural transport systems.

A little more is known on traffic management. Traffic plans have now been implemented in most European cities as well as in a number of third world ones, with the dual aim of rationalizing the use of the existing street network, and of adapting the network to the newly organized traffic. The success in terms of accident reduction has proved highly variable, depending on the amount of control retained on car traffic, and the extent to which all types of transport means (including walking and cycling) were provided for in the final structure.

Traffic plans are obviously an indispensable feature of transport operation in large cities, but to succeed in improving safety, they have to meet some minimum requirements:

- provide increased facilities and protection for all significant categories of road users, with a priority to pedestrians, as walking is the basic transport mean and concerns the whole population;
- take into account the whole urban area, and not only its central part, in order to avoid possible "accident migrations";
- provide "quiet traffic areas" where needed for urban life, as for instance on commercial streets, or in neighbourhoods with many young children or elderly people;
- consider all aspects of transport operations, including elements such as access to bus-stops or stations, car parking etc., in order to avoid the development of unforeseen unsafe situations;

- include all necessary devices to control the speeds of the different categories of vehicles, in order to keep them under suitable limits in view of the local infrastructure and the presence or absence of vulnerable road users.

In short, urban traffic management plans should not reflect any priority given to one particular type of transport mean, but should for safety reasons show a balanced view of all components of the transport system as a whole.

3. Policy issues related to road engineering

Improving roads, through better engineering, maintenance, and proper safety devices is essential to increase safety, as can be seen from past experience in European or American countries: the infrastructure has to adapt to ever increasing flows of vehicles and mobility needs, in order to avoid critical situations where the road and its use would become incompatible.

Improving the road network to allow for adequate traffic operation is of course the first way to prevent accidents, provided vehicle speed is kept under a fixed limit: adapting the infrastructure would otherwise be an endless and frustrating task... The maximum acceptable speed is thus a necessary compromise between travel objectives, potentiality for road improvements, and safety. A few other principles have to be kept in mind when building or upgrading a road:

- movements and safety of all road users (including pedestrians, two-wheelers etc.) should be taken into account when calibrating and organizing the road-space;

- a driver's task is complex, the environment should not make it worse; any type of pitfall that could lead to a mistake should be avoided: road junctions should be easily detectable at a distance, areas where pedestrians cross should be well indicated, hazards should be signed, inhabited areas clearly marked etc.;
- in difficult situations where incidents are likely to occur (road bends or other singular points or sections), the road or the roadsides should be designed so as to allow evasive action, with respect to vehicle dynamics and driver's reactions;
- in any operation of road building or safety improvement, provisions should be made for future maintenance.

In addition to this "built-in" approach to safety, specific corrective action, motivated by past accident history, is also currently undertaken to solve the problem, especially on locations where accidents are seen to accumulate; for instance:

- blackspot treatment has been one of the major features of road safety policies in Europe for the last 20 years; blackspots are most often intersections or pedestrian crossings in urban or rural areas where a specific environmental problem generates an accident process: the corresponding treatment is therefore highly situation-related, and requires a strong safety diagnosis, in order to be designed as efficiently and cheaply as possible. This approach has provided good safety results, but has also reached its limits, at least in countries where it has been systematically implemented: once "real" blackspots have progressively been eliminated, a wider approach is needed to tackle the remaining accident problem.

- route treatment, or safety diagnosis and countermeasures applied to a stretch of road in urban or rural area, takes into account the adaptation of driver behaviour in relation to changes in the driving environment, as well as the possible frictions between different types of traffic (pedestrians vs. vehicles, access vs. through traffic, etc.); it is now a current way to improve safety on highways or urban arterials displaying several related accident blackspots (or greyspots), or a continuous accident pattern. This approach derives from the blackspot one, but is somewhat more difficult to apply, as the interactions between behaviour, and road or traffic features have to be identified and elicited.

- area-wide countermeasures are usually designed for parts of urban areas, where a specific safety problem is identified, but where accidents are scattered all over the street network; this is the case for instance in residential areas (accidents involving young children or elderly people), in commercial areas (friction between different types of traffic) etc. Most of the treatment consists of channelizing through-traffic on adequate parts of the network through devices such as road closures, one way streets, and so on, and slowing down vehicles with speed restraints (humps, chicanes, mixed traffic streets etc.). Such schemes, involving half road or environmental improvement, and half traffic management, have proved quite successful in European cities over the last few years, provided the side-effects (traffic increase on some routes) were adequately controlled; but they are sometimes costly.

All approaches to road improvement, whether integrated or corrective, have their advantages and their specific fields of application, and any road safety policy should consider a combination of them, in view of the accident

situation in the country. Of course, financing road improvements will be a major problem, and to obtain "built-in" safety is of course cheaper in the long range than having to develop corrective action...

4. Policy issues related to vehicle safety

As concerns the vehicle, most safety policies have so far concentrated on regulatory measures. For instance:

- some particular specifications may apply to vehicle construction, if there are manufacturers in the country, or to importations;
- special safety devices may be made mandatory, such as safety belts, anti-locking brakes for lorries, crash protection etc.;
- maintenance standards may be defined, such as maximum amount of wear for tyres etc.;
- technical control of vehicles at regular intervals may be made mandatory for goods or public transport vehicles, as well as for cars (but usually with different procedures).

Most of these policy elements are actually applied in European or in American countries: although it is often difficult to identify the part played by the vehicles themselves in accident processes, it is clear that ill-built or ill-maintained cars, lorries or two-wheelers are likely to aggravate unsafety; some of the regulations, however, such as the periodical control of vehicles, are not so easy to organize and enforce, and are thus not always as effective as expected.

5. Policy issues related to behaviour

Taking measures to influence road user behaviour in order to make it "safer" covers a whole range of possible actions:

- a) behaviour can be changed locally and rapidly through improvements to the road, the street, or the driving environment; assumptions are then made as to what a "safe behaviour" should be in the particular circumstances considered, and physical countermeasures are designed accordingly;

- b) general behaviour can be changed also rapidly through regulatory measures, such as speed limits, laws on professional driving, maximum alcohol rate etc.;

- c) driver behaviour can also be improved through better training; effects should be immediate for the drivers who have just been trained (improved vehicle handling, better knowledge of the rules), but the overall effect on safety of a training system can only be assessed in the long term when enough drivers have gone through it; training can be considered in relation with licensing, but may also be organized as an addition to the licensing system, for instance for professional drivers, road users having committed serious offences, who-wheeler riders etc.;

- d) road user behaviour can be influenced through a change of attitudes, or through improved knowledge of the traffic and its environment, although any precise relationship between these three factors has never been identified; changing attitudes or improving knowledge is usually sought through information campaigns, carrying specific messages for target groups of road users defined in view of the accident problem in the country; according to

their particular aims, campaigns may be launched at national level or more locally, and may use different sorts of media. Their safety effects are difficult to establish; it may be suggested, however, that while campaigns on their own may not be as efficient as needed to actually influence behaviour, campaigns designed and implemented to support another type of safety measure (environmental or regulatory for instance) may be extremely useful;

e) education is the main type of action to consider when aiming at changing behaviour in the long term; educating children first to care for their own safety as pedestrians, then to be better two-wheeler riders or car drivers, can have visible effects on safety only after a generation of pupils have gone through the system, and have grown up enough to experiment several phases of road practice. Building and evaluating an education programme is not an easy task, but it is an important one if safety measures are to cost less tomorrow than they do today: improving long term behaviour is part of the same issue as designing roads with "built-in" safety.

Education programmes, to have a positive influence, should be progressive, so as to take into account the age of the children they address to, and their corresponding abilities to learn and to tackle their task as road users; their content should also be defined in relation to the specific rules and traffic conditions in the country, in order to be realistic and avoid inducing inadequate items of behaviour (particularly as regards interactions between child-pedestrians and cars).

Education programmes, as experimented (and often mandatory) in European countries, are usually part of the primary school curriculum. A new trend is now to start education earlier, for pre-school children (under 5 or 6),

providing pedagogical help through books or media, and relying on families to do the work. Some evaluation of such "home" programmes has been made, for instance in England, and results have been encouraging. Extension of school programmes for children over 10 is also being experimented.

6. Policy issues related to legislation and enforcement

Safety policies in terms of traffic laws and regulations are not easy to design:

- They have to be well integrated into the country's own legal system, while at the same time conforming to some international consensus, in order to avoid problems for foreign drivers, as well as for nationals driving abroad;
- laws have to be acceptable for a majority of road users; the necessary changes in attitudes may sometimes be achieved through information campaigns, but these changes should be effective before the law is passed;
- laws should be enforceable: it is useless passing a law whose application cannot be controlled, as the road users will soon be aware of it...

On top of the usual driving code, the main laws and regulations currently applied in European countries are:

a) speed limits: they vary between 48 and 60 km/h in urban areas, between 80 and 110 for cars on rural roads, and between 90 and 130 on motorways (where they do not always exist yet), and are the result of a local compromise between safety and the requirements for fast travel; as such, and with proper enforcement, they work (to some extent) and have proved efficient in reducing accident numbers and severity;

b) alcohol regulations: in most countries, a maximum rate of alcohol in the blood stream has been fixed between 0.5 and 1.0 g/l; enforcement is difficult, and alcohol laws seem to be successful for a limited time, and need to be regularly supported by campaigns or strengthened;

c) mandatory safety belt wearing: such law has proved everywhere very useful in reducing accident severity, but its efficiency seems to have been greatly enhanced in countries where information campaigns have been carried out over long periods before the law was taken; there are indications that seat belt wearing may in the longer term be well accepted enough to do without enforcement, as this is the case already for instance in Germany and in England;

e) mandatory helmet wearing for two-wheelers: this is a well accepted and efficient measure in Nordic and temperate countries, perhaps not so much so under warmer climates; public information is again a valuable tool to enhance the effects of the law;

f) a variety of other laws or regulations, although not so generalized as those mentioned above, are still often applied: obligation for children under 10 or 12 to travel on the back seat, special rules for professional drivers (maximum daily driving period, weekly rest etc.), and so on.

Whatever the policy, enforcement strategies are necessary; the existing ones, as well as the penalties for traffic offenses, vary very much according to the national context, and there has been no attempt to homogenize this type of action, as the modalities for control and enforcement should be defined in accordance with each country's traditions and legal system. One sure thing is, enforcement is expensive, time and manpower consuming, and sometimes damageable for social life: it should thus only be considered as a way to eliminate marginal risky behaviour; laws and supporting measures should be defined and implemented so that a majority of road users conforms without the need for any police, fines, or jails.

7. Emergency rescue systems

Traffic safety policies do not involve only preventing accidents, but also reducing accident severity. One of the most important factors to avoid unnecessary deaths from accidents is the speed of the rescue after a collision, and the medical quality of the treatment delivered in the first minutes after the crash to the victims. Organizing an efficient emergency rescue system, based on a quick reporting procedure for accidents (alert), and an adequate network of medical centres equipped for reanimation, is therefore a major feature of any safety policy designed at the national level.

8. Monitoring the safety situation

In order to design traffic safety policies, to identify the main priorities in accident prevention, to prepare and implement a programme of countermeasures at the national or the local level, and finally to evaluate the safety gains obtained and orientate future policies accordingly, a sound accident data base is needed.

National Accident Statistics, which should be exhaustive and reliable, are the basic tool for any safety decision-maker. They are usually prepared yearly by a centralized agency, and treated on a computer, after proper checks on the basic data, and on the conditions of its transfer from local to central level. The amount of details to include in the statistics is usually a compromise between the minimum necessary for policy purposes, and practical requirements for the data collection: it is better to obtain little accurate data than a large range of unreliable or uncomplete information.

Accident statistics, although essential, are usually not sufficient to help in the detailed design of countermeasures, or in research studies, as they describe the unsafety situation without giving enough indications as to the accident causation processes. More detailed accident data is therefore also necessary, gathered at least on representative samples of accident situations, and requires investigations to be carried out at the collision scene immediately after the crash, by a team of specialized investigators trained for the task. Detailed accident data collection should be linked to the emergency rescue procedure (in order to avoid duplicating the alert system), and should also, if possible, be coordinated with the statistical data collection, to make the best use of available manpower, and to eliminate possibilities for discrepancies between the two data sets.

9. Research, technology transfer, and technical cooperation

Very few safety measures applied in developing countries have yet been followed up and evaluated: very little is known about the accident processes specific to these countries, even less is known about how to influence behaviour, and how countermeasures actually work. Results drawn from European or American studies and experiments may or may not be applicable in a different psycho-sociological and economical environment, but in any case the differences or similarities relevant to information transfer have not yet been identified. Research is thus acutely needed, in combination with field-experimentation.

Such research is, of necessity, multidisciplinary, just as accident diagnoses and safety action themselves. To be efficient, it should take into account the priorities identified for safety programmes, provided these are rationally defined on the basis of valid accident data. But long term research, aimed at improving preventive action, and at studying the effects on behaviour and accidents of the countermeasures applied, should not be neglected as it will provide the only way to move from a corrective approach to integrated safety.

Research activities require high skills and time, and are usually expensive. Research cooperation between countries showing comparable geographical, psycho-sociological or economical conditions is highly advisable, in order to pool the available means in terms of manpower, technical tools, data, and scientific information, organize common research studies, and compare results. New ideas and concepts are also more likely to appear when a larger number of researchers get the opportunity of working together on a permanent basis (as can be seen from examples in Europe).

Although the conditions for the application to developing countries of the knowledge gathered for instance in Europe have not yet been identified, it is clear that the methodological experience, as well as some basic scientific findings, should be of use for safety research and the design of countermeasures in other contexts. Cooperation between developed and developing countries in the traffic safety field should therefore be of help, and should save valuable time.

If research and practice do (as they should) work hand in hand, it should be possible to set permanent international structures for information exchange, and policy and research cooperation, both at government level and between researchers.

10. Infrastructure for intersectoral management of traffic safety programmes

Although policy issues for traffic safety improvement have been detailed in this paper according to the main element of the traffic system they apply to, the corresponding countermeasures should be seen as working best in combinations, and require coordination: accidents result from multifactorial processes, and actions aiming at the elimination of several associated factors are bound to enhance each other.

Safety actions applying to different components of the traffic system (the environment, the road, the vehicle, the road user) are usually taken under the responsibility of different administrations or bodies. Coordinating safety measures, for instance in a medium-term integrated programme, thus requires that some specialized structure be set, with advisory, or preferably decision-making powers, over the bodies concerned. In the most favourable case, the traffic safety specialized structure will also have its own budget.

Such a structure already exists, for example, in most countries of the European Community; it may be a Parliamentary Commission (as in Great Britain, Germany, Belgium, Luxembourg, Denmark, The Netherlands), an Interministerial Committee (as in France, Spain, Portugal, Italy), or a National Private Council (as in Ireland). One of the government departments concerned with safety is usually designated as the leader; according to the country, it may be the Department of Transport, Public Works, Interior, or Justice. Even when the Central Traffic Safety Institution has officially only advisory powers, its influence on safety programmes is usually considered great.