

MAKING ROAD SAFETY AUDITS A EUROPEWIDE TOOL

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ABSTRACT

Road Safety Audits are relatively new practices. However, their potential benefits to road safety are well known. This article gives an overview on the current practice of road safety audits in the world and presents a compilation of technical procedures concerning road safety audits.

1. INTRODUCTION

In 2001 the European Union set itself the ambitious objective of halving the number of fatalities on European roads by 2010 from 50 000 to 25 000 [1]. While progress is being made [2], road accidents have still caused 38 400 victims on EU roads in 2005.

Much progress has been made in terms of vehicle safety. Car occupants run a much lower risk of death or injury in case of crash than ten years ago. Test and training requirements have been gradually increased to ensure that European drivers can cope with the dangers of road traffic. Because speeding, non-wearing of seat belts and drink-driving are the main causes of death on European roads, enforcement of traffic rules has been stepped up [3]. Besides action on the driver and the vehicle, infrastructure should be the third pillar of any comprehensive road safety programme. Physical features of a road network together with associated traffic volumes are important contributing factors to accidents.

Therefore, the European Commission has adopted on 5 October 2006 a proposal for a Directive on road infrastructure safety management centring on the following four procedures:

- (1) *Road safety impact assessments* will help strategic decision-making about the safety implications of new roads or major changes of operation of existing roads, especially on the adjacent network.
- (2) *Road safety audits* shall provide for an independent control and recommendations for technical verification of the design of either a new road or a rehabilitation of a road.
- (3) *Network safety management* is to target remedial measures to parts of the network with high concentrations of accidents (high risk road sections or black spots) and/or a high potential to avoid them in the future.
- (4) *Safety inspections* as part of regular road maintenance will allow detecting and reducing in a preventive way risks of accidents through cost-efficient measures.

These procedures already exist and are applied at varying degrees in some Member States.

2. ROAD SAFETY AUDITS HISTORY

Road Safety Audits originated in accident investigation [4]. Modern road safety audits were established by British traffic engineers in the 1980's. The idea of safety audits, however, is much older. The first procedures date back to the 19th century when senior army engineers were ordered to investigate the frequent occurring railway accidents. Based upon their findings, recommendations were made how to prevent similar accidents, and inspections had to be carried out before a railway line was opened [5].

The procedures developed in the United Kingdom in the 1980's were adopted by many other countries around the world. Australia and New Zealand established Road Safety Audit procedures in the early 1990's. After the United Kingdom, Denmark, Iceland and Norway were the first countries which introduced RSA procedures in Europe.

In the late 1990's a large number of countries began to show interest in Road Safety Audits. Among others, these countries were Austria, Canada, the Czech Republic, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Poland, Portugal, Spain and the USA.

3. DEFINITIONS

Throughout the world several different definitions of road safety audits exist. According to PIARC [6] a Road Safety Audit is a "formal systematic road safety assessment of the road or road scheme carried out by an independent, qualified auditor or team of auditors who reports on the project's accident potential for all kinds of road users". Although the given definition also includes reviews of existing roads, the current international understanding of road safety audits refers to examinations conducted in the planning and the design stages of road projects (which include new projects but also re-design projects) before or shortly after a road is opened to traffic or the measure is completed [7,8,9].

4. REASONS FOR CARRYING OUT ROAD SAFETY AUDITS

In most countries design guidelines are applied which consider road safety issues implicitly. Despite the application of these guidelines, accidents occur on new roads. This is caused by a number of reasons. First, design guidelines often contain minimum requirements regarding road safety. An inauspicious combination of design elements with minimum standards can lead to hazardous road stretches. Furthermore, during the design process, a road designer has to keep several issues in mind which have an affect on the design itself. Besides the environment, the project costs and the topography, often political restraints or the opposition of pressure groups and concerned residents force the designer to make compromises. These compromises in design do not always lead to a design with the highest level of safety. To avoid negative effects on road safety, alternatives or compensatory measures have to be found.

For this reason, audits are carried out in order to give road safety issues higher weight in the planning process and to avoid road accidents before they happen. The aim of Road Safety Audits is to ensure that all new road schemes operate as safely as possible from the view of all road users. During a road safety audit, an independent road safety expert (auditor) checks the road schemes for any possible improvement regarding road safety. Audits allow decision makers to include safety considerations in all their decisions and should therefore be an integral part of the planning process.

At the first sight, one may consider audits as checks for possible errors in design. The fear of being controlled is therefore one possible reason why in the implementation phase some designers seem to reject the idea of road safety audits. To find errors is, however, not the primary aim of audits. The independent safety check of the auditor should provide information how the design can be improved with regard to road safety. These improvements do not necessarily deal with errors, i.e. deviations from existing standards, only.

Most guidelines and design standards imply a correct behaviour of the road users. But more than 90% of all road accidents are caused by human errors. Therefore, a user friendly and safe road design does not only have to comply with standards but it must also consider human behaviour and the latest road safety research. Road safety audits are therefore carried out by specialists, experienced in road safety and traffic behaviour research in order to help road designers and road owners to design roads which are as safe as possible for all road users.

5. THE AUDITING PROCESS [10]

5.1. The participants

Mostly three different parties are involved in the audit process: the client, the designer and the auditor. The roles and responsibilities of the different parties can sometimes differ.

Client: The organisation responsible for the project. This is often the road authority or local stakeholders but also private investors can be responsible for road projects.

Designer: A person or team commissioned by the client to develop the road schemes. The design team can be part of the client's organisation.

Auditor: A person or team commissioned (or approved) by the client to carry out the audit. The auditors should be independent from the designer's organisation.

In order to ensure an unbiased judgement, the auditor should not be involved in the design process or in the operation of the road.

5.2. Stages of audits

Audits can be carried out at different stages in the development of road projects. There is clearly a need to audit road or traffic related projects at different stages of the project cycle. Otherwise there is a great risk and possibility that important safety issues are not considered or even identified before it is too late or expensive to change the project design.

Feasibility stage (stage 1): At this stage the road project itself and all possible alternatives are evaluated. After the feasibility stage the route will be determined. At this stage, an audit can influence general design issues such as route choice, general road layout and number and types of intersections.

Preliminary design stage (2): At the preliminary design stage the general alignment is worked out. Audits deal with horizontal and vertical curves as well as cross section dimensions and the general junction layout prior to land acquisition procedures.

Detailed design stage (3): Detailed schemes are worked out at this stage prior to contracting the construction. The schemes contain detailed information on any road elements, installations, traffic signalling as well as regulation, markings and roadside equipment. Audits check the safety of these aspects.

Before opening stage (4): Audits at this stage take place after completion of the construction, shortly before the road is opened to traffic. Auditors inspect the sites at different daytimes in order to check if the safety of all road users has been considered.

After opening stage (5): Audits at this stage are carried out after completion of the construction, shortly after the road has been opened to traffic. Auditors check if the road users make use of the road as intended.

5.3. Inspection of schemes/ Site Inspection

During the road safety audit, the auditor critically analyses all available schemes and data. Even during the early planning stages a site inspection helps to assess the road infrastructure project and its surroundings (e.g. traffic situation, the design of adjacent road sections, roadside environment etc.).

Auditing is no simple check whether the design is according to the standards. The audits are more focused on real safety issues affecting road users rather than design issues. The auditor has therefore to check if the road infrastructure is safe from the point of view of all road users groups, including vulnerable and impaired road users. A site inspection at different daytimes (rush hour, dusk/dawn/night) can be necessary.

The most important question the auditors have to answer during the inspection is: “who can be hurt here and why?”

The auditor carries out the audit based on his experience and his knowledge on road safety issues. A profound knowledge therefore is the precondition for carrying out audits successfully. In order to assure that no relevant issue has been overlooked, the audit can be assisted by the use of checklists. Checklists have to be tailor-made in order to match regional road safety problems. They can be different in form and size and should be adapted to different road types and audit stages. Whether they have to be more comprehensive or quite concise depends on the experience of the auditors. While inexperienced auditors need more guidance where to look at, practice shows that more experienced auditors only need a list of general topics which they countercheck after having conducted the inspections.

5.4. Reporting

After the inspection of the schemes the auditors prepare an audit report. This report should contain information regarding the project, the auditors and the audit itself.

The auditors list all safety hazards they have found during their inspection. They have to take care that only safety relevant aspects will be part of the report. The report is meant to be sent to the client who will decide how and which of the listed hazards will be treated.

In order to get a high acceptance of their recommendations the auditors should describe the potential hazard. E.g. “A further growth of the roadside vegetation will block the sight line between pedestrians and motorists. As a result, right-turning cars cannot see pedestrians in time”.

The report might also contain recommendation how to solve the problems (e.g. “Remove the sight obstacle”). However, for most hazards usually more than one possible solution exists. The proposal of one design solution by the auditor might imply legal consequences for both the auditor and the client.

For this reason, it is common that the designer works out solutions based on the advice of the auditor or possible solutions are concertedly worked out in a completion meeting. In any case, the decision on the remedial measure has to be made by the client.

5.5. Follow ups

The decision whether or not a recommendation made by the auditor is accepted is in any case taken by the client (road authority or the political body) who bears responsibility for the road. Afterwards, the client instructs the designer to make the changes in the design. If the audit causes major changes in the scheme, the new scheme can be subject for an audit again.

In the case that important reasons lead to a refusal of the auditor’s recommendations, an exception report has to be prepared by the client stating the reasons for the decision. This report should be filed together with the audit report.

The audit process should be an active, self-enhancing process. In order to increase experience and the quality, a feedback should be given to the auditors after the audit.

6. REQUIREMENTS FOR AUDITORS

Road Safety Audits started in the United Kingdom, and all countries that introduced RSA afterwards where inspired by this example. Still the demands with relation to the skills and the experience of the candidate road safety auditors and the approach for the training courses differ widely.

Many countries are still in the early phase of introducing RSA. Other countries have passed this phase and have defined the skills and the experience of the candidate road safety auditors and the approach for the training courses in a very strict and detailed way, based on their earlier experiences.

Introducing RSA in a country is not easy with relation to the qualification and the formation of road safety auditors. The knowledge and especially the experience are normally not available on the necessary scale, and it takes time to solve this problem. Some countries therefore made an appeal to other countries for assistance. When the first road safety auditors have gathered some experience, it is important that it will be passed to their colleagues and to the next generation of auditors. In the first instance this can be done by training courses. Formal or informal meetings between road safety auditors or integrating candidate road safety auditors in the activities of road safety auditor teams as part of their training are additional possibilities to train auditors.

There is a common awareness among all countries that the principal requirements for candidate road safety auditors are their earlier skills and experiences. The training courses, which in most countries take only 2 or 3 days, cannot possibly provide them with all the necessary information and skills they will need. In these courses the emphasis is

rightly placed on explaining what road safety audits are, and how they are executed in the best way.

Several countries which perform road safety audits have training courses for auditors, but they are not always preconditions for carrying out road safety audits. These courses are only standardised in some countries and participants do not always get certificates. In general it is desirable, especially for countries which do not have an elaborate tradition in road safety, to establish standardised courses.

Many countries are convinced that a certain technical knowledge is indispensable for road safety auditors, but that they do not necessarily have to be engineers in the field of road design or construction. Road safety is also a matter of human behaviour. A road safety auditor should not be a specialist in only one field of experience, but have a very wide field of knowledge in order to be able to deal with all aspects of road safety. If some very specialist knowledge is needed within an audit of a specific situation, the assistance of an external specialist can be enlisted.

Depending on the process of decision taking, in some countries the importance of the ability of the road safety auditors to express themselves in a clear manner in speech and in writing, and to convince people, is recognised. The importance of these abilities is gaining even more emphasis when bearing in mind that although a road safety audit is only an advice to road authorities, it is important that the auditor's recommendations are followed as much as possible and that drawing up a road safety report is often a process of several people working together.

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