INTEGRATION BETWEEN OPERATIONAL SAFETY REVIEW AND TYPICAL ACCIDENT SCENARIOS TO IMPROVE THE SAFETY OF WALKING IN URBAN AREA

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ABSTRACT

Public officials are constantly looking for ways to improve roadways safety especially for walkers, but with increasingly scarce funds, it is difficult to seek-out new ideas of area-engineering, enforcement, legislation, training and public education.
This paper presents how to obtain a preventive method for improving road safety, which gives solutions that can be easily evaluated by project officials or managers, integrating two different techniques: the “Operational Safety Review” and the “typical accident scenarios”.
Road Safety Audit is a formal assessment of the safety of a future road; in the case of an existing road, this method is called “Operational Safety Review” (OSR). This is a method of prevention of road accidents, which consists in an examination by an independent team of trained specialists, who assesses the crash potential and safety performance of a road and prepares a report that identifies potential safety problems, proposing improvements.
The method of typical accident scenarios, developed in France at the end of the 80s at the *Institut National de Recherche sur les Transports et leur Sécurité (INRETS),* takes its origin from the black spots analysis. Reviewing all the Police reports of a certain type of accidents occurred in an area, they are classified in order to their temporal and casual development. Every group of accidents which have particular similarities constitutes a scenario, and for every scenario some solution are proposed.
In OSR, checklist are used during the drive-/or walk-through as a memorandum of all the factors that might cause crashes, but the solution to the problems should be given every time by the experts; to obviate this, typical accident scenarios can be associated to some problems which can constitute part of a checklist; consequently the solutions related to the scenario, would be automatically connected to the problems in the checklist and technicians would have solutions, among which they could choose the most suitable ones.
As a case study Brescia (an Italian town with about 200.000 inhabitants) have been chosen, for which several typical pedestrian accident scenarios exist.
Since 1991 the University of Brescia has been monitoring and mapping road accidents, developing a long experience about road safety in urban area and particularly about OSR and typical accident scenarios.
The effectiveness of the integration of these two methods will be therefore proved through the creation of a database of typical accident scenarios with the solutions related, that the Public officials could easily manage.

KEY WORDS

SAFETY / WALKING / OPERATIONAL SAFETY REVIEW / CRASH TYPING / COUNTERMEASURES.

Even if walking is a basic human activity, a truly viable pedestrian system is rare to find, especially in terms of safety, comfort and accessibility for vulnerable road users, including those with disabilities.

This paper presents a possible way on how to create a safe and walkable environment in urban areas, through the integration between two different techniques: the “Operational Safety Review” and the “typical accident scenarios”.

Road Safety Audit (RSA) is a systematic and independent assessment of the safety aspects of an existing road, which, in the case of an existing road, is called “Operational Safety Review” (OSR). Its purpose is to make roads as safe as possible, in a short period of time and before accidents occur or without accidents database. An examination by an independent team of trained specialists, through the aid of checklists, indicates elements of existing design, layout and road equipment, which can be expected to cause, or have been ascertained as causing, accidents. Finally the auditors prepare a report that identifies potential safety problems, proposing case by case special reccomandations. This method has been developed in UK and then implemented in Denmark, USA, New Zeland, and Australia, and, in 2000 the Italian Transport and Infrastructure Ministry published a study on RSA (and OSR).
In all the guidelines of the different countries there are specific checklist for vulnerable road users, but these checklists, are less defined than the ones on drivers’ point of view and consequently the recommendations and the comments could be less precise.

On the contrary, the method of typical accident scenarios, developed in France at the end of the 80s at the *Institut National de Recherche sur les Transports et leur Sécurité (INRETS),* has been experimented, also in Italy, for pedestrian crashes. This technique is based on the analyse of the Police reports of accidents occurred in an area, in order to classify their temporal and casual development. Every group of accidents which have particular similarities constitutes a scenario, and for every scenario some solutions are proposed.
Moreover in the 1970’s the American National Highway Traffic Safety Administration (NHTSA) started to type pedestrian and bicycle crashes, from which some frequently occurring types of crashes have been extracted. These types can be used together with the French typical accident scenarios in order to enlarge the Italian database, which is been created.

Close examination of pedestrian crashes of the database can anticipate the principle causes and can suggest corrective measures to lessen the like hood of some of the crashes. In this way specific checklist for roads with a strong presence of walkers can be created.

Following an example to explain how to integrate the two methods.
First of all the examination of types of crashes can create a list of possible problems which can be add to the existing checklists for pedestrians.
For example for the type of crash in an urban area with a pedestrian that ran into the roadway and was struck by a vehicle, the possible causes in the real crashes are the following:
pedestrian tries to cross high speed and /or high-volume arterial street;
child runs into the neighbourhood/collector street;
too high speed road in respect to the road class;
motorist was speeding;
motorist’s view of pedestrian was blocked by a bus;
motorist’s view of pedestrian was blocked by a parked car;
motorist’s view of pedestrian was blocked by street furniture;
pedestrian attracted by an element on the other side of the road.

Therefore the Italian checklist already includes some possible causes, like the first one (Is the speed of the motorists flow compatible with the pedestrian presence?) but doesn't gives other possible questions like the presence of bus stops or street furniture which could limit visibility.

Table 1 – Existing roads - Check list 8 - Vulnerable Road Users (Italian Ministry of Infrastructure and Transportation, 2000)

Crosswalks	
1	Is the visibility of the crosswalk by motorists satisfactory?
2	At the crosswalk are children visible?
3	Is motorized traffic visible by pedestrians?
4	Is the visibility by night satisfactory?
5	Is there vegetations which in some periods could represent an obstacle to visibility?
6	Are crosswalks and pedestrian areas well coordinated?
7	Is there the distance among crosswalks sufficient to deter crossing road at unsafe locations?
8	Is the crosswalk type adequate to road width (refuges)?
9	Is the speed road adequate to pedestrian flow crossing?
10	Are traffic calming measures necessary to slow down traffic?
11	Is there adequate space for pedestrians to wait on footway?
12	Can vulnerable road users cross within a single phase?
13	Is there special kerb height reduction for disabled at crosswalks?
14	Is there special tactile pavements for disabled at crosswalks?
15	Are there crosswalks next to bus stops?
Pedestrian paths	
16	Are there sidewalks where pedestrian flow is present?
17	Is sidewalks width adequate to pedestrian flow?
18	Are there obstacles on sidewalks?
19	Are there shops that obstacle pedestrian flow on sidewalks?
20	Are there drainage devices that obstacle pedestrian flow on sidewalks?
21	Are pedestrian paths continue?
22	Is pavements of crosswalks adequate?
23	Are restrictions to motorized traffic necessary?
24	Are traffic calming measures necessary to slow down traffic?

Secondly, to each problem some countermeasures elaborated by accidents scenarios could be related.
The problem of high speed arterial street could be solved by installing medians or pedestrians crossing islands, provide staggered crosswalk through the median, providing curb extensions at intersections, advanced traffic lights with speed sensor, video cameras, etc.
If a child runs into the neighbourhood/collector street, the solution can affect also urban planning measures, like converting street to "zone 30" or woonerf , pedestrian street, or relocate some urban functions, like schools or parks. But also countermeasures which can affect children education about safe crossing, providing adult crossing guard and so on.
The problem of limited visibility due to parked cars can suggest to remove or restrict on-street parking, or to provide curb extension.

As far as the audit process is concerned, it should represent a regular reassessment of the function and safety of the road by the operating organisation lead by an external coordinator, in order to assure a deep knowledge of the road but also transparency in the procedures and objectivity.

Concluding, conducting OSR in the way mentioned, is a cheap and easy method to evidence and to correct dangerous factors for pedestrians, and since the checklist are not always complete and recommendations should be given in a very short time, crash typing and accidents scenarios can help to give a more detailed panorama of all the possible problems and countermeasures, not only related to infrastructure.

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