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Transport Planning Guidelines for Vulnerable Road User Safety in Emerging Economies

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Abstract

With the rapid expanse of motorised traffic in countries such as Brazil and India, the safety of vulnerable road users (VRUs) needs to be a key component in any transportation development. It should be considered what can be learnt from European transport planning experiences. This review identifies current good practice in Europe and considers how VRU safety is considered in the process. Based on this review, recommendations are given for:

- Stakeholder participation;
- The development of a step by step planning process;
- The implementation of VRU principles into the process.

An assessment of the feasibility and implications for safety of applying European practice to Emerging Economies is also given.

Keywords: Transport planning; European best practice; Vulnerable Road User Safety; Emerging Economies; India; Brazil.

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1. Introduction

The main aim of the European Commission (EC) funded SaferBraIn project is to develop recommendations, guidelines and tools for improving safety levels of the road transport system and its components in Emerging Economies. Attention is focussed on vulnerable road users' (VRUs) safety (i.e. pedestrians and pedal cyclists), and the work is contributing to the overall scope of reducing the number of fatalities and severity of injuries caused by road accidents in countries such as India and Brazil. The developed guidelines and recommendations will mainly focus on improving safety as part of the design and development process of safe roads. However, safety is also an important consideration at an even earlier phase, which is during the planning process, and it is not just important during the planning of individual roads, but also of whole road networks and how future development will impact on safety levels.

In many countries, transport planning has been a developing discipline over the past 50-60 years, since the increasing popularity of the motor car meant that road capacity started to overtake motor vehicle use, leading to concerns about congestion and the environment. In the UK, publication such as the Planning Policy Guidance 13 (Department for Communities and Local Government, 2001 revised in 2011), outlined that unrestrained growth in road traffic was not sustainable, citing concerns about congestion, environmental impact and discrimination against the most vulnerable users in society (e.g. the poor, elderly, disabled).

Emerging Economies, such as India and Brazil, are in a process of rapid growth in terms of economy, industrialisation and business. As opposed to the gradual development of transport infrastructure over a number of decades, typically seen in many European countries, the USA and Australia, the rate of change in Emerging Economies is also much faster. Therefore many of the stages of transport development which have been observed in Europe may have been passed over to try and manage the ever changes demands. Examples include the rapid change from walking to car use, changing from an untreated track to an 8 lane highway, and changing from segregation to shared use. These types of issues need to be taken into consideration when suggesting European measures and methods for introduction to Emerging Economies. In India, the National Urban Transport Policy (NUTP) (Indian Ministry of Urban Development, 2006) was developed in 2006 to integrate land use and transport planning in cities and recommends priority to be given to public transport users and non-motorised users. In Sao Paulo, Brazil, there is the Urban Transport Integrated Plan (PITU) (Department of Metropolitan Transportation, 2006) which includes projections for improving rail, road and public transportation up to 2025, although the focus on pedestrians and cyclists in this plan is currently limited.

Alongside the rapid growth of transport development in Emerging Economies, a high number of road traffic fatalities can be seen for many of these countries. For example, fatality rates in India and Brazil are more than double compared with rates given for the European Union (EU) (18 deaths per 100,000 population in Brazil, 17 in India and 8 in the EU) (SaferBraIn, 2012).

The main objective of this paper is to assess the feasibility of recommending best practice guidelines for transport planning in Emerging Economies for improving Vulnerable Road User (VRU) safety, based on current European best practice. The issues discussed in this paper are based on the findings of SaferBraIn Deliverable 4.1 (SaferBraIn Consortium, 2011).

2. Review of Transport Planning Guidance in Europe

Long-term planning is needed to create the fundamental changes that will improve the safety and mobility of vulnerable road users. Measures require a framework that takes the various needs of VRUs into account. Concepts like the Dutch Sustainably Safe Traffic (Wegman & Aarts, 2006) and Vision Zero

(Tingvall, 1995) provide the framework that long-term planning requires. These concepts outline that road fatalities can and should be avoided, and the probability of crashes can be reduced drastically by means of the infrastructure design. Where crashes still do occur, the process which determines the severity of these crashes should be influenced in such a manner that the possibility of severe injury is virtually eliminated (SafetyNet Consortium, 2009).

A road safety system based on this framework can be combined with transport policies that consider walking and cycling as a mode of transport, such as the one written down in UK's White Paper "A New Deal for Transport: Better for Everyone" (Department for Transport, 1998). The main consequences of the necessary framework and new concepts for road planning and design are:

- Motorised traffic with a flow or distribution function must be segregated from non-motorised traffic;
- A network of main traffic routes must be created for pedestrians and cyclists;
- A fair balance between motorised and non-motorised traffic for priority at crossings should be achieved;
- The maximum speed of motorised traffic should be limited on roads where it mixes with non-motorised traffic.

In Europe, a number of EC funded projects were identified which have previously investigated the areas of urban mobility, land use, transportation and the environment. Collectively, they are known as the Land Use and Transport Research (LUTR) cluster and their aims are to develop 'policies for the cities of tomorrow'. The findings of these projects are based on best practice drawn together from countries across Europe. The two projects with relevant results are PROSPECTS (May et al, 2003, Minken et al, 2003) and TRANSPLUS (TRANSPLUS Consortium, 2003). The following documents were also identified which contained relevant information for transport planning:

- Planning Policy Guidance 13 (PPG13): Transport (DCLG, 2001);
- Guidance on Transport Assessments (Transport for London, 2010);
- Streetscape Guidance (Transport for London, 2009);
- London's Great Outdoors (Mayor of London, 2009);
- Transport Analysis Guidance (Department for Transport, 2003);
- World Class Places (HM Government, 2009);
- Home Zones (Institute of Highway Incorporated Engineers, 2002);
- Manual for Streets (Department for Transport, 2007);
- Manual for Streets 2 (CIHT, 2010).

After an extensive review of the available guidance, (see SaferBraIn Consortium, 2011) it was determined that the findings of the PROSPECTS project (in particular the Methodological Guidebook developed in the project) and the TRANSPLUS project, along with best practice identified in a number of other guidance documents (Planning Policy Guidance 13, Manual for Streets 2, Guidance on Transport Assessments), would form the basis of recommendations for best practice transport planning.

3. Recommendations for Best Practice in Transport Planning

From reviewing the relevant guidance and documents available in Europe, three main recommendations were developed for best practice transport planning, taking into account VRU safety:

- Ensure the relevant stakeholders are involved in the planning process and an effective level of participation is determined (TRANSPLUS, 2003);
- Ensure that principles which consider VRU safety as a priority are taken into account during the planning process (principles outlined in Manual for Streets - CIHT, 2010);
- Ensure that a well-defined step by step planning process is used to develop the plan and that each step is considered (logical structure from PROSPECTS guidebooks - May et al, 2003, Minken et al, 2003).

There are also a number of additional recommendations which should be taken into account as part of the recommended transport planning process and should help to achieve the aims of considering VRU priority. The foundations of these recommendations are sourced from a number of best practice guidance:

- Ensure there is accessibility for all, particularly for walking and cycling, but also consider mobility issues for the disabled (PPG13: Transport - DCLG, 2001);
- Integrate strategies/policies with similar objectives (e.g. safety, sustainability, economy, environment...), but whatever the main overall objectives, safety for VRUs should not be ignored (consider a policy integration matrix, such as outlined in the PROSPECTS guidebook - May et al, 2003, Minken et al, 2003);
- Ensure that the possibility of future nearby developments are considered and that scope is available to seamlessly continue and expand accessible and safe routes for VRUs (i.e. direct routes, following desire lines, provide national/regional cycle networks) (Planning Policy Guidance 13 – DCLG, 2001);
- Consider the existing needs of VRUs, but also motorised users (which could affect VRUs), in any transport plan and determine what the current is integration between transport modes (see Guidance on Transport Assessments – Transport for London, 2010);
- Consider the future needs of VRUs, but also motorised users, in any transport plan. Determine what the current integration will be between the various transport modes. For example, by encouraging more people to walk and cycle through the improvement of the infrastructure, determine how this will affect the safety and accessibility considerations for the area (see Guidance on Transport Assessments – Transport for London, 2010).

3.1. Recommendation: Ensure there is Stakeholder Participation in the Transport Planning Process

Participation and communication at all stages of the transport plan has become increasingly important to their success over recent years. There are advantages and disadvantages to having a large number of stakeholders involved in a planning process, so careful consideration is needed to ensure the correct balance between having an 'open' process and having fixed objectives is achieved.

Having stakeholder participation in the planning process helps towards an improved quality of plan, effective implementation, ensures common objectives and guidelines, helps to avoid and/or solve any potential conflicts and helps to raise awareness and change behaviours. However, participation can lead to greater costs, a slower process, greater difficulty in managing the needs of all stakeholders, and may create conflicts which would not have arisen without participation. However, with a carefully balanced level of stakeholder participation, the benefits can outweigh any potential detriments to the plan.

The TRANSPLUS project (TRANSPLUS, 2003) recommended 3 stages to improve the effectiveness of participation, which were:

- Define what the basic objectives and issues of involvement are, and provide a starting document;
- Clarify who is supposed to be participating, and prepare them for the process;
- Provide an open response to participation and avoid "consultation fatigue".

3.2. Recommendation: Consider Principles Aimed at VRU Safety when Developing a Transport Plan

The Manual for Streets 2 guidelines (CIHT, 2010) begin with a list of principles which should be implemented when approaching the design, construction, adoption and maintenance of urban streets. Each principle should be considered when formulating a transport plan and incorporated into the planning process which is outlined in Section 3.3 (Process for Integrated Transport Planning). The principles are as follows:

- Apply a user hierarchy to the design process with pedestrians and cyclists at the top;

- Emphasise a collaborative approach to the delivery of streets (i.e. integration, not segregation);
- Recognise the importance of the community function of streets;
- Promote an inclusive environment which recognises the needs of people of all ages and abilities;
- Reflect and support pedestrian and cyclist desire lines in networks and detailed designs;
- Develop master-plans and prepare design codes for larger scale developments;
- Establish a clear vision and set objectives for schemes;
- Strike a locally appropriate balance for different user group needs;
- Provide permeability, connectivity and choice in routes;
- Avoid hierarchies of standard road types (e.g. based on traffic flows and/or building numbers);
- Develop street character types on a location-specific basis;
- Encourage innovation with a flexible approach to street layouts;
- Use quality audit processes that demonstrate how designs will meet objectives for the locality;
- Design for a low speed limit where there is significant pedestrian movement;
- Use the minimum of highway design features necessary to make the street work properly.

SaferBraIn Deliverable 4.1 (SaferBraIn Consortium, 2011) describes in further detail these principles and how they could potentially be adapted to improve VRU safety.

3.3. Recommendation: Ensure a Step by Step Process for Integrated Transport Planning is used

Using the logical structure of the PROSPECTS Methodological Guidebook (May et al, 2003), each stage of the planning process can be explained in more detail to consider transport planning specifically for vulnerable road user safety. This takes into account the third recommendation outlined at the start of Section 3, which states 'Ensure that a well-defined step by step planning process is used to develop the plan and that each step is considered'. The stages of the PROPSECTS logical structure are as follows:

1. Setting objectives and identifying indicators;
2. Constructing scenarios;
3. Problem identification;
4. Developing policy instruments;
5. Identify barriers to implementation;
6. Formulation of strategies;
7. Predicting impacts;
8. Undertaking appraisal and evaluation;
9. Optimisation of solutions;
10. Implementation of policies;
11. Evaluating and monitoring performance.

SaferBraIn Deliverable 4.1 (SaferBraIn Consortium, 2011) describes in further detail these stages in the logical structure and how they can help to develop a transport plan which can contribute to improved VRU safety. All of these recommendations were assessed by local SaferBraIn partners in Brazil and India in terms of how feasible they would be to implement locally.

4. Discussion of Comparison of Local Conditions against Best Practice Recommendations

4.1. Brazil

The participation of stakeholders is known to occur in planning initiatives in Brazil. As a rule, the level to which stakeholders are open to be involved in the planning process in Brazil is normally left to be defined by local authorities. Legal requirements exist for public consultation projects with relevant

environmental impact and also for the formulation of general urban development plans (known as Director Plans or Master Plans) (Saule and Uzzo, 2009). Some local authorities tend to minimise the consultation involvement and also the level of conflicts that can be generated, while other local authorities go beyond this and elevate public involvement to budgetary decisions and project approval, which is sometimes required by municipal laws. One major drawback is related to the application of these local laws. Initial publicity is often not widely achieved, which in turn affects the success of discussion and deliberation with the public. Experiences with strong community involvement generally tend to be isolated initiatives and are not the general rule. Under Brazilian conditions, none of the legal requirements for promoting stakeholders involvement appear to show promise of being effective. Opposition against open planning processes by those in charge seem to be strong as they want to control the decision-making process themselves. Public interest in participation also varies and even if present, it is not as supportive of VRU safety as is probably the case in Europe.

The positive effects of stakeholder participation on VRU safety is uncertain, but one can expect that the wider involvement of local communities can favour local needs (such as the needs of pedestrians and perhaps cyclists too). It is unclear whether local needs would overcome the pressure of non-local needs in most portions of the road system. However, there is strong public pressure against traffic problems in several cities in Brazil, although these are often aimed at improved traffic conditions for motorised vehicle users. However, these can help to justify the need to control traffic flows for the benefit of all road user types. Successful demonstration cases involving stakeholder participation could be beneficial in convincing road users of the overall benefits of protecting local needs with no or little sacrifice to non-local ones and would be of help in motivating road users and citizens that their involvement is of value.

Often, general transport planning principles are not clearly understood until translated into practical actions, but the recommended principles from Manual for Streets 2 (CIHT, 2010) seem to be largely relevant and applicable. The idea of a user hierarchy and inclusive design, the recognition of community function, the support to desire lines of non-motorised users, permeability and connectivity to main destinations/routes, the balance of all users' needs in identifying place and movement needs, among others, all seem to offer an attractive approach. However, a clearer view is needed on how the principles will be translated into practices before a detailed evaluation is possible. The application of these principles can be seen as a valuable option for demonstration projects, given the potential for improving VRU safety and the urban environment.

Although recognising its effect and value, there is no clear commitment to the wide application of principles in any Brazilian city or region similar to those recommended. No clear support from the governments or from the population has been observed in Brazil. Experiences reveal that implementation often leads to conflicts between mobility and safety. As the interests of VRUs are generally weaker in Emerging Economies, support for VRU safety goals is less than observed in Europe. However, as the principles are clearly guided towards elevating the position of local needs and VRUs against motorised traffic, they are potentially effective in promoting VRU safety if it was to achieve wide application.

In Brazil, the requirement for general urban development plans (Director Plans or Master Plans, as called in Brazil) is included in the Constitution of 1988, for cities with more than twenty thousand inhabitants (Saule and Uzzo, 2009). The Statute of City or City Act (the major federal law on urban ordinance) enlarges this requirement, setting goals, conditions and tools applicable to urban policies, including a wider consultation process (Barros et al. 2010). This general setting can be taken as a positive for the implementation of improved planning methods. However, Brazil does not have a strong tradition for establishing technical guidelines for planning studies. For example, no clear requirements for assessment methods have been included in the legal framework or its regulation. Planning methods are selected by each body and city, based on the preferences of their personnel. VRU safety is one of a

number of relevant urban problems that needs to be addressed and the PROSPECTS logical structure would need to be used alongside general policy design to promote such a VRU specific goal.

The adoption of any general planning framework would depend on the voluntary decision of local bodies or on its enforcement by some high level government or financing body. The promotion of the approach by a recognised institution is a possibility.

In comparison, design practices for specific infrastructure measures (e.g. cycle lanes, pedestrian crossings) are generally easier to promote than a wide approach, such as the PROSPECTS logical structure. However, it could be valuable in achieving wider results that can be conditioned to the VRU safety problem, such as reducing travel distances (i.e. promoting local interactions) or car use (and traffic flows). Assuming these conditioning factors are relevant, this would also make the wide approach just as indispensable, even crucial. In addition, the mentioned explicit consideration of safety and liveability among main goals can favour VRUs as well.

4.2. India

After evaluation, it was considered that most of the aspects of the best practice recommendations could be implemented in India as long as they are adapted to the local context. The following were deemed to be the most feasible best practice recommendations to implement:

- Promoting an inclusive environment that recognises the needs of people of all ages and abilities;
- Applying user hierarchy to the design process with pedestrians at the top;
- Recognising the importance of the community function of streets.

India has the second largest road network, of which nearly half of all roads are unpaved. The road traffic contains an incredible mix of pedestrians, animal drawn vehicles, bicycles, motorcycles, cars, buses and trucks. On the whole, facilities for the large number of non-motorised road users are poor and the 40 million vehicles using the roads have a large toll on human life. Quality of mobility for pedestrians is not merely about roads and paths but safety and protection. However, all the focus is aimed at creating large infrastructure projects focusing on mobility for vehicles but not for pedestrians. In India, roads are not merely transport nodes. There is a strong economy that runs by the roadside (e.g. street vendors, roadside temples), where pedestrians play the most important role (Sharma, 2010). This supports the need for applying a user hierarchy with pedestrians on the top, recognising the importance of the community function of streets.

Some of the aspects of the recommendations which will be difficult to implement in India are:

- Establishing a clear vision and setting objectives;
- Developing master-plans and preparing design codes for larger scale developments;
- Using quality audit process that demonstrates how designs will meet objectives for the locality;
- Encouraging innovation with a flexible approach to street layout.

Cities in India vary considerably in terms of their population, area, urban form, topography, economic activities, income levels and growth constraints. Accordingly, the design of the transport system will have to depend on these city specific features. Further, transport planning is intrinsically linked to land use planning and both need to be developed together in a manner that serves the entire population and yet minimises travel needs. In short, an integrated master plan needs to internalise the features of sustainable transport systems. In India there is a National Urban Transport Policy (NUTP) (Indian Ministry of Urban Development 2006), which is propagated by the Central Government. The actual decision making responsibility for management of urban areas (and thus urban transport) rests with the State Governments and it further varies according to the local municipal corporations. Involvement of the stakeholders is not given so much of a priority. Common barriers to implementing urban transport systems are:

- Legal and institutional barriers - Lack of policies exist because the problems associated with urban transport are still relatively new in India;
- Financial barriers - Generating revenue is a major issue for infrastructure projects;
- Political and cultural barriers - There is often a lack of political will for implementing processes and hindrances caused by local pressure groups and Non-Governmental Organisations (NGO's) exist.

There is a need to have behavioural and attitudinal changes in the masses as urban transport policies cannot succeed without the fullest co-operation of all the city residents. Such co-operation can be best secured if the objective of any initiative is clearly made known to them. It is, therefore, necessary to launch intensive awareness campaigns which educate people so that acceptance level is high. Presently there is a lack of education, enforcement and monitoring. When dealing with VRU safety, the best practice recommendations cannot be looked at in isolation, as all the principles recommended are important. However, some of the principles would need to be given a higher priority, particularly:

- Promoting an inclusive environment;
- Reflecting and supporting pedestrians and cyclist desire lines;
- Developing policy instruments formulating strategies.

Non-motorised modes need to be given their share in the transport system as they are more environmentally friendly and affordable and they help in shaping the character of the place/space. Hence safety concerns of cyclists and pedestrians have to be addressed by encouraging the construction of segregated rights of way for bicycles and pedestrians. Apart from improving safety, the segregation of vehicles moving at different speeds would help improve traffic flow, increase the average speed of traffic and reduce emissions resulting from sub-optimal speeds. It has been the experience that such cycle tracks and pedestrian paths do not get used as initially envisaged. However, a view has been that this is because these facilities are designed badly and without fully recognising the limitations and problems faced by cyclists or pedestrians. It would, therefore, be essential that such facilities be constructed after an open debate on the designs with experts and the community that is expected to use them. Any special changes which need to be undertaken for VRUs have to be integrated into the main policy and not applied as an add-on or an afterthought. Once the policies are implemented, strict monitoring is needed.

The aspects which would make little difference to VRU safety in India would be related to those which have no clear objectives followed by no quick implementation, enforcement and monitoring. All the aspects recommended have to be adapted to local context so that the people can relate to them. For example, even if permeability and connectivity is provided, the created network might be underused due to the need for changes in users' attitudinal behaviour; or there is no clear awareness from the point of view of the user towards the laid out network. In the same way, there is little use providing design interventions which keep vehicle speeds low in places with significant pedestrian movement if the vehicle owners are not educated and made aware about the concept and how it is helpful to the society.

5. Conclusions

The aim of the work outlined in this report was to recommend best practice for transport planning which could be applied to Emerging Economies based on a review of existing guidance in Europe. A particular emphasis was made towards taking into account VRU safety and the implications for safety for VRUs of any recommended best practice. From the review of existing European guidance, a summary of best practice recommendations was identified which could potentially be transferred to Emerging Economies. All these recommendations were linked to the guidance documents that deal with these issues. Three main areas were recommended from the existing guidance:

- The consideration of stakeholder participation;
- The development of a step by step planning process;

- The consideration of VRU specific principles during the step by step process.

Other recommendations included ensuring accessibility for all, integration of policies, consideration of potential future development impacts, and consideration of existing and future needs of all road users, but from the point of view of VRU safety.

There were found to be potential positive and negative impacts to applying the best practice recommendations to India and Brazil. In Brazil, bias towards more affluent areas and business interests was highlighted as a barrier to the successful implementation of best practice. Overriding support amongst the general public for the motorised vehicle user over the pedestrian and cyclist was another identified issue. However, the wider approach taken in these guidelines would benefit wider results (e.g. reducing travel distances and car use by promoting local interactions). The application of the general principles would benefit from successful demonstration projects to improve support for VRU safety.

In India, the main issues were related with the technical aspects of the best practice recommendations and issues with the lack of political support for implementing guidelines unless they are seen as beneficial to the politician. A positive impact would be related to the fact that in India, many roads are already seen as more than routes on which to travel. They are places where all types of community activities take place. Therefore, the benefits of implementing the VRU principles would be considerable.

In order for the any European best practice to be successfully adapted in Emerging Economies, barriers within the institutional infrastructure need to be overcome, particularly related to support for policy implementation, successful completion of construction projects, regular maintenance once in use and availability of appropriate skills. But there are also barriers related to road users' unfamiliarity with modern road measures and the evolving road environment and road user mix that need to be considered. In general, transport planning principles are not clearly understood until translated into practical actions. So until this happens, there is bound to be some resistance to implementing these principles in countries relatively new to developing transport plans.

This has proven a useful first insight into the potential issues that come with developing a best practice transport plan based on existing European knowledge for transferring effectively to countries such as Brazil and India. More detailed analysis would enable more comprehensive findings about the wide range of specific measures and strategies that can, and do, potentially form part of an integrated plan. This could be achieved by undertaking detailed investigations which look at specific real world case examples and would enable these initial findings to be evaluated even further.

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