

# **ROAD SAFETY RESEARCH IN THE ASIAN PACIFIC REGION**

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The following sections summarize some of the findings of the above project in terms of road safety research.

## **ROAD SAFETY RESEARCH**

Effective research on road safety issues is an essential pre-requisite to better understanding of the problem and provides the framework against which effective policies and counter-measures should be developed.

Research is usually undertaken in Universities and Research Institutes and is normally financed by the country in which the Research Institute or University is located. In a few instances, collaborative research may be undertaken which spans several countries or institutes and which is funded from several different sources but this is the exception rather than the rule.

There is however one unique organisation (UK Transport Research Laboratory) whose work was previously wholly funded by British overseas aid (Department for International Development - DFID) and whose focus of work over the last 25 years or more has been on the investigation of road safety issues in developing countries. This has encompassed short visits, single country research on specific issues, comparative analyses of safety data from different countries and secondment of staff to carry out longer term research in collaborating countries.

Twenty eight research institutes and universities were identified as being most likely to have carried out road safety research in the Asia/Pacific region. A few of these research institutes and universities have become more seriously involved in road safety research in recent years and they, along with TRL, have provided the majority of background road safety research which has been undertaken in the region in recent years. The most important of these institutions are outlined below.

From the replies received (15 out of 28 at date of writing), the six most active organisations undertaking road safety research in the area appear to be:

- 1 Transport Research Laboratory (TRL), UK.
- 2 Central Road Research Institute (CRRI), India.
- 3 Indian Institute of Technology (IIT), India.
- 4 Bangladesh University of Engineering and Technology (BUET), Bangladesh.
- 5 Traffic Sciences Institute (TSI), (Korean Road Traffic Association), Korea.
- 6 The Korean Transport Institute (KOTI), Korea.

Each of these is briefly described below.

## **The Transport Research Laboratory, UK.**

The TRL is justifiably recognised as the leading and most active and influential research institution on road safety problems in the developing world. Since the research programme into the problem of road safety in the developing countries started in 1972 it has carried out many research studies in Asia and Pacific Region. The fundamental aim of such work has been to provide scientifically sound advice on ways of reducing road accidents. This work of the TRL has been supported over the years through DFID as part of the British Aid Programme to the developing countries. The TRL has focused on four main road safety themes over the years namely:

- The development of micro based accident data systems to permit better collection storage and analyses of accident data (this is now in use in around 15-20 countries around the world, including around 10 or 12 Asian/Pacific countries).
- Low cost safety remedial measures (measures have been developed and implemented in a number of Asian/Pacific countries including Pakistan, PNG, Malaysia, China).
- Road user behaviour studies covering driver knowledge and behaviour and traffic education of children. Such work has been undertaken in Pakistan, India and Thailand. The research work of TRL has been supplemented with practical project experience on assignments for DFID and other funding agencies.
- Training road safety professionals via the development/distribution of guidelines and training materials on road safety issues (e.g. *Towards Safer Roads*).

The importance/relevance of TRL research is sufficiently high that it requires a more detailed elaboration of their overall strategy and contribution to road safety research in the Asia/Pacific region.

## **The Central Road Research Institute (CRRI), India**

The CRRI's traffic safety and environment unit was established in 1986, as an offshoot of the traffic and transport department in order to give road safety greater emphasis. Staff currently total around 20 with half working on road safety issues, while a few years back road safety had as many as 14 staff employed full time in this area. The traffic unit at CRRI in general have come under economic constraints in recent years and are being encouraged to focus research efforts into areas where other agencies from the private sector are willing to finance. The main objective of CRRI road safety research has been to create road safety awareness amongst the decision makers in India. CRRI has attempted to stimulate interest by publicising the worsening road safety situation and the issues that are involved. Thus much of their previous work has been in the analysis of accident data to evaluate and describe the road safety crisis. Other themes have developed, often due to funding considerations as in the early 1990's where CRRI received a 1.8 million Rupees grant from the Ministry of Surface Transport to provide traffic police training. CRRI has also done much research in areas of driver testing (visual and psycho-physical assessment systems) and these projects have been jointly organised and partly funded by the private sector.

At present, CRRRI has an ongoing road safety research project in the areas of non-motorised vehicle accidents, motor cycle helmet usage, design standards and operational practices of median installation, road safety in and around schools and further research into driver evaluation methods.

### **The Indian Institute of Technology (IIT), India**

Within IIT, the centre for biomedical engineering has focused on injury control and this has included road safety with particular reference to vulnerable road users (VRU) which includes pedestrians, bicyclists, and motorised two wheeler riders. It has been very successful and was so recognised when, in 1991, it was selected as a WHO collaborating centre in the area of injury control. As one of the 13 collaborating centres world wide (TRL is also one), the centre has focused on problem areas specific to developing countries and has undertaken assessment of the road safety policies in Indonesia, and produced an injury development programme for Libya. Its research work in India has been funded from various Indian Government organisations as well as international donors such as the US Agency for International Development (USAid), and the World Research Institute (WRI).

With approximately seven staff working in the area of road safety, the centre has an average monthly expenditure of one million rupees in road safety research and while the area of VRU has been targeted, it has also developed a computerised accident recording system for India and has worked on road safety education. In mid 1995, a proposal was submitted to establish a transportation systems research programme with staff from the transportation planning and engineering department, bio mechanics and safety engineering, and the area of statistics. Its focus will be on urban transportation issues and safer transport on national highways in particular. While a core funding has been requested to initiate the work, the research programme is expected to be self-sufficient within three years with half its funding coming from industry and the other half from the public sector, government agencies and other donor agencies.

### **The Korea Transport Institute (KOTI), Korea**

The Korea Transport Institute (KOTI) formerly operated under the Ministry of Transport and now operates under the newly amalgamated Ministry of Transport and Construction. It undertakes research projects on behalf of the MoT but most of these tend to be consultancy type projects such as feasibility studies and practical implementation projects. It seeks to provide policy guidance to MoT on road safety issues.

### **Traffic Sciences Institute (TSI), Korea**

The Traffic Sciences Institute (TSI) is a recently established research institute which operates within the Korea Road Traffic Safety Association. It concentrates on road safety research and is potentially the main road safety research organisation in Korea undertaking research projects in all sectors of road safety. Funding for TSI is provided via the Road Traffic Safety Association. With its numerous highly qualified research staff (many have doctorates) it is expected to become the premier road safety Research Institute in Korea.

## **REGIONAL DISTRIBUTION OF ROAD SAFETY RESEARCH**

In South Asia, India appears to have been the most active in promoting road safety with research being undertaken by the Central Road Research Institute (CRRI) and the Indian Institute of Technology (IIT). Of the 41 road safety projects reported in India, three quarters were undertaken by the CRRI. CRRI's research projects last on average about six months compared to IIT projects which run between one to three years in duration. None of the other projects reported from the South Asia region, for example Bangladesh, Pakistan or Sri Lanka appear to include any local financing. There is also, at this stage, no information on research undertaken in these other countries although it is known that the NTRC in Islamabad has carried out a significant amount of research on road safety issues.

## **RESEARCH ACTIVITY BY THE ROAD SAFETY SECTORS**

### **General Studies**

Initial inputs to carry out assessments or appraisal where all road safety sectors are briefly evaluated have become common in the countries where further investment is expected. (i.e. long term adviser positions.) They offer an overview and can compare the various sectors efforts and the level of interaction and cooperation between sectors.

The road safety situation in Nepal, for example, was summarised in an initial two month road safety input which also outlined the subsequent work of the road safety component project. In Bangladesh, a similar process has been followed with a four to six month preliminary phase before the long term adviser and safety specialists are provided. A 1995 three month input in Vietnam was able to review the road safety sectors and provide an overview of the road safety situation. All of these foregoing projects have been financed through DFID funding.

### **Road Safety Management and Coordination**

Only one research institute (KOTI) mentioned any work being conducted in the area of road safety management or coordination. Whilst the head of the Traffic Safety and Environment Unit in CRRI is a member of the Indian National Road Safety Council, no work has been conducted to guide or facilitate the NRSCs efforts despite the obvious need. [Formed in 1988, the Indian NRSC meets every year. It has not established a permanent secretary yet and does not yet have any funding of its own.] Some of the research undertaken by KOTI in Korea has looked into the needs of the National Road Safety Council and has provided some guidance to the Council in Korea on such issues.

### **Accident Data Systems**

The installation of TRL's MAAP System, often on a trial basis, accounted for almost all of the work undertaken in accident reporting and analysis systems. IIT claims to have developed its own accident reporting and analyses package which was intended to be appropriate for the whole country but appears not to be widely used in India. (In fact under an ADB funded project, the TRL MAAP System is currently being established for use in storing data and analysing the accident situation along the National network in India.)

## **Traffic Enforcement and Legislation**

While most if not all countries in Asia and Pacific have revised their road regulations in the past 15 years, little bilateral technical assistance seems to have been provided in this sector nor does there seem to have been local research effort in such countries despite many countries sharing the same base for road regulations (The British Motor Vehicle Code 1939). Little exchange of information and experience has occurred and traffic regulations have generally been revised individually by each country. No regional manual has been produced similar to such manuals that exist in Africa and other regions of the world.

Traffic Police training programmes have been developed by the CRRI with sponsorship from the Ministry of Surface Transport. National workshops on traffic police training were also organised in 1992 and '93. Traffic police from 23 metropolitan cities were trained before the project was discontinued. Ongoing at the same time was a CRRI research project analysing the past 10 years of traffic violations from Delhi covering 1980 to 1990. The analysis revealed misguided priorities with administrative violations being enforced more frequently than the more dangerous moving violations.

Highway patrolling was quite effective when it was introduced in Pakistan in the early 1980s as it discouraged overtaking and targeted road safety parking, both of which were known to contribute to road accidents in Pakistan.

## **Engineering and Planning**

Geometric design standards are often taken from motorised countries and thus are not always appropriate given the presence of pedestrians and other vulnerable road users and non-motorised vehicles in the road traffic stream. There has been much effort in safety engineering research to minimise the risk of accidents and DFID sponsored the development and publication of *Towards Safer Roads* (TSR) which was the first major manual to address safety engineering and planning in developing countries. TSR also introduced the practice of safety audits (a standardized procedure for checking the safety concerns of road projects from the feasibility stage through to final construction and operation). Formal safety audits have also begun to be used recently in Nepal, Malaysia, Fiji and a number of other developing countries including Bangladesh.

Identifying safety impacts of geometric design modifications was a research focus in PNG and was recently reviewed for the latest version of the Highway Design and Maintenance Programme (HDM4). Recent research funded by Sweroad included the development of a traffic safety effects catalogue to include the various findings of the impact of geometric design and traffic control features on road accidents and accident rates.

Several projects both on implementation and the research side have focused on traffic engineering and traffic management issues with applied road safety benefits. For example, Australian Aid projects in Papua New Guinea and Western Samoa follow this pattern as does the past research in CRRI on roadside development and road signs. The research recently started on the design and

implementation issues of median installation for example are illustrative of the types of research being undertaken in this area.

### **Vehicles and Vehicle Inspection**

Both TRL and the IIT in India have conducted research into vehicle design and injury control. In Papua New Guinea the MAAP system identified many casualties occurring in run-off accidents in open top pickups. Open top pickups are a common public transport mode and are often heavily loaded with passengers in PNG. TRL concluded research into vehicle design to minimise such injuries.

IIT has modeled crash impacts of bus fronts and three wheeler motorised scooter taxis to determine how the design can be altered to reduce injury severity to pedestrians hit by buses and the Three Wheeler Scooter Taxi (TST) drivers, passengers and pedestrians in TST crashes. TSTs are found to be unsafe for all three user groups (drivers, pedestrians and passengers at velocity impacts as low as 15 to 20 kilometres per hour). Minor modifications were found to make a significant difference in the safety to all three user groups in crashes up to speeds of 25 to 30 kilometres per hour.

IIT research also identifies structural weaknesses in motor cycle helmet design. Earlier work had identified a majority of head impacts and two wheel crashes to be sustained on the side of the head yet VIS standards did not include a side impact test. IIT devised and implemented a side impact test and when all helmets in general were found to be inadequate in side impact, BIS amended the motor cycle helmet standards. Delhi Police have sponsored this research and later publicised the findings and distributed guidelines for customers and the relative rankings of the different helmets.

Around the same time that IIT was studying the relative safety of motor cycle helmets in Delhi, CRRRI was also studying the use of motor cycle helmets and conducting opinion surveys on the use of motor cycle helmets in several metropolitan cities where motor cycle helmet usage was mandatory. These studies all helped to influence road safety policy in India.

### **Driver Training and Testing**

Whilst commercial vehicles have frequently been found to have high accident involvement rates, only one commercial driver training programme has been identified so far in the region. As part of the two year input in Pakistan funded by DFID in the early 1980s, a two week bus driver re-training programme was provided. Bus driving standards are observed before and after the course and while bus driving standards showed improvement when drivers knew they were being observed, this improvement did not carry over to other times. This demonstrated the difference between driving skill and driving behaviour and the need for enforcement and incentive schemes to encourage good driving standards.

Surveys in driver knowledge and driver behaviour were undertaken in several countries worldwide including Pakistan, Indonesia, Thailand and Sri Lanka. Driver behaviour was assessed at pedestrian crossings, traffic signals and priority junctions. As a follow up driver knowledge

surveys were conducted in Pakistan and Thailand and both these studies have been published as separate TRL reports.

While the CRRI also worked on the area of private knowledge with drivers surveyed on sign comprehension and traffic awareness, the CRRI has spent much effort in developing a driver reflexes testing system (DRTS) which seeks to eliminate human bias and includes psycho physical tests. Work in this area has continued over the past decade with a few DRTS systems in use in India.

### **Road Safety Education**

IIT has been involved with the development of a road safety education primer for children. It began in 1991 at the International Conference of Road Safety in Delhi, the project is partly funded from the sale of paintings at the Conference. A student was awarded a scholarship from the National Institute of Design for the objective of developing education procedures for children on traffic safety. A literature research on children's psychology in education programmes was undertaken and school teachers interviewed to identify the gaps in children's traffic safety knowledge. A booklet was subsequently prepared and is in the final stages of being published.

### **Post Accident Medical Assistance**

While hospitals have been involved in casualty surveys, only the IIT has studied the emergency medical services. Detailed information has yet to be provided although a survey of all the emergency medical services in Delhi was believed to have been conducted.

### **Motor Vehicle Insurance and Accident Costing**

Accident costing research has been conducted in Vietnam and was attempted in Bangladesh where the set of under-reporting, lack of vehicle damage cost and inadequate time prevented any practical accident cost calculation from being developed. Accident costing is currently underway in Nepal and is facing similar problems of accident under-reporting and lack of vehicle damage cost data. The situation helped by the lack of any legal requirements of motor vehicle insurance in many countries.

## **INTERIM CONCLUSIONS**

### **Regional Distribution of Projects and Research**

It is clear that a large amount of research appears to have been undertaken in India and some research has also been undertaken in Korea. The work of the TRL in the UK spans the whole of the region although much of the work has been concentrated in Indonesia, Thailand, Nepal, Bangladesh, India and Pakistan.

## **Non Motorised Vehicles and Road Users**

The road safety of non motorised road users which includes pedestrians, has been regularly reviewed by CRRRI with studies conducted in 1982, 1988, and 1992. The 1982 study analysed fatal accidents involving pedestrians and cyclists in Delhi while the 1988 work was a socio-economic survey of pedestrian and cyclist road traffic fatalities in Delhi. The 1992 research considered non motorised accidents of all severities and several other general accident analyses (country or city wide) have also highlighted the risk to vulnerable road users.

TRL have also been very active in this area and have carried out research over the years in a number of the countries in the region. TRL have also been very active in the field of pedestrian safety. TRL's focus on accident reporting has facilitated all accident analyses including NMV accidents and TRL's earlier work in Pakistan (1988) investigated pedestrian accidents and estimated potential accident reduction from raised pedestrian crossings based on field trials. TRL is also conducted a major study of pedestrian accidents in five developing cities and PNG, India and Sri Lanka are included in the study.

The United Nations ESCAP carried out some research on non-motorised vehicles in several Asian cities including Dhaka in Bangladesh. The ADB Regional Technical Assistance project (RETA 5620) explicitly looked at facilities for non-motorised vehicles in the region and consolidated the available information as part of the project.