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INDIAN INSTITUTE OF TECHNOLOGY DELHI

Publications

Advani M and Tiwari G. (2004). Evaluation of public transport systems: case study of Delhi metro, *Proceedings International Conference on Structural and Road Transportation Engineering, IIT Kharagpur, India.*

Chawla A., Mukherjee S., Mohan D. and Parihar A.(2004). Validation of lower exteremity model in THUMS, *Proceedings International Conference on the Biomechanics of Impact, IRCOBI, Austria.*

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Gawade T., Mukherjee S. and Mohan D. (2004). Wheel lift-off and ride comfort of three-wheeled vehicle over bump, *Journal of the Institution of Engineers(India)- MC, 85, 78-87.*

Gawade T., Mukherjee S. and Mohan D (2004). Rollover propensity of three-wheeled vehicles, *Proceedings Canadian Multidisciplinary Road Safety Conference, Ottawa.*

Mohan D. (2004). Road traffic deaths and injuries in India: Time for action, *National Medical Journal of India, 17, 63-66.*

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Tiwari G. (2004). Landuse transport integration for sustainable transport, *Proceeding BAQ 2004, Agra, India.*

In proceedings 7th World Conference on Injury Prevention & Safety Promotion, Institut Sicher Leben, Vienna, Austria, 2004:

Gandhi S., Patankar V. and Tiwari G. Bus commuter safety at bus shelter in Delhi.

Mahajan P., Subrahmanyam V.V. and Mohan D. Helmet design for improved ventilation finite element modelling.

Mohan D.Effectiveness of mandatory seat belt laws in Delhi.

Seedat M., Tiwari G. and Mohan D. Pedestrian behaviours in a large Indian city: a case study.

Tiwari G. Pedestrian crossing at signalized Intersections.

Wijlhuizen G.J., Mavalankar D. and Mohan D. The aetiology of traffic accidents and injuries in Sabarkantha district of Gujarat.

Varghese M. Evaluation of trauma deaths in a tertiary care hospital.

Research Projects

Sustainable Urban Transport in Less Motorised Countries Research and Training. *Volvo Research & Educational Foundations. D. Mohan, G. Tiwari, A. Chawla, S. Mukherjee, S.R. Kale, P. Mahajan, S. Sanghi, R. Ravi, Dunu Roy and M. Varghese.*

Technology Development for Collecting Bone and Tissue Properties and Development of Human Body FE Model-Phase II & III. *Japan Automobile Research Institute. A. Chawla, S. Mukherjee and D. Mohan.*

Development of FE Models for Human Body Parts for Impact Simulation. *Miinistry of Human Resource Development. A. Chawla and S. Mukherjee.*

Obtaining Low-Speed Impact Properties of Soft Tissues. *Miinistry of Human Resource Development. A. Chawla and S. Mukherjee*

Airport traffic Circulation in Northern Region. *Airport Authority of India. G. Tiwari and D. Mohan.*

Implementation of High Capacity Bus System Corridor. *Transport Department, Government of Delhi. G. Tiwari and D. Mohan.*

India Liveable Communities Initiative. *Institute for Transportation and Development Policy (ITDP), USA. G. Tiwari and D. Mohan.*

Development of a Training Manual for Road Traffic Injury Prevention. *World Health Organization. D. Mohan and G. Tiwari.*

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The Road Ahead: Traffic Injuries and Fatalities in India - Report
Mohan D. *TRIPP, IIT Delhi, 2004.*
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The Way Forward: Transportation Planning and Road Safety
Tiwari G., Mohan D., and Muhlrad N.
Macmillan India Ltd, New Delhi
ISBN: 140392502X Price: Rs. 590/-

'Ricksha - Ek Mahagatha, *Lokayan, 2004.*
Lokayan's study of the Cycle Rickshaw in the National Capital Region of Delhi was conferred the award of *"Sahityik Kriti Samman" by the Hindi Academy, Delhi.*

The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology Delhi, is an interdisciplinary programme focussing on the reduction of adverse health effects of road transport. TRIPP attempts to integrate all issues concerned with transportation in order to promote safety, cleaner air, and energy conservation. Faculty members are involved in planning safer urban and inter-city transportation systems, and developing designs for vehicles, safety equipment and infrastructure for the future. Activities include applied research projects, special courses and workshops, and supervision of student projects at postgraduate and undergraduate levels. Projects are done in collaboration with associated departments and centres at IIT Delhi, government departments, industry and international agencies.

▶ Dunu Roy is Director of Hazards Centre (HC) and Rajendra Ravi is Director of the Institute for Democracy and Sustainability(IDS). Both these organizations provide an interface between TRIPP and the informal sector

Dunu Roy

Rajendra Ravi

Question 1. How does your work complement research activities at TRIPP?

IDS: We believe that, in the name of development, our society is experiencing a degradation of its life support systems. The process of "development" suffers from a lack of contextual thought and a disregard for the long-term vision of sustainable development. There is a need to prevent this degradation. The profile of our society in general, and democracy in particular, is changing due to a continuous exodus of poor people from the villages to the cities to find employment opportunities in the informal sector: vendors, rag-pickers, domestic and industrial workers and rickshaw-pullers. We at the IDS come from a background of advocacy and research, with the experience of combining both in a relevant manner for social need-based issues. Our strong research capability enables us to understand issues in depth and in a realistic manner and advocacy enables us to ensure that awareness and implementation of our research results happens at different levels. Several professionals like social scientists and planners address the same issues as we do, but in a piecemeal manner. In this context, we define ourselves as a community based group working at the grass-root level, to find sustainable solutions for these problems. In the context of the global crisis of environmental and societal degradation, it is the existing network of non-polluting and people-friendly modes of transportation that need to be supported and strengthened. The most significant of these modes are the pedestrians, cycles and the cycle-rickshaws. For the past few years now we have been working with and for these significant but vulnerable road users to understand how they live, how they work and how they access their livelihood in our cities.

HC: The Hazards Centre provides advice and technical and professional services to community groups on any aspect of daily life that they see as posing a threat to themselves or their way of life. The Hazards Centre often acts as a facilitator in training community groups in the underprivileged and informal sectors; it helps them identify, study, research and document their own problems as a first step towards solving them. The Hazard Centre helps facilitate in the mobilization, advocacy, and campaigning for the benefit of urban community groups in various parts of India, but especially in Delhi. As often happens, these and other forms of activism lead to political action which the Hazards Centre helps orchaestrate. As such, the Hazards Centre is often concerned with the problems of transportation and mobility between the habitats and places of work of the low income daily-wage-earners in cities. It is this aspect of the work of the Hazards Centre regarding the livelihood and mobility of these disadvantaged groups that is of special interest to TRIPP (Transportation Research and Injury Prevention Programme) IIT. The Hazards Centre and TRIPP have had a long and fruitful association over the years, on such and other shared urban concerns.

Question 2. What is the most common complaint about transportation systems in place?

IDS: The transportation system and the way road spaces are allocated in the cities, is a clear indication of a societal attitude and mind-set. Transport planning is clearly car-oriented, with cars having priority on the high speed road stretches, at the intersections which minimize their waiting time, at flyovers that allow them to avoid the congestions, at market places that give them large parking spaces, and the list goes on. While the authorities may apologize for badly maintained roads, they would never think of apologizing for the broken pedestrian paths, non-existent bicycle lanes and dilapidated bus shelters and the inefficient public transport now in place. So the essential problem with our transport system today is its reiteration of social exclusivity and its inability to comprehend its role as an essential and equal access provider for all.

HC: Transportation is inextricably connected with the geographical location of habitats and places of work; leisure and social activities come next. Hazards Centre has conducted a detailed and wide-ranging survey among various community groups to find out in what aspects of their lives they faced the highest risks. When the detailed written answers were in, it became clear that eighty percent of the respondents faced the highest risk in traveling to and from their places of work. Forty percent of these respondents traveled by public transport like buses; the remaining sixty percent cycled or walked to their places of work. This is indicative of the fact that these vulnerable groups of commuters feels that it most at risk from the owners of private vehicles, like cars. Whenever the government demolishes a shanty town or slum in the inner city, the tenants are forcibly shifted and relocated in new areas in far away places (often outside the city limits). This adversely affects the livelihood earning capacity of all the uprooted residents. This drastic move is particularly harsh on women whose work as domestic help in several households to supplement the family's meager resources is reduced disastrously to nothing or near nothing.

Question 3. How do mobility and livelihood issues form a part of city planning?

IDS: The need to move in a city is a result, primarily, of the necessity to access livelihood or a source of income since livelihood is necessary for survival. Hence mobility is an essential part of the ability to survive in a city. The city structure can be, at a very simplistic level, defined as spaces to live, spaces to work and the spaces which connect the two. It is the triad of shelter, livelihood and transportation which is the guiding principle of city planning.

HC: Since most people do not live where they work, their livelihood depends on transportation. City planning, which includes transportation, is best done when it is participative. It must give all stakeholders (the formal and informal sectors, inclusive of those beyond the pale) a say in how their city should be planned. Apart from this inclusiveness, the technical expertise must be harnessed in several specialized fields: housing, parks, work places, roads, transportation, power, water, sanitation, etc. Our surveys indicate that those whose homes are less than five kilometers from their places of work, cover the distance by walking; where the distance to be commuted is between five to ten kilometers, cycles are used; however,

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economic constraints operate; that is to say, there are people who walk over five kilometers to work daily because they cannot afford to buy a cycle; anything over ten kilometers means a recourse to public transport like trains or buses. A study of the history of Delhi is very educative on this account. It shows how the disadvantaged have, over the years, been repeatedly displaced by the powerful few in the name of progress, cleanliness, etc. Because of the relocation policies of the government, the distance between work and home has increased over twenty kilometers or more. This increase in travel time and money has drastically reduced the livelihood options of the weaker sections in the city, making the poor, poorer.

Question 4. Among the people you work with, in the informal sector, how do they see the new transport projects and plans for Delhi, like the metro, the new flyovers, etc?

IDS: Large and capital intensive transport projects like the flyovers and the metro underline and strengthen the attitudes of social exclusion of the vulnerable groups, giving them no space on the roads, hence no space in society. In fact, most of these projects actively disable the mobility of the informal sector, preventing them from accessing work and jeopardizing their survival in the city. The couple of cases in point are the new, beautiful flyovers in important locations like AIIMS and Dhaulakuan along the ring road. These are points of high pedestrian concentration as they act as interchanges for several important bus routes, both interstate and intrastate. After the construction of the flyovers, the pedestrians have to walk several kilometers to access the next route change, for which there are no facilities. Another example is that of the metro, which does not allow people with luggage (and milkmen!) to board the metro, though it connects the inter-state bus terminus and the Shahadra railway station with the rest of the city, thus effectively excluding the lower income interstate commuters from a system designed for brief-case carrying office goers. The construction of these transport projects has excluded the bicycles and cycle-rickshaws from the roads and destroyed hawker and vendor spaces on the roads. The fact that they have caused relocation of several slum settlements to the periphery of the city, is a very significant example of how these transport projects impinge on the lives of the poor.

HC: Elevated expressways, skytrains, metros and monorails together with flyovers and shopping malls may be dreams to some people. But for those in the informal sector they are at best irrelevant and at worst nightmares. All these rapid transit systems are enormously expensive and hopelessly rigid. A mixed modal transport system with the focus on the bus would be the most economically affordable and adaptably supple for any city with heterogeneous traffic and mixed land use. Unless city planning, including transport projects, takes the informal sector into consideration as a prime participant around which the rest of the construct is assembled, it is doomed to failure. To ignore this underprevileged group is merely an attempt to ape the west without being sensitive to the various factors that make this informal sector a vibrant and inalienable part of our lives that cannot be wished away. A simple example will suffice: If a mixed modal transport system is put in place with the emphasis on the bus, then it immediately makes room for the informal sector; from the commuters on the bus and bicycles to the pedestrians and streetside hawkers and vendors, all are made players in the game; as such, there is an increase in safety and traffic flow (in that order) for everyone on the street, from the vulnerable road user to the grandest car owner. The lesson is simple and clear as far as the informal sector is concerned: you ignore them at your peril.

Question 5.. Why is there inequity in transport planning and income generation between the countries of the 'North' and 'South'?

IDS: The very comparison of the north and south creates inequities by putting them together on the same platform and by judging the south by the rules and indicators developed in the north. The development patterns, values and societal structures of both regions are entirely different. In the post-industrial era of the modern world, technology and technical empowerment has been seen as the solution to all problems. This has marginalized the role of human labor. There has been no effort to question how a development model, which is based on a homogeneous society with a low population, can be applied to a heterogeneous society with a high availability of human resources. When the transport planning and economic models of the north are applied to the south, the latter is judged as chaotic and poor. We still have cycle rickshaws plying on our roads and only need to include them in our formal transport planning to make our systems both environmentally and economically sustainable. Some developed cites of the north are now trying to introduce the cycle rickshaw as a sustainable mode of transport, but they will have an uphill struggle because human powered vehicles are no longer a part of their tradition or planning.

HC: All world class cities (in the countries of the north as you call them) are upper class cities. The upper classes in these cities have managed to fashion their cities in their own image. The structural roots of this mismatch been the countries of the north and south in transportation, city planning, lifestyle and income generation is historical. The capital available to the developed world has always been much higher because of their colonialism and imperialism. The city planning and transportation infrastructure of the developed world needs an enormous amount of capital to keep this kind of technology up-to-date and moving. This capital is just not available to the developing world. In addition to this, the developed countries of the north have built their economies on the basis of manufacturing which is a process of value addition. The countries of the developing world of the south, on the other hand, are moving into services when there is no value addition. Accordingly, the massive subsidy required for state-of-theart transport technology is just not available to countries of the south.

Question 6.. How can academic institutions contribute to development?

IDS: Academic institutions can play a key role in forming a nexus between community based organizations (CBOs), policymakers and planners. They are important in translating the work done by the CBOs into a language and format that the policymakers can comprehend and implement. The CBOs like the IDS, when associated with academic institutions, can help to spread awareness and build a consensus amongst the people by dealing with them on their platform and in their language. Also, their proximity to the communities enables them to have a realistic assessment of the community needs, which can be used by the academic institutions as a base for helping the policy makers formulate coherent and need-based policies. The relationship of TRIPP and IDS has been a learning experience for both that has enabled us to bridge the gap between academic research and the people's understanding of that work.

HC: Transportation is only part of the urban landscape which is changing. What is driving this change is the assertion by the upper classes, in the countries of the south, which is an expression of the will of the political class. This is at variance with the weaker sections of the informal sector of the populace who try their best to resist the grand plans for the city that leaves them out of the loop and consigns them to suffer repeated relocations in the name of beautification, environmentalism, etc. Academic institutions can play a useful role in helping the informal sector articulate its assertion in a participative and inclusive manner which will make democracy truly meaningful to all sections of society equally.

Campaign for Equal Road Rights

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News

Bicycle-related injuries among children

This study shows that age at debut of cycling is an important factor for the risk of getting a bicycle related injury during the first 2 years of cycling. There is less risk of getting injured during this period if the children wait to start cycling until, for example, 6 or 7 years instead of at 4 or 5 years. This might be explained by the fact that young children have immature psychomotor skills or lack knowledge of how to manage a traffic situation with moving objects. There is a calculated risk of getting injured when bicycling and it seems logical that children spending more time cycling have an increased risk of getting injured. One could assume, however, that spending more time cycling would increase the skills and thereby reduce the risk of getting injured. This study does not support such a hypothesis.

Bicycle-related injuries among young children related to age at debut of cycling. Kari Schroder Hansen, Geir Egil Eide, Ernst Omenaas, Lars Birger Engesaeter, Asgaut Viste. Accident Analysis and Prevention, Vol. 37(1), Jan. 2005.

Speed and road safety

The relation between speed and road safety rests on two pillars. The first is the influence that speed has on crash severity: the faster the collision speed, the severer the crash. In spite of all the measures taken during the past years to protect occupants during a collision, it remains a fact that it has significant consequences for the outcome. At a collision speed of 80 km/hour, the chance of car occupants being killed is 20 times greater than at 30 km/hour.

The second pillar is the crash rate: it gets higher the faster one drives. On the one hand, this is because of the longer braking distance and, on the other hand, that humans are limited in their capacity to process information and use it to take action. The faster one drives, the more information per unit of time there is to be processed, and the less time there is to react to it. However, the relation between speed and crash rate is much less direct and much more complicated than the relation between speed and crash severity.

The SWOV's literature study has shown that most studies found an exponential relation between speed and crash rate. Considering the results of the vast majority of the studies on this topic, we conclude that the speed-crash relation is not linear but exponential.

Some studies have reported a so-called U curve: the faster or slower motorists drove than most of the vehicles on the road, the greater the crash involvement. However, recent studies that used modern measuring equipment, and also another research design, have not been able to reproduce these findings. They found that vehicles that drove much faster than the average had a greater crash rate: those that drove slower did not.

The relation between speed and road safety: a complicated affair. The SWOV report (in Dutch, but with a summary in English) 'Speed, speed distribution and the chance of road crashes; Literature study and inventory of research methods' (R-2004-9) may be consulted and downloaded from the SWOV website http://www.swov.nl/Publications.

Tests of cyclist-car front collisions

On 25th November, the EU EuroNCAP organization published the latest results of the collision tests. Up till now, the safety of occupants had been the core value. What is new in the collision tests is the attention being paid to the safety of pedestrians hit by a car. Starting in 2010, there will be new EU requirements for the collision friendliness and safety of car fronts for the large number of vulnerable road users. In Research Activities 26 SWOV recommended especially taking cyclists into account in the new requirements. Cyclists usually are hit by completely different parts of a car front than pedestrians. This is why the safety benefits of the new guidelines will be less for cyclists than for pedestrians.

SWOV report R-2003-33 'Cyclist-car front collisions; Factors that influence occurrence and injury severity', in Dutch with an English summary, can be consulted and downloaded on the SWOV website under publications. The EuroNCAP 2004 test results can be studied at http://www.euroncap.com/

Trends in vehicle kilometers of travel in world cities

The increase in urban mobility between 1960 and 1990 has been the direct result of increased affluence and the consequent greater ownership of private motor vehicles. Such increased vehicle ownership does not automatically flow to increased private vkt and a number of cities in Europe and Asia have shown that clear policy initiatives can contain the growth of urban private motorized mobility. Despite the urban sprawl apparent in USA,. Canadian and Australian cities, this has not been as significant a contributor to growth in vkt as population increase and greater affluence, although there is a more even contribution between the various factors in these cities.

However, in other cities such as Stockholm, the control of urban sprawl such that densities have increased, appears to have been pivotal in reducing the growth in car use, despite strong growth in affluence and car ownership. Overall this highlights the fact that if cities are to minimize growth in car use, then they cannot afford to overlook any of the key underlying drivers of private motorized mobility in their policy approaches. The evidence in this study suggest that whilst forces of growing affluence are strong, there is nothing inevitable or irresistible about growing automobile dependence in cities.

Although the Cameron et al. (2003) model predicts private motorized mobility, a full description of urban mobility requires an understanding of mobility by public transport as well. Some of the case studies (Munich, Singapore, Stockholm and Hong Kong) have suggested the importance of developments in public transport working hand-in-hand with other urban policies to minimize private motorized mobility. Likewise, the absence of better public transport in other case studies is seen to be associated with less abated growth in car use (Perth, Phoenix). The application of this model illustrates the consequences on private motorized mobility of a number of key policy initiatives, yet the full story clearly also requires the modeling of urban mobility incorporating both public and private motorized mobility, as well as non-motorised mobility.

Trends in vehicle kilometers of travel in world cities, 1960-1990: underlying drivers and policy responses. I. Cameron, T.J. Lyons, J.R. Kenworthy. Transport Policy, 11(2004), 287-298.

Future Events

8th World Conference on Injury Prevention and Safety Promotion
April 2-5, 2005, Durban, South Africa. http://safety2006.info

19th International Technical Conference on the Enhanced Safety of Vehicles(ESV)
June 6-9, 2005, Washington DC, USA. http://www.esv2005.nhtsa.dot.gov/

14th International Conference on Safe Communities
June 13-15, 2005, Bergen, Norway. http://www.safebergen.com

International Conference on Science and Technology for Sustainable Development
August 10-13, 2005, Kottayam, Kerela, India. http://www.conferencesbc.org

8th Asian Urbanization Conference
August 20-23, 2005, Kobe, Hyogo, Japan

5th European Congress and Exhibition on ITS
August 24-26, 2005,Delft, Netherlands. email: kunderdown@hgluk.com

3rd International SIIV Congress on People, Land, Environment and Transport Infrastructures
September 25-27, 2005, Annecy, France. Email: oc@siiv2005.com

The 2005 International IRCOBI Conference on the Biomechanics of Impact
September 21-23, Prague, Czech Republic. http://www.ircobi.org/interface.html

Road Safety on Four Continents Conference
October 5-7, Warsaw, Poland. http://www.vti.se/templates/page_3566.aspx

Traffic 2005
October 10-12, 2005, Paris, France. Email: traffic@ifema.es

49th STAPP Car Crash Conference
November 9-11, 2005, Washington DC, USA. http://www.stapp.org/

Road Safety & Traffic Management 2006
February 15-16, 2006, Cairo, Egypt. http://www.trafficegypt.com/en/index.asp

RoSPA Road Safety Congress 2006
February 27 - March 1, 2006, Blackpool, England. http://www.rospa.com/road/

The 8th World Conference on Injury Prevention and Safety Promotion
April 2-5, 2006, Durban, South Africa. http://www.safety2006.info/

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