

ROAD SAFETY IN LESS MOTORISED COUNTRIES: POTENTIAL FOR, AND LIMITATIONS OF, TRANSFER OF EXPERIENCES FROM MOTORISED COUNTRIES

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ABSTRACT

Less motorised countries have road crash rates which are considerably higher than those of motorised countries, and efforts have been made to address their road safety problems by applying experiences gained during the motorisation of Western countries. This paper reports on the mixed results which have sometimes been obtained, and explores the cultural, social and economic context of road use in less motorised countries. It is proposed that a more studied approach needs to be taken to the transfer of the experiences of highly motorised countries, combining a greater awareness of cultural, social and economic issues with different approaches to the identification and treatment of road safety issues.

INTRODUCTION

Road safety has received considerable attention and funding over several decades in the Western world, and crash rates have declined to levels which were considered impossible to achieve in the not-too-distant past. Road safety risks in less motorised countries are much higher according to some widely used crash rate measures, such as fatalities per kilometre of road and fatalities per registered vehicle. In spite of the differences between less motorised countries and the motorised countries of the West, the experiences gained in Western countries may provide benefits for less motorised countries, enabling them to improve their levels of road safety more rapidly than if they developed their own approaches to road safety from scratch. The purpose of this paper is to critically evaluate this proposition.

THE ROAD SAFETY PROBLEM IN LESS MOTORISED COUNTRIES

The term ‘less motorised country’ or LMC is used in preference to value-laden terms such as ‘underdeveloped’ and ‘developing’. The term ‘motorising country’ is also avoided because, among other things, it implies that motorisation to Western levels is an eventual target, which is not necessarily the case for a variety of reasons. It is worth noting that motorisation is not a fixed state - many of the highly motorised countries (HMCs) are still motorising in terms of vehicle ownership.

The majority of the world’s countries are LMCs, and they account for an overwhelming majority of the world’s population. For convenience, the figures presented below are confined to the South East Asian countries, with Australia as a comparison HMC. Table 1 presents data on road length, population and vehicle ownership in each country, together with total fatalities and fatality rates.

The figures are sourced from the Asian Development Bank (1) and are relatively old, and their accuracy is questionable. Some of the fatality rates calculated from the data in the table differ markedly from rates presented elsewhere in the source document. Attention is also drawn to the calculation of fatality rates using figures from different years, an important consideration when the base figures are dynamic. An extreme example can be found in Vietnam, where the number of registered vehicles increased by 2,100% between 1980 and 1994, and fatalities by 104%, while population increased by only 35% in the same period, and road length increased by 30% between 1980 and 1992.

Table 1: Comparative road, population, vehicle, road fatality and fatality rate data, South East Asian countries and Australia

	Annual base data*				Fatality rates		
	Km road (,000) ^a	Population (0,000) ^b	Registered vehicles (0,000) ^c	Fatalities ^d	Per ,000 kms road	Per 0,000 population	Per 0,000 registered vehicles
Brunei	2.2	28.2	14.4	47	21.4	1.7	3.3
Cambodia	14.8	922.2	-	-	-	-	-
Indonesia	283.5	19,805.5	1,137.3	11,004	38.8	0.6	9.7
Lao PDR	13.3	474.2	13.4	200	15	0.4	14.9
Malaysia	61.6	1,968.3	662.7	3,651	59.2	1.9	5.5
Myanmar	30.6	4,557.3	25.2	924	30.2	0.2	36.7
Philippines	160.6	6,789.8	212.5	1,027	6.4	0.2	4.8
Singapore	3	282.5	58.4	254	85	0.9	4.3
Thailand	46.7	5,758.6	1,106.2	9,496	203.3	1.6	8.6
Vietnam	105.5	7,234.2	339.6	4,533	43	0.6	13.3
Australia	810.3	1,808.9	1,061.3	1,953	2.4	1.1	1.8

* Source: Asian Development Bank (1), Appendix D.

^a Data 1992 except: 1993 (Singapore), 1991 (Malaysia, Philippines), 1990 (Indonesia), 1989 (Brunei, Australia)

^b Data 1994

^c Data 1993 except: 1994 (Indonesia, Lao PDR, Vietnam), 1992 (Brunei)

^d Data 1994 except: 1993 (Malaysia, Myanmar, Thailand, Australia), 1992 (Brunei)

Despite the caveats above, two generalisations can be made from these data:

- Australia has much lower fatality rates per road length and per vehicle than any of the South East Asian countries, supporting the proposition that HMCs could offer the benefits of their experience to LMCs; but
- conversely, Australia's road safety performance per head of population is among the worst of the South East Asian countries, which suggests that a key experience of HMCs is that increasing motorisation inevitably makes road use less safe for individuals.

CLASSIFYING ROAD SAFETY TRANSFER

The application of Western road safety experience to LMCs has probably been taking place since motorisation began, with the nature of the transfer process over time reflecting the rise of more systematic and multidisciplinary road safety approaches in HMCs.

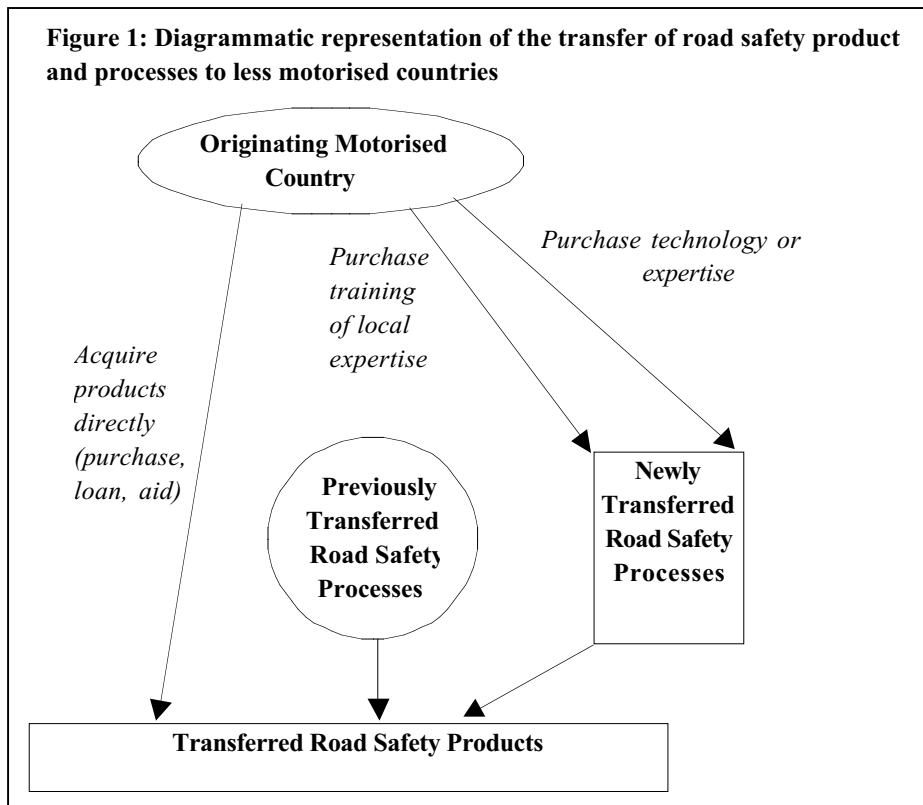
There are several categories into which the objects of transfer can be placed, and there is more than one way of defining categories. The categorisation used here distinguishes between *products* and *processes*:

- *road safety products*, which include crash barriers, well-designed roads, safe vehicles, well-constructed road safety training packages, effective road safety publicity campaigns (i.e. materials plus media), effective enforcement programs, and effective legal and administrative systems; and
- *road safety processes*, which include the processes and tools used to develop road safety products, e.g. manufacturing technology and standards for crash barriers and safe vehicles, road design standards and traffic engineering practices for safe roads, consultation and market research for training packages and media publicity, systems development, lobbying, advocacy etc.

Ultimately, LMCs need road safety products. As Figure 1 shows, transferred road safety products can be:

- acquired directly from HMCs;
- developed by LMCs using road safety processes newly acquired from HMCs (through purchase of expertise, or purchase of training in the processes); and/or
- developed with existing local expertise in previously transferred road safety processes.

Figure 1: Diagrammatic representation of the transfer of road safety product and processes to less motorised countries



SUCCESS OF ROAD SAFETY TRANSFER EFFORTS

Evaluations of road safety measures in LMCs for the purpose of determining the success of transfer efforts are rare. The Asian Development Bank has prepared Guidelines for Road Safety in the Asia Pacific (1), however they appear to summarise Western best practice and the experiences of road safety experts who have worked in the Asia Pacific, rather than the results of evaluations.

The author has published a short review of the road safety outcomes of the implementation of best practice Western engineering measures in Asia (2), based on a limited search of the published research literature and some anecdotal information. It was noted that it is rare to find studies which attempt to identify failures or sub-optimal results. Several examples were found, e.g.:

- red lights were routinely ignored at traffic signals;
- some vehicle types routinely travelled counterflow at roundabouts;
- bus drivers ignored bus stops and bus lanes, stopping in the middle lanes of the road and on demand; and
- some black spot treatments based on best practice engineering led to increased crashes, as vehicle speeds increased in response to an improved road environment and low levels of enforcement.

It was concluded that engineering best practice developed in HMCs may contain implicit assumptions about the relationship between a road safety problem, an engineering treatment, and the impact that it will have on road user behaviour. For example, installation of traffic lights to improve road safety is based on the assumption that drivers will observe the traffic lights.

Mohan and Tiwari (3) are also quite critical of the assumption that practices developed in HMCs will be effective in LMCs, pointing in particular to the different kinds of vehicles and traffic in LMCs. Campbell et al (4), while more optimistic about transfer efforts, caution against the uncritical assumption that road safety measures transfer readily from HMCs to LMCs.

In spite of these cautions, the author has not found any references which argue against the conclusion that transfer of road safety products and processes has shown at least some success, and promises potentially greater benefits for the future. The question then arises, how do we approach the transfer of the road safety experiences of HMCs in a way which optimises road safety?

A FRAMEWORK FOR TRANSFER OF ROAD SAFETY EXPERIENCE

More effective transfer of road safety experience requires an understanding of the factors which influence the process, and their interrelationships. A theory is a concise expression of such an understanding. Therefore, a theory relevant to the transfer of road safety should explain the success or failure of the transfer process in terms of the presence, absence, amount or quality of some subset of the variables which have been shown to influence effective transfer.

There is limited evidence that theoretical perspectives on road safety transfer are lacking, based on a pilot study carried out by the author on the application of social science theory and methodology to road safety in Asia (5). Publications on road safety in Asia were collected and examined. To some extent it was an opportunity sample based on studies readily available to the author in a strict timeframe. The majority of the 68 studies reviewed were published between 1995 and 1999, and a large proportion were conference papers.

Two kinds of information were sought: the social science theoretical perspective adopted in approaching road safety transfer; and the kind of social science methodology used. As it was a pilot study, the categories for responses were not strictly defined prior to assessment of the studies, but were developed as part of the literature review process. The results are presented in Table 2.

Table 2: Use of social science theory and methodology in a sample of road safety studies in Asia (n = 68)

Theory	Theoretical perspectives on behaviour	0
	Recognised need to understand road user behaviour	7
Methodology	Marketing approach	3
	Simple social science methods (questionnaires, observed behaviour)	3
	Ethnographic methods	2
	Community development approach	1

There was a clear lack of theoretical approaches to the achievement of road safety outcomes through the transfer process, at least where social science theory was concerned. However, there was a tendency for the studies to use 'naive theory', that is, to make common sense or popular generalisations about road user behaviour. Social science methodologies were slightly less uncommon.

A separate literature review and analysis (also reported in reference 5) examined the factors which influence road safety transfer effectiveness. These were summarised as:

- *institutional*, e.g. legislative and decision-making systems, role of police, relationship between central and regional governments, etc.;
- *economic*, e.g. distribution of wealth, relative costs of transport modes, use of development funds for road-building, etc.; and
- *social and cultural*, e.g. social stratification, values, involvement of poorer and disenfranchised people in problem identification and treatment.

This was supplemented with a review of literature relevant to the theoretical perspectives which could address factors such as these. A useful framework was found in Neuman (6), who distinguished the following three social science approaches:

- *positivism*, which assumes an objective world in which findings can be replicated and apply generally; this is the dominant approach across science and engineering, but does not accommodate institutional factors well, and is unsuited to dealing with social and cultural factors;
- *interpretive social science*, which deals with social and individual meaning systems; it has a clear applicability to social and cultural factors, and some institutional factors; and
- *critical social science*, an action research model with Marxist influences, aimed at changing the situation which is being studied, through the understanding and involvement of the actors.

Anthropology is a social science approach which falls into the interpretive category, and is therefore useful in addressing social, cultural and some institutional factors. It has some other advantages, as it takes into account the issues involved when outsiders collect information in a different culture, and the data collected seem amenable to use in positivist and critical social science frameworks. It is easy to see how anthropological techniques could contribute to a better understanding of the factors influencing road user behaviour in a non-Western setting. It is possible that anthropological theory could be useful as well, in contributing insights into how to change road user behaviour or implement road safety interventions optimally. The subdiscipline of medical anthropology may offer the best promise in this area, as it has a long history of application to practical problems involved in the transfer of health knowledge and technology to non-Western societies.

Theories incorporating institutional, political and economic factors tend to be macroscopic. Theories which apply to the economic development of LMCs, for example, provide a context within which the transfer of knowledge and technology can be understood. They include modernization theory, Frank's dependency theory, the cultural template model of innovation and world systems theory. Unfortunately, none enjoy convincing empirical support (7). It has been argued that world systems theory (which sees flows of economic and political power as part of a global movement commencing in the 16th century) has great potential as an explanatory system which dovetails with anthropological theory, provided it gives a role to people acting locally to have an impact on their own circumstances instead of being carried passively along in global currents (7). It appears that this kind of perspective might aid an analysis of political and economic barriers to, or facilitators of, road safety transfer, but without providing information on how best to proceed.

The injury control approach (8) is more practically focused and more readily applicable to road safety. It takes economic, social and political factors into account, explaining the impact (on injury and its prevention) of income differences, the existence and actions of elites, and societal complexity. It also taps into human rights viewpoints and the concept of an ethical civil society, as a way of giving direction and legitimacy to injury control efforts. However, there is danger in pursuing what appears to be a political agenda as a justification for injury control measures.

Finally, community participation approaches (9) suggest another means of achieving better road safety outcomes through a transfer approach. While this approach is quite prescriptive, it is possible to provide a theoretical rationale using the concept of 'socially distributed knowledge' (4). From the literature reviewed so far, community participation and the concept of social distribution of knowledge do not appear to have been utilised much, let alone evaluated in a road safety context.

A framework for understanding and improving the transfer of road safety knowledge and expertise to LMCs would therefore involve:

- elements of the theoretical perspectives of world systems theory and the injury control approach to develop a better understanding of the relationship between institutional, economic, social and cultural factors and road safety;
- elements of medical anthropology, community participation approaches and the theory of socially distributed knowledge to develop approaches to implementing road safety measures more effectively; and
- anthropological methodology to supplement traditional road safety methodologies, in order to facilitate an understanding of road user behaviour, assist in the development and implementation of road safety measures, and evaluate their impact.

TOWARDS A TEST OF A NEW APPROACH

Even if such a framework is further developed, refined and put into practice, there is no guarantee that it will prove to be more effective than current efforts at transfer of road safety knowledge and techniques. This would require testing, which presents a range of methodological problems. It is hard to envisage a controlled experiment using this framework in some situations, contrasted with the use of current approaches in another, because:

- each situation will have some unique features which affect the validity of comparisons;
- there is no coherent 'current approach' as such, for comparison purposes; and
- the potential size and complexity of such an experiment would be overwhelming.

An alternative would be the use of a case study approach, examining various instances of road safety transfer in order to determine:

- which elements of the proposed framework were present;
- which of the factors influencing road safety outcomes (institutional, economic, social and cultural) were present, and their nature; and
- the impact of these influences on road safety.

The 'cases' under this scenario could be large scale enforcement programs, locally focused community interventions, engineering treatments, etc., and would need to be drawn from more than one country. The assistance of local researchers, practitioners or other interested people would be essential, both from a methodological viewpoint, and because of the insights they could provide.

SUMMARY AND DISCUSSION

The picture presented by road safety statistics for LMCs is mixed, suggesting that road safety is not necessarily the major issue that it is sometimes assumed to be. It is worth adding that many LMCs have quite severe population health problems by comparison with Western countries, making road safety even less important by comparison.

On the other hand, motorisation is rapidly increasing, and experience shows that this will lead to large increases in deaths and injuries. HMCs would therefore appear to be able to offer the benefits of their experience with motorisation to LMCs. The transfer of this experience could take the form of road safety products (enforcement programs, publicity materials, standards, etc.) or the road safety processes used to develop the road safety products, with the expertise to undertake these processes being either purchased (e.g. consultants) or trained.

Transfer efforts have been taking place over a considerable period, however the results have raised questions about whether road safety experiences are readily transferable, because of differences in the institutional, economic, social and cultural settings which influence road safety outcomes. A framework is needed to enable a better understanding of these factors and how to address them so that road safety outcomes are achieved.

The framework proposed above would involve input from several disciplines in the social sciences, in the three key areas of developing a better understanding of factors influencing road safety in the setting, developing more effective interventions in the setting, and providing a methodology to facilitate the foregoing two activities and evaluation of the effectiveness of interventions. A case study approach is suggested as a way of evaluating the use of this framework.

One implication of the use of such a framework is that a move away from transfer of road safety products to transfer of road safety processes may be indicated, e.g. it may be better to assist in training appropriate local people how to develop and implement a road safety enforcement program for drink driving, rather than simply attempting to implement random breath testing. This would have a strong influence on the nature of the input that might be sought from HMCs, i.e. less purchasing of products and of expertise in the form of consultants, and more purchasing of training.

This raises an important point which has been briefly mentioned already, and merits further attention - the degree to which local expertise already exists. As shown in Figure 1, each country has some form of existing local expertise which contributes to the development of road safety products. If, as the discussion above suggests, there are problems in the transfer of road safety experiences from Western countries because of a lack of knowledge of factors in the new setting, could it be that local expertise will always be superior to transferred experience? In practice the answer to this question will probably vary according to the country and the road safety product or process being considered, but it cannot be overlooked. As noted in Figure 1, the transfer of Western experience through training will have the effect of strengthening local expertise in any case, and the need for consistent international standards in most areas of road safety means that there will always be a role for transfer processes.

It would therefore be more appropriate to view the transfer of road safety experience as being carried out in partnership (or at least cooperation) between the road safety experts of the originating HMC and those of the recipient LMC. This introduces two other institutional issues:

- factors which contribute to the effectiveness of local road safety experts in introducing road safety measures successfully (for example, in some settings non-government organisations may find it easier to promote road safety measures than government agencies do); and
- factors determining the relative success of partnership or cooperation between local and Western road safety experts.

The case study method proposed above can accommodate the consideration of these issues.

The framework and approach outlined above are admittedly complex, and the addition of local expertise as an important variable is a further elaboration. However the issues raised above are not likely to go away, and it would be worthwhile pursuing this course of research. The author intends to do so, by conducting a series of case studies in Asia.

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REFERENCES

1. Asian Development Bank (1998). Road Safety Guidelines for Asian and Pacific Region, Asian Development Bank: Manila.
2. King, M.J. (2000). Engineering for safer road use behaviour in Asia, Traffic and Transportation Studies: Proceedings of ICTTS 2000, eds. Kelvin C.P. Wang, Guiping Xiao and Jialun Ji, pp. 963-970, Reston, Virginia: American Society of Civil Engineers.
3. Mohan and Tiwari, G. (1998). Traffic safety in low-income countries: issues and concerns regarding technology transfer from high-income countries. Reflections on the Transfer of Traffic Safety Knowledge to Motorising Nations, Global Safety Trust: Melbourne, pp. 27-56.
4. Campbell, B.J., Knight, P.R. and Johnston, I.R. (1998). Through a kaleidoscope darkly. Reflections on the Transfer of Traffic Safety Knowledge to Motorising Nations, Global Safety Trust: Melbourne, pp. 155-163.
5. King, M.J. (in press). The role of social science theory and methodology in the transfer of Western road safety and traffic knowledge to Asia. Paper presented at the International Conference on Transport and Traffic Psychology, Berne, Switzerland, October 2000.
6. Neuman, W.L. (1997). Social Research Methods: Qualitative and Quantitative Approaches, 3rd Edition, Allyn and Bacon: Boston.
7. Gross, D.R. (1992). Discovering Anthropology, Mountain View, California: Mayfield.
8. Mohan, D. (2000). Injury control and safety promotion: ethics, science and practice. Injury Prevention and Control, eds. D. Mohan and G. Tiwari, London: Taylor and Francis, pp. 1-12.
9. World Health Organisation (1999). Community participation in local health and sustainable development: a working document on approaches and techniques. Copenhagen, World Health Organisation.