

THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

Report by Rifaat Shoukrallah

2006 Churchill Fellowship

The 2006 NRMA-ACT Road Safety Trust Churchill Fellowship: to examine road safety policies, particularly engineering measures implemented as a result of these policies in Sweden, UK, Norway, Japan and Denmark.

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Signed Rifaat Shoukrallah

Dated October 2007



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1. INTRODUCTION

In Australia, 600,000 road crashes are reported each year, killing 1,750 people and injuring in excess of 200,000. According to the Bureau of Transport and Regional Economics, these 'preventable' road crashes cost the community more than \$15 billion every year¹.

Some overseas countries are achieving better road safety results, and have been particularly more successful in reducing road fatalities, than Australia. The 2006 NRMA-ACT Road Safety Trust Churchill Fellowship allowed me to travel overseas in 2007 to examine road safety policies, particularly engineering measures implemented as a result of these policies in Sweden, UK, Norway, Japan and Denmark.

The knowledge gained from my Fellowship relied on personal research undertaken prior to the trip, meetings with many road safety experts in the above countries as well as field visits of implemented measures.

While the objectives of this fellowship were at the centre of all these activities, knowledge was also gained in other road safety related areas such as education, enforcement and awareness campaigns. I have included the most notable examples in this report.

I am very grateful to both the Winston Churchill Memorial Trust of Australia and the NRMA-ACT Road Safety Trust for this opportunity of personal and professional development.

The people I met overseas during my fellowship were very generous with their time and knowledge. These meetings also gave me the opportunity to access the latest directions, publications, internal reports and presentations in these countries. Reference to some of this material is made in this report with appropriate acknowledgment. Discussions also often lead to additional meetings with other professionals with whom I had not made any prior arrangements. Their responsiveness to short-noticed requests enriched the knowledge I gained in my fellowship. I was overwhelmed with how welcoming and well prepared everyone was for my visit and thank them all for their assistance.

The support I received from the senior officers in the ACT Department of Territory and Municipal Services is also much appreciated.

¹ Road Safety Towards 2010 (Australian College of Road Safety, 2004)

2. EXECUTIVE SUMMARY

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Project Description

I visited Sweden, UK, Norway, Japan and Denmark to examine road safety policies in these countries and the engineering measures implemented as a result of these policies.

Highlights

- Access to the latest directions, publications and internal reports in these countries.
- Field visits of engineering measures implemented on, 400km of, Swedish roads and of measures implemented in an urban environment in Copenhagen.
- Invited by Professor Yasuo Hino to make a presentation at the Osaka City University in Japan about road safety policies and practice in the ACT and Australia.

Findings and Recommendations

Importing 'foreign' solutions can only be successful after careful consideration of differences between countries. In this context, the following is recommended:

- 1 Undertake more research in the potential for crash/casualty reductions of engineering, education, awareness measures to generate credible targets for policies.
- 2 Develop communication/marketing plans to encourage public participation and acceptance of policies, solutions and enforcement efforts.
- 3 Intensify lobbying for stronger political support and funding provision.
- 4 Encourage stronger road safety structures and improve links between the various levels of government and coordination between organizations.
- 5 Encourage the private sector to emphasize road safety in their business activities.
- 6 Strengthen efforts to reduce speeding and drink driving on our road networks.
- 7 Increase examination of the safety of routes, areas and networks and:
 - implement mass treatments to address network-wide crash patterns.
 - implement measures to create a more forgiving environment when crashes occur.
 - provide physical separation of pedestrian, cyclist and vehicle movements.
- 8 Develop national awareness campaigns addressing the more-common crash patterns.
- 9 Explore the potential for using education as a substitute for prosecution.

Implementation and Dissemination

To share the benefits of my fellowship with others, I have, so far, accepted invitations to speak at the Institution of Engineers Australia and at an NRMA-ACT Road Safety Trust workshop. I will also make a number of presentations for senior executives of my Department as well as road safety practitioners in the ACT to disseminate my new knowledge. Some of my findings are worthy of consideration for implementation. I have already initiated some new projects in the ACT based on my findings.

3. CHURCHILL FELLOWSHIP STUDY PROGRAM

My fellowship study program consisted of meetings with many road safety experts listed below. Field visits were also undertaken in Sweden and Denmark.

JAPAN: 5th June to 19th June 2007

Kunihiko OKA, Head of Division
Dr Susumo TAKAMIYA, Senior Researcher
Hiroki HASHIMOTO, Researcher
Advanced Road Design and Safety Division, Road Bureau
National Institute for Land and Infrastructure Management
The Ministry of Land, Infrastructure and Transport, Tokyo, Japan

Professor Yasuo HINO, Professor Infrastructure Planning and Transportation
Engineering
Muhammad Zulkifli MOCHTAR, PhD Student
Department of Civil Engineering, Osaka City University, Japan

Kazua TOJO, Consultant
Yoko GOKURAKUJI, Consultant
Mitsue NAGANA, Consultant
Shusei Construction Consultants, Osaka, Japan

UK: 19th June to 27th June 2007 and 10th August to 14th August

Professor Benjamin HEYDECKER, Head of Transport Studies
Heather WARD, Road Safety Researcher
University College of London, London, UK

Chris LINES, Head of London Road Safety Unit
Transport for London, London, UK

John SMART, Deputy Chief Executive & Director of Technical Affairs
The Institute of Highways and Transportation, London, UK

Denmark: 7th July to 14th July 2007

Lars BOLET, Director, Office for Traffic Safety
Anne ERIKSSON, Office for Traffic Safety
Area Centre for South Denmark
Road Directorate, Danish Road Administration
Ministry for Transport and Energy, Copenhagen, Denmark

Claus ROSENKILDE, Project Leader
Centre for Traffic
City of Copenhagen, Denmark

Jesper SOLUND, Chief of Documentations
The Danish Road Safety Council

Norway: 14th July to 21st July 2007

Marika KOLBENSTBEDT, Head of Department
Rune ELVIK, Chief Research Scientist
Department of Safety and Environment
Institute of Transport Economics
Norwegian Centre for Transport Research, Oslo, Norway

Sweden: 21st July to 4th August 2007

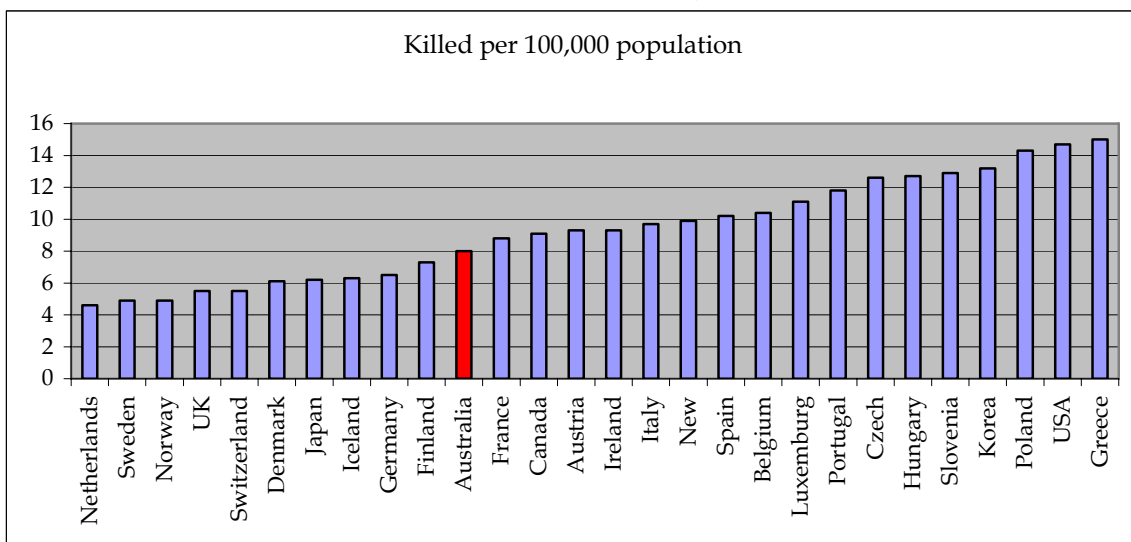
Frederik GUSTAFSSON, Project Manager Road Safety
Magnus AXELSSON, Regional Office of Eskilstuna
Department of Society
Swedish Road Administration

4. THE INTERNATIONAL SCENE

Approximately 1.2 million people worldwide are killed (more than 3000 people every day) and 50 million people are injured in road crashes each year. The global cost of road traffic injuries is estimated at US\$ 518 billion each year ².

In higher-income countries, road traffic crashes are among the top ten leading causes of disease burden as measured in Disability-Adjusted Life Years. Road traffic injuries are expected to take third place in the rank order of disease burden by 2020³.

Organizations such as the UN, the World Health Organization, the World Bank and the European Union have developed comprehensive traffic safety plans. Similarly, interesting plans have been prepared for most European countries. International road death rates allow Australia's road safety performance to be compared with other OECD nations while taking into account the differing levels of population (a measure of the public health risk associated with road trauma), motorisation and distances traveled (a direct measure of the risk associated with road travel).



Among OECD nations, Australia has the 11th lowest rate in road deaths per 100,000 population; the 9th lowest rate in road deaths per 10,000 registered vehicles and the 7th lowest rate in road deaths per 100 million vehicle kilometers traveled⁴.

While these rates, and subsequently the rankings, change every year, some countries have consistently displayed better road safety records than Australia. This report examines the policies and measures in 5 such countries: Sweden, UK, Norway, Japan and Denmark in an attempt to understand the reasons behind such good performance.

² The global burden of disease (WHO)

³ World Report on road traffic injury prevention (WHO, 2004)

⁴ International Road Safety Comparisons: The 2005 Report (Australian Transport Safety Bureau, May 2007)

5. ROAD SAFETY POLICIES

In October 1997, the Road Traffic Safety Bill was passed in the Swedish parliament. The Bill is based on *Vision Zero* which aims that 'eventually no one will be killed or seriously injured within the road transport system'⁵. Zero is not a target to be achieved by a certain date. It is, however, a change from an emphasis on current problems and possible ways of reducing these to being guided by what the optimum state of the road transport system should be.

The vision is based on: *Ethics* (every human being is unique and irreplaceable) and *Science* (human physical and mental capabilities are known and should form the basis for road design. Knowledge of our limited ability and tolerance in a crash should be premises for chosen solutions and measures).

Vision Zero also changes the emphasis in responsibility for road safety from the road user only to a shared responsibility by all those who have an effect on, or participate in, road traffic (politicians, designers, planners, road managers, vehicle manufacturers, transport companies, the police and road users).

Safety is considered more important than other issues (such as mobility) in the road transport system. Vision Zero presented this paradigm shift which contrasts to the more general principle, where human life, mobility and other benefits and problems are weighted against each other.

The Norwegian Government has also established that Vision Zero shall form the basis for traffic safety activities in Norway: "The vision means that the Government, in addition to conducting a policy with the goal of reducing the total number of accidents, will focus strongly on measures that can reduce the most serious accidents"⁶.

The action plan strongly promotes cooperation between the Norwegian Public Roads Administration, the National Police Directorate, the Norwegian Council for Road Safety and the Directorate of Health and Social Affairs as well as the importance of developing the strength of each of these actors. It also acknowledges the importance to secure the engagement of local politicians and the population at large.

The Norwegian *National Action Plan for Road Safety 2002-2011* adopted a number of performance indicators to be measured annually by recording the development of parameters like crash reduction; operating speeds, technical standard of heavy vehicles; seat belt usage; helmet usage; light usage for cyclists; retro-reflector usage for pedestrians and cyclists; proportion of drivers under the influence of alcohol/ drugs and hazardous traffic behaviour.

⁵ Vision Zero - an ethical approach to safety and Mobility (Claes Tingvall and Narelle Haworth, 1999)

⁶ Vision Strategy and Targets for Road Traffic Safety in Norway (Ministry of Transport and Communications, 2006)

Similarly, the vision and central theme of the **Danish** road safety strategy 2002-2011 is *"Every Accident is One too Many"*. The vision sets a course towards a future road system without any road crashes whatsoever and retains a focus on preventive measures. Road safety initiatives are based on five strategies⁷:

- Road safety starts with you: acknowledging that if all drivers followed three golden rules by observing the speed limit, fastening their seatbelt, never drink and drive, Denmark would experience an immediate reduction of at least 40% in the number of deaths in road crashes. The Road Safety Commission is allocating more funds to intensive national campaigns to change road user behaviour within these areas.
- Four key areas: speeding, alcohol, cyclists, and junctions are the focus of the actions.
- A commission for road crashes is to be set up to obtain more detailed and systematic knowledge on the causes and circumstances of various types of road crashes.
- Local road safety efforts should be strengthened.
- Agreements between private and public enterprises, and transport service suppliers present great potential for crash prevention and should be fostered.

The responsibility of implementing the strategy *'Tomorrow's roads: safer for everyone 2000-2010 in the UK'* is shared by many stakeholders, led by the Government's Department for Transport. There are 10 main themes in the Government's framework for improving road safety⁸ which acknowledges the need for new thinking and fresh ideas and not be afraid to challenge conventional wisdom. These themes cover actions contributing, to safer children, safer drivers (training, testing), safer drivers (drinks and drugs), safer infrastructure, safer speeds, safer vehicles, safer motorcycling, safer pedestrians cyclists and horse riders, better enforcement and promoting safer road use.

The Traffic Safety Policies Law in Japan requires the government to report to the Diet, each year, on the status of traffic crashes, on measures being implemented and on plans for traffic safety measures. This is contained in the **'White paper on traffic safety in Japan'**. Expert panels develop Fundamental Traffic Safety Programs (FTSP) every five years. The Eighth FTSP (2006 to 2010) acknowledges the need to respond to declining birthrates and an aging society; establishing improved pedestrian safety and raising people's awareness. The common philosophy of the Eighth FTSP includes⁹:

- The aim is a crash-free society.
- Giving people precedence: a "people first" philosophy giving consideration for those who are weaker than others.
- Dealing with the issue of human error in public transportation: by improving the organizational structures and systems of companies providing transport services.
- Encourage participatory traffic safety activities by enabling citizens to participate in the planning stages of traffic safety measures run by national and local authorities.

⁷ Every Accident is one too many (The Danish Ministry of Transport, 2000)

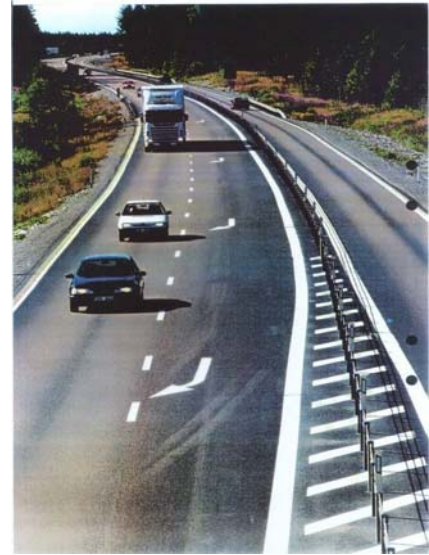
⁸ Tomorrow's roads – safer for everyone (Department for Transport, UK, 2000)

⁹ White Paper on Traffic Safety in Japan (International Association of Traffic and Safety Sciences, 2006)

6. MEASURES TO IMPROVE THE ROAD TRAFFIC ENVIRONMENT

The roads in *Sweden* have been gradually changing over the last few years. Investments were made to reduce the risk of serious human injury (Vision Zero):

- The cross sections of around 1000 km of undivided roads in Sweden have been rearranged to cater for two lanes in one direction, a wire rope guardrail in a painted median and a single lane in the opposite direction (2+1 roads)¹⁰. This arrangement is estimated to have reduced head-on collisions by about 90%.
- Speed limits on the road network have been reviewed in order to ensure that they reflect the safety standard of the road. It is now unusual to find a road with a speed of 110 km/h without a median barrier. If barriers are not installed, the speed limit is reduced to 80 km/h.
- A 30km/h speed limit has been established in built-up areas emphasizing that this must be the limit if pedestrians and cyclists are to survive a collision. It has been implemented on a large scale as a result of the application of Vision Zero to urban environments.
- Roundabouts have become more commonplace at intersections since the consequences of a collision are less severe than in a normal intersection due to the different angles of impact and lower speeds.
- The application of Vision Zero for bikes and pedestrians at major paths (schools).
- SEK 4.9 billion, for the period 2004 – 2015, are earmarked for physical road safety measures such as roads with median guardrails, fully controlled intersections, roundabouts, lighting, sealed shoulders, tactile edge line marking, etc.
- Major investments have also been made to minimise the damage ensuing from cars veering off the road. Guardrails have been erected, and trees and boulders have been cleared away from roadside areas.
- Pedestrian crossings are being removed in some cases as they are controversially considered to create planned crash locations! Crashes are analysed to determine whether drivers were blinded by lighting and missed to see what's before and/or after a crossing.



¹⁰ Photo of (2+1) road courtesy of Mr Magnus Axelsson of the Swedish Road Administration

To improve traffic safety *in Norway*, long-term as well as short-term measures are being implemented. In the long term the main roads with heavy traffic, many fatalities and serious injuries are being developed to motorway standard. In the meantime, improved markings, median barriers, and roadside measures will be implemented.

Regular road safety inspections show the needs for short-term as well as long-term measures. The Ministry of Transport and Communications is considering improvements to four-lane dual carriageways with centre crash barriers to reduce the number of head-on collisions. Norway has 75 km of '2+1 roads' with median guardrails. In some cases, median rumble strips¹¹ are used in the place of guard rails/barriers.

Rumbled edge markings; straightening sharp curves; Improving visibility, better road markings and guard rails are also being implemented to reduce the number of single-vehicle crashes. To reduce their severity, roadside obstacles (trees and the like) are being removed and forgiving utility poles are being used.



Road lighting, safe crossings and underpasses, especially on routes to schools, are also receiving attention to reduce the number of crashes involving vulnerable road users.

While the residential speed limit is 50 km/h, speed limits are continuously reviewed. The latest work on 80 km/h roads reduced the speed limit on 30% of these roads.

Many of the above measures were applied to the national demonstration project for Vision Zero established in the Lillehammer district and included:

- Automatic traffic surveillance.
- Painted central line and machined rumble strips.
- Free-text signboards to provide better information to road users.
- Installation of lighting pylons that bend or have a breaking point.
- The construction of a footpath/bicycle lane.
- Lowering the speed limit to 30 km/h in streets with many pedestrians.
- The use of speed humps and more orderly street parking.
- Narrowing the driving lanes and increasing the width of the road shoulders.

¹¹ Photo courtesy of Mr Rune Elvik of the Norwegian Centre for Transport Research, Oslo.

Nearly half of all road crashes *in Denmark* happen at intersections killing almost 200 people and injuring approximately 4800. The two typical factors involved are speeding and failure to observe priority rules. Specific measures are implemented in Denmark:

- Roundabouts at T-junctions and crossroads to reduce speed and conflict points.
- Stop signs at intersections without traffic lights (Give Way signs were more common).
- Traffic lights with longer pauses, more visible lights and refuge islands for pedestrians (painted island in photo).
- Speed reductions at intersections.
- Systematically identify and treat black spots.



Apart from these priorities, measures to improve safety in curves, to improve road lighting, to address "grey areas" i.e. stretches of road with high crash rates, and to improve intersections on rural roads are also used.

The general speed limits are 50 km/h in urban areas, 80 km/h outside urban areas and 130 km/h on motorways with sections of 110 km/h. Travel speeds went down when the limit was raised to 130 km/h because it highlighted the 'unsafe' sections.

Cycling achieves a staggering modal split of 36% of journeys to work in Copenhagen. Cycling facilities such as bicycle lanes and storage boxes at intersections are a priority.



Bicycle Treatment at roundabouts¹²

¹² Photo courtesy of Ms Anne Eriksson of the Road Directorate, Danish Road Administration.

The White Paper *A New Deal for Transport: Better for Everyone in the UK* made clear that simply building more new roads is not the answer. The emphasis is now on making the best use of the existing network, giving priority to treating the places with the worst safety, congestion and environmental records. Key elements of the approach include recognition that good engineering reduces the risk of crashes.

The basic road markings, lighting, signs and crossings which help responsible motorists drive safely are now often supplemented with traffic calming features such as humps and chicanes.

Local authorities receive a single block allocation for all of their services and resources for road safety schemes are allocated by authorities themselves according to locally determined priorities.

The professionals' approach to safety planning is changing. The old emphasis on curing crash hot spots is giving way to whole route and area treatments. Many borough councils introduce safety schemes involving engineering measures by identifying crash cluster sites, and where appropriate, further investigations are carried out and proposals for remedial measures prepared.

On arterial roads, speed indication devices (SID) are being used to raise drivers' awareness of their travel speeds and encourage them to slow down. Other vehicle actuated flashing signs are also used at intersections.

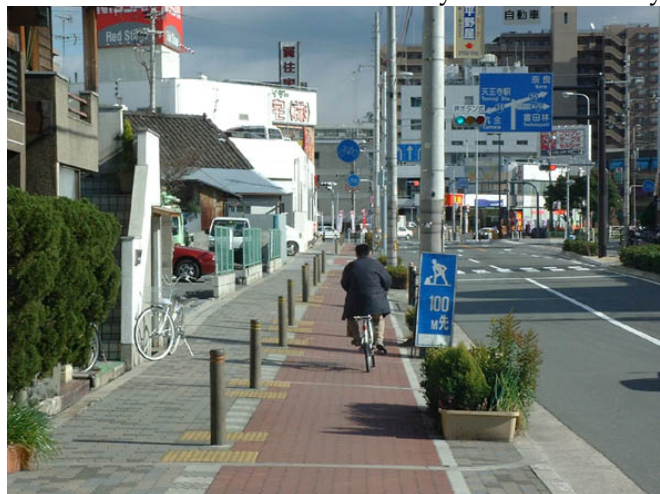
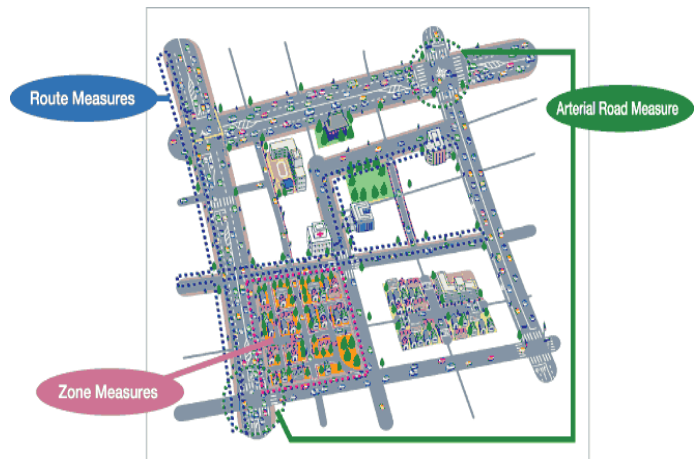
Although the default speed limit in residential areas has been set at 30 m/h, home zones with 20 m/h speed limit are quickly spreading in residential areas.

Speed humps and other physical devices are used in home zones and the use of speed cameras is also being considered at entry/exit points to residential areas.



Safer road networks are implemented in *Japan* (new road construction and reconstruction). As a result, a road network with low crash rate is constantly expanding. The following projects were pursued:

- Under a new procedure, a set of target figures for reductions in crashes is determined first, then the types of countermeasures required to achieve those targets are selected. The degree of achieving the target is assessed every year.
- In 2003, National and local agencies launched a project to reduce the number of crashes at black spots by 30% by 2007. Prefectural public safety commissions are implementing measures at these sites.
- The road network is targeted at three different levels¹³ by developing Routes for the coexistence of pedestrians and vehicles; creating Zones where pedestrians and bicycles have priority and by implementing Arterial Road Measures: including the placement of right-turn lanes; intersection improvements; securing parking space; regulation of illegal parking and installing LED traffic signals.
- “Safe Pedestrian Areas” have been identified and have become the focus of area-wide crash prevention measures (measures to limit travel speeds, to alert drivers to road characteristics and to demarcate sections to be used by traffic and by pedestrians).
- Wide sidewalks¹⁴ were also developed along school routes, around train stations and other public facilities.
- Japan tries to eliminate utility poles, construct pedestrian overpasses with lifts; implement rest areas for pedestrians; bicycle parking facilities and improve signs and markings to make them more visible to the elderly.



¹³ Figure courtesy of Mr Hiroki Hashimoto of the National Institute for Land and Infrastructure Management, Japan

¹⁴ Photo courtesy of Mr Hiroki Hashimoto of the National Institute for Land and Infrastructure Management, Japan

7. OTHER NOTABLE MEASURES TO IMPROVE ROAD SAFETY

The objectives of this fellowship were to study road safety policies and engineering measures in five leading countries. However, discussions also lead to other road safety activities pursued in these countries that are worth noting and some examples are covered in this section.

7.1 SAFER SPEEDS / ENFORCEMENT/ REGULATION

Automatic Speed Control using speed cameras has proven to have very positive effects on road safety in Sweden (800 cameras) where a reduction of speeds by 8km/h was achieved. Cameras are not signposted separately but rather at the beginning and end of the motorway. Cameras are also used in the UK (700 cameras in London: 250 red light and 350 speed) and in Norway (a total of 360 checkpoints when completed). Mobile speed cameras are also used in Denmark.

The Home Office Review of Road Traffic Penalties in the UK and the Government in Norway will consider a range of offences with a view to render penalties more appropriate and proportionate to the seriousness of offences. The Government in Norway is considering the usefulness of more frequent bans on the use of a vehicle by confiscating the vehicles if the user commits repeated serious offences.

7.2 EDUCATION

In a project called One Step Ahead, the Transport Research Laboratory (TRL) in the UK developed a series of magazines for parents of children up to three years old to explain how to avoid traffic crashes and how to deal with them if they happen. Once three years old, the council sends each child a book introducing road safety ideas which parents can use to teach their children. If they choose to join the 'Traffic Club', they receive a new book every six months for the next three years. The 'Kerbcraft' manual was developed to train children aged between 5 and 7 in basic pedestrian skills while the 'Smart Moves' CD-ROM produced for the Scottish Road Safety Campaign, aimed at 10-14 year olds, takes the user through route planning, dangerous behaviour, conspicuity, hazards, cycle safety and other matters.

In recent years, the UK police developed schemes which offer retraining rather than prosecution to drivers who have committed careless errors. The 'National Driver Improvement Scheme' has been adopted by over 30 forces. To reduce drink-driving, special arrangements apply to 'high risk offenders' who are found with high alcohol levels or those who re-offend within 10 years. They are required to have a medical examination before they are allowed back on the road after being disqualified. Similarly, a PC based Speed Awareness course has been developed. It is a 'hazard perception' exercise and speed offenders have the option of attending the course to offset losing points off their license.

The Cabinet Office in Japan will implement programs such as the “Cross-generation Sharing Project,” in which people from three generations meet to learn about traffic safety, and the “Seniors Home Visit Project,” in which traffic safety guidance is provided at home to seniors unable to attend seminars. The country also supported the establishment of traffic safety clubs within seniors’ clubs and retirement homes. Classes for drivers between 65 and 70 years of age teach them the changes that are occurring in their physical functioning, their own driving tendencies and about the characteristics of crashes in which they are commonly involved.

7.3 AWARENESS CAMPAIGNS

The ‘Think’ campaign in the UK has been very successful. The powerful drink-drive advertising has helped make drinking and driving socially unacceptable, and a substantial fall in drink-related casualties was achieved. Over 90% of drivers and front seat passengers now wear their belts thanks to the ‘clunk click’ advertising.

The Public Roads Administration in Norway concentrates on the use of safety belts, speed reduction, cycling and walking to school. Knowing that about 95% of drivers and passengers already wear seat belts, trying to reach the remaining 5% was a challenge. Instead, the campaign targeted those who already wear seat belts urging them to remind and encourage others to do the same¹⁵. The ‘Speak Out’ campaign targeting 16 to 24 year olds about dangerous driving (speed/drink driving) is asking people to speak to the driver about any dangerous habits and not to accept being in the same vehicle.



Similarly, the Road Safety Commission in Denmark calls on all counties to carry out annual ‘Say No’ campaigns to create a high-profile, nation-wide effort directed against drink-driving among young people. Impressive market research takes place in Denmark to identify the target audience for each safety message and how to reach them (safety messages for young drivers are aired at movie theatres showing films that attract young people). A short movie was produced using topless girls (speed bandits) to draw young people’s attention to speed signs and speed limits. Given that people forward all sorts of Internet messages these days, this ad was forwarded to 10 million people in a very short time span.

¹⁵ Russian campaign uses Norwegian traffic posters (A Elkin, E Larionova, <http://www.sr.se>)

Although reflective material is recognised as an effective means of preventing pedestrian crashes at night, the number of people who own or use such material in Japan is low. The national government has stepped up its calls to pedestrians to use reflective material. Prefectural police distributed reflective material on street corners, on visits to seniors' homes and at educational events. Nighttime programs to increase the public's understanding of the benefits of wearing reflective material are undertaken. Items in Fashion shows highlighted reflective material including shoes and accessories. Persons who wore reflective material each time he or she left the house at night increased from 23% to 35%.

7.5 VEHICLE SAFETY

The automotive industry can contribute to road safety by meeting consumer demands. Particularly important are demands set by governments, municipalities, county councils and private business. The Swedish Government demands specific safety features/accessories in its fleet and is therefore indirectly able to affect manufacturers without the need to change vehicle standards.

In the UK, The Government is determined to improve vehicle safety further, by making the fitting of seat belts and anti-lock systems compulsory on all new buses, coaches and large goods vehicles. The UK is backing proposals for the European Commission to bring forward a directive to make car fronts safer; encouraging better information for consumers, helping them to choose safer vehicles (NCAP) and better standards of vehicle maintenance.

Japan strengthened its information gathering system for vehicle defects by publicising the availability of a vehicle defect hotline and requiring the manufacturers to issue regular reports on any emerging problems.

7.6 MEDICAL SERVICES

In Norway, studies show that if the person first arriving at the scene of the crash masters first aid, every fifth fatality could be avoided. More emphasis should therefore be put on improved preparedness both in the general population and in the health services.

The doctors-on-helicopters program in Japan, which uses specially equipped helicopters and deploys to sites with a physician on board aims to provide better medical care at emergency sites and during patient transportation. As of the end of 2005, ten emergency stations in nine prefectures operated such helicopters. To improve pre-hospital care, the government will also promote the use of doctor cars (ambulances with a doctor aboard) and train emergency life-saving technicians in order to achieve a more systematic deployment of such personnel.

8. CONCLUSIONS

The major findings in the countries visited were not just about the measures deployed but rather about the overall approach to road safety and how the authorities manage it in its various stages:

- 8.1 Speeding and drink driving continue to be the major problems to address. While some people may think it is shameful to be caught drink driving, they still boast about speeding. Vulnerable road users are also receiving a lot of attention.
- 8.2 The profile of road safety, in the visited countries, is raised through political support at the highest levels. The Prime Minister of Japan chairs the Central Committee on Traffic Safety Measures responsible for formulating the Fundamental Traffic Safety Programs. Similarly the Swedish and Norwegian Governments have stipulated that Vision Zero forms the basis of future programs. In London, the mayor's office has produced its own 'transport strategy for London' supporting walking, cycling and road safety. That political support is also usually translated in funding provision.
- 8.3 Holistic approaches to road safety are becoming common including the Swedish 'Vision Zero' and the Dutch 'Sustainable Mobility'.
- 8.4 This holistic approach is being translated in organizational structures. The 'old' set-up of placing various components of road safety in different parts of an organization is giving way to a consolidation of all efforts (policy, engineering, awareness campaigns and education) in one group. These new structures allow the choice of treatment across different fields, and sometimes, their integration in a 'solution'. The need for specialist skills and continuous training is pursued to develop the 'right' people for the task.
- 8.5 National coordination of road safety works is a strong aspect in the visited countries. Road safety is a 'Strategic Aim' and a 'culture' within the various organizations. The holistic perspective of recent policies has resulted in closer cooperation between system designers and other players. Players at different levels of Government and in different organizations understand the goals and their role in achieving them. The need to strengthen each organization especially at the local municipality level is also pursued.
- 8.6 Funding seems, sometimes, to also be made available as a 'bulk' amount to cover the various efforts across road safety rather than separate funding for each discipline (engineering, awareness campaigns and education). In some cases, local authorities have to prove their contribution to road safety to seek funding and the level of funding is linked to their performance.

- 8.7 Cooperation does not stop at Government organizations but also extends to the private sector. Companies that either procure or operate transport services have started to assume responsibility for their impacts on road safety. Quality assurance agreements are being developed in Sweden and Denmark with big companies, such as Ikea and Carlsberg, to promote road safety (seat belts, speeding) within the company. The road authority may sponsor initial measures such as alcolocks but the company benefits from health to their employees and being a 'good citizen'. Many companies are gradually joining the scheme.
- 8.8 Road Safety Policies are, more and more, focusing on reducing casualties. A 'People First' philosophy is continuing to gain popularity. Despite the fact that politicians do not generally support targets (as they admit acceptance of a certain number of deaths), ambitious targets are set to provide the focus for the whole of Government effort. These targets are set in line with measures recommended by the policy and their expected potential for casualty reductions (A lot of good research, especially in Norway, has been done in this area).
- 8.9 The importance of the availability and quality of data is strongly acknowledged since it informs the decision making process especially in the common environment of limited budgets. Separate organizations/commissions are being created (Denmark, Japan) to improve the processes of data collection and analysis in order to identify problems, determine appropriate goals, set priorities and justify expenditure. Geographic Information Systems (GIS) are spreading enabling better ways of presenting and analyzing crashes across routes, areas and the whole network. Warnings about the trade off of graphical presentation and the statistical capability of some GIS systems have also been raised. Data is also used to convert the goals for the road transport system into indicators that measure quality and are easy to monitor enabling the regular evaluation of measures, projects and programs.
- 8.10 In depth studies of every death are starting to become a standard part of the process to examine whether they could have been prevented. These studies are not necessarily interested into why the crash happened (before the crash) but rather into why did it get the consequences it got? Why did the person die? (after the crash). The system designers assemble stakeholders (e.g. truck operators for crashes involving heavy vehicles) to discuss possible solutions to avoid the same thing from happening again. This is followed by the implementation of concrete measures, confirmed in a declaration of intent signed by each stakeholder. In order to ensure that the conclusions drawn from an in-depth study are implemented, "OLA (Objective data, List of solutions and Addressed action plans)" projects are conducted in Sweden.

8.11 Apart from the traditional 'blackspot' approach which examines single sites, more and more work is being done at other levels of analysis:

- Arterial Routes are examined either through a comparison of crash rates per km, per million vehicle kms of travel (reactive) or through risk assessments (pro-active) using a Road Safety Audit approach. The European concept for road tests, Euro RAP (European Road Assessment Program) classifies road stretches according to their level of safety and assigns star ratings.
- Areas are compared in terms of crash rates to identify priorities for funding. Scattered crashes are dealt with by 'traffic calming' area treatments. The use of speed cameras as an area-wide residential treatment is also being considered.
- Networks are analysed to identify crash trends and mass engineering, and other, treatments are implemented. This approach has proven very successful and many examples exist:
 - o Lower residential speed limits (20 m/h home zones in the UK, the general speed limit was lowered to 30 km/h in residential streets and CBDs in Norway, the residential speed limit is 40 km/h in Japan and 30 km/h speed zones are used around schools in Sweden).
 - o '2+1' roads with median barriers in Sweden (1000 kms).
 - o Rumble markings at road edges/medians in Sweden and Norway.
 - o Pedestrian facilities/sidewalks in Japan.
 - o Physical separation of travel modes (cycling and walking from other modes).
 - o Passive supports for gantries on motorways in the UK.
 - o Maintaining clear zones at road edges to create more forgiving environments.
 - o Lower blood alcohol limits to 0.02g/l in Norway and Sweden.
 - o Speed cameras across the network.

8.12 Influencing road user behaviour, through awareness campaigns, is an important matter. Massive general campaigns are not the norm anymore. Rather, a more targeted approach to specific groups is used. Analysis is undertaken to determine the details of the problem, what the message should be; who is the target audience/the high risk group, make sure the target audience sees the message (use MTV channel for young drivers ads). For example, to increase drink driving awareness in Sweden the number of offenders was translated into a total number of trips per day which happened to equate to the number of taxis in Stockholm. This simple translation has increased the community's awareness of drink driving.

8.13 Educational/training opportunities, offered as a substitute to prosecution in the UK, have been successful. Speed offenders have the option of attending the Speed Awareness course to offset losing points off their license. It is also interesting to note that these courses are self-financing. Victims of traffic crashes (Road Peace in the UK, and Traffic Informers in Denmark) assist the Government in education efforts of school children or others and represent a powerful source of change.

8.14 For these countries to stay up front with the leading nations in the field of road safety, the need to maintain high standards of road safety research, to challenge conventional wisdom and to develop new solutions is acknowledged. Examples include:

- Japan's National Police Agency plans to introduce a road safety system that alerts drivers to potential hazards through audio and visual notifications. The 'Driving Safety Support System' relies on networks of two-way communication devices installed in crash-prone areas. The infrared beacons detect the presence of vehicles and pedestrians in hard-to-see locations and communicate this information to drivers through their in-vehicle navigation systems. About 20 different subsystems, each designed to prevent a specific crash type (rear-end collisions, head-on collisions) are being studied. Some of these are expected to be rolled out in 2008 and are currently being tested in Tokyo.
- Intelligent Speed Adaptation (ISA) is a promising method for helping drivers keep to the speed limit. Using GPS technology the system registers the vehicle's speed and compares it with the permitted speed at the current location. The speed limit data is taken from a road database that contains information on all roads. If the speed limit is exceeded, then some systems issue a sound signal while others use the accelerator through counter-pressure or vibration. ISA has been promoted to companies in Sweden so that they can reduce speeding by their drivers. Government Departments have also installed it in their vehicles and consideration is being given to its use on taxis and buses as a first step of implementation.

These findings and my discussions with the many experts during my trip have enriched my knowledge and experience in road safety. In an attempt to share them with others, I have, so far, accepted invitations to speak at the Institution of Engineers Australia, at an NRMA-ACT Road Safety Trust workshop and to produce an article for the Australasian College of Road Safety newsletter. I also plan to make a number of presentations for senior executives of my Department as well as road safety practitioners in the ACT to disseminate my new knowledge.

Some of my findings are worthy of consideration for implementation. I have already initiated some new projects in the ACT based on my findings. In that context, my study will greatly assist and guide my road safety work in the ACT and my contributions to the development of the new Austroads (national) Guide to Traffic Management.

9. RECOMMENDATIONS

Many differences exist between countries including cultural influences, legislative requirements, the standard of the road network, the use of the various travel modes, the interactions between these modes and others. Importing and implementing 'foreign' solutions can only be successful after careful consideration of these matters. In this context, the following is recommended:

- 1 Undertake more research in the potential for crash/casualty reductions of the various measures across all fields (engineering, education, awareness campaigns) in order to generate credible targets for road safety policies.
- 2 Develop communication/marketing plans for road safety policies and measures to encourage public participation, to improve public acceptance of policies, solutions and enforcement efforts and to pro-actively manage criticism by minority groups.
- 3 Intensify lobbying for stronger political support and funding provision for road safety. Champions are needed.
- 4 Encourage stronger road safety structures and improve links between the various levels of government and coordination between organizations.
- 5 Encourage the private sector to give emphasis to road safety in their business activities.
- 6 Strengthen efforts to reduce speeding and drink driving on our road networks and further explore the potential for, and the benefits of, lowering residential speed limits, lowering allowable blood alcohol limits and using educational opportunities as a substitute for prosecution.
- 7 Increase examination of the safety of routes, areas and networks and:
 - implement mass treatments to address network-wide crash patterns.
 - implement measures to create a more forgiving environment when crashes occur.
 - whenever possible, provide physical separation of pedestrian, cyclist and vehicle movements.
- 8 Develop national awareness campaigns addressing the more-common crash patterns in Australia. Undertake detailed research to determine targets for these campaigns and the most suitable methods of delivering the relevant message.