



Performance indicators in the road sector

The Australian experience

1. PERFORMANCE INDICATORS, THE ROAD SYSTEM AND ROAD AUTHORITIES

Background

Australia is striving to increase its global competitiveness through micro-economic reform. Australia's infrastructure providers therefore need to maximise their productivity to lower the costs imposed on import-competing and exporting companies.

The provision of road infrastructure plays a critical part in Australia's global competitiveness. This is reflected by the fact that road transport consumes 72% of total estimated transport resource consumption.

Australia's road network is long and relatively lightly trafficked. In comparison to similarly developed and governed countries, Australia spends a relatively large proportion of its Gross National Product on enhancing and maintaining its road network (see Table 1.1).

Table 1.1
Selected Comparisons Between Australia and Other Countries

<i>Country</i>	<i>Area (sq. km)</i>	<i>Population</i>	<i>Population per sq. km</i>	<i>Road km per 1000 cars</i>	<i>GNP per capita \$</i>	<i>% GNP on roads</i>
Australia	7,682,300	17,414,000	2.3	104	14,400	1.20
U.S.A.	9,052,871	248,710,000	27.5	49	21,100	1.00
Canada	9,203,210	27,297,000	2.9	N/A	16,760	0.50
U.K.	229,880	53,917,000	234.5	22	14,570	1.20
Germany	356,854	79,753,000	223.5	19	20,750	0.50

Australian road authorities actively pursue policies aimed at providing services more effectively and efficiently. They also aim to integrate transport and land use planning more effectively and recognise the need for ecologically sustainable development.

In response to the needs of their stakeholders, Australian road agencies have developed a comprehensive performance management framework within which road authority and road system performance can be benchmarked.

Developed in consultation with key stakeholders, the framework comprises a role statement, a list of outcomes and a set of performance indicators.

The role statement identifies the primary purposes and functions of the road system. The list of outcomes reflects stakeholder expectations of the road system and the set of performance indicators provides the specificity required for benchmarking purposes.

This project is one of a number of Austroads projects in progress targeting different aspects of performance measurement. The performance indicators will address the contribution of the road system to economic and social development, the performance of the road system, and the performance of the road authorities.

Implementation

In 1993, Austroads established a program to develop and implement a rigorous set of national performance indicators for the road system and road authorities.

Details of the principal outcomes required by key stakeholders for the Australian road system, together with associated performance indicators that address the outcomes, are set out below.

**Table 1.2
Principal Stakeholder Outcomes and Performance Indicators**

THE AUSTRALIAN ROAD SYSTEM PRINCIPAL OUTCOMES REQUIRED BY KEY STAKEHOLDERS	PERFORMANCE INDICATORS	
	ROAD SYSTEM	ROAD AUTHORITIES
<i>Economic Outcomes</i>		
(i) Lower road user resource costs (eg. vehicle operating costs and travel times).	<ul style="list-style-type: none"> • Actual Travel Time • Nominal Travel Time • Congestion Indicator • User Satisfaction Index • User Costs/Distance Travelled 	<ul style="list-style-type: none"> • Road Maintenance Effectiveness • Return on Construction Expenditure • Return on Maintenance Expenditure • Return on Non-Road Interventions • Road Construction Costs • Achievement Index
(ii) Lower non-road costs of road users , by strategic interventions assisting efficient location choices and minimisation of inventories, and by harmonisation of transport (and other) regulations, across state borders.	<ul style="list-style-type: none"> • Variability of Travel Time • Smooth Travel Exposure 	<ul style="list-style-type: none"> • User Transaction Efficiency • User Transaction Additional Costs
(iii) Increased regional development , including tourism, mining, agriculture, growth of regional centres and urban development, by new and improved roads enhancing accessibility and reducing travel costs.	No measures yet proposed	No measures yet proposed
(iv) Expansion of the scope of markets , by bringing them closer together in time and cost through new and improved roads.	No measures yet proposed	No measures yet proposed
(v) Economic based choices of transport vehicles, modes, routes and times of use, by matching social costs of use to prices charged to users.	<ul style="list-style-type: none"> • Lane Occupancy Rate • Proportion of Travel on Primary Roads 	<ul style="list-style-type: none"> • Efficient Charging

Principal Outcomes Required by Key Stakeholders <i>continued</i>	ROAD SYSTEM PERFORMANCE INDICATORS	ROAD AUTHORITIES PERFORMANCE INDICATORS
<i>Social Outcomes</i>		
(vi) A basic level of accessibility to other places and activities for all communities throughout Australia, in concert with other modes, providing for health and education services and enhanced employment opportunities particularly in remote areas.	Additional measures being developed	No measures yet proposed
(vii) Wider range of choices and opportunities for interaction among people, organisations and businesses, by improved accessibility and mobility.	Additional measures being developed	No measures yet proposed
(viii) Fair distribution of costs and benefits of the road system	Additional measures being developed	No measures yet proposed
<i>Safety Outcomes</i>		
(ix) Lower levels of road-related deaths, injuries and costs, by reductions in the incidence and severity of road accidents.	<ul style="list-style-type: none"> • Social Cost of Casualty Crashes per head of Population • Social Cost of Casualty Crashes per Vehicle-km Travelled • Casualty Crashes per head of Population • Casualty Crashes per Vehicle-km Travelled • Road Fatalities per head of Population • Road Fatalities per Vehicle-km Travelled • Persons Hospitalised per head of Population • Persons Hospitalised per Vehicle-km Travelled 	Return on Safety Expenditure
(x) Safe transport of hazardous loads.	No measures yet proposed	No measures yet proposed
<i>Environmental Outcomes</i>		
(xi) Lowered levels of air pollution and greenhouse gas emissions from managed operation of the road system.	Greenhouse gas emissions	No measures yet proposed
(xii) Reduced other adverse environmental impacts and enhancements of the natural and built environments.	Traffic Noise Exposure	No measures yet proposed

In August 1995, Austroads published *The Australian Road System and Road Authorities National Performance Measures (AP-122/95)*. That report set out data for the first 11 of the 29 nationally based performance indicators selected by Austroads, as follows:

Road Safety

- Serious Casualty Crashes per Head of Population
- Serious Casualty Crashes per Vehicle-km
- Road Fatalities per Head of Population
- Road Fatalities per Vehicle-km
- Persons Hospitalised per Head of Population
- Persons Hospitalised per Vehicle-km
- Social Cost of Casualty Crashes per Head of Population
- Social Cost of Casualty Crashes per Vehicle-km

Environment

- Greenhouse Gas Emissions

User Transactions (Registration and Licensing Indicators)

- User Transaction Efficiency
- User Transaction Additional Cost

This current report publishes data for a further eight national performance indicators for the Australian road system and road authorities. This report also provides updated data for the Road Safety and User Transaction indicators set out above. The newly reported indicators are:

Travel Time

- Actual Travel Time (Urban)
- Nominal Travel Time (Urban)
- Congestion Indicator (Urban)
- Variability of Travel Time (Urban)

Road Maintenance

- Road Maintenance Effectiveness
- Smooth Travel Exposure

Road Construction Effectiveness

- Return on Construction Expenditure
- Achievement Index

Future steps to be undertaken include the publication in late 1996 of the final 10 performance indicators of the original set of 29, and development of additional performance indicators to complete the performance management framework. These new indicators will address the social and environmental outcomes of the road system by some stakeholders.

The annual publication of performance indicators will enable time series comparisons of the performance of the road network and of road authorities within States and Territories to be made, in addition to the comparisons that can be made between States and Territories.

Table 1.3. Summary of the National Performance Indicators: Description and Purpose

Performance Indicator	Description	Purpose
Actual Travel Time (Urban)	The aggregation of travel times actually achieved per kilometre on a representative sample of arterial roads and freeways in the urban metropolitan area.	To monitor the level of service provided by the road system to road users.
Nominal Travel Time (Urban)	The aggregation of trip times per kilometre achievable by a vehicle travelling at the speed limit on a representative sample of arterial roads and freeways in the urban metropolitan area.	To establish base system capability for measurement of level of service to road users.
Congestion Indicator (Urban)	The aggregation of delay per kilometre on a representative sample of arterial roads and freeways in the urban metropolitan area.	To monitor the extent of congestion.
Variability of Travel Time (Urban)	The measurement of variability of travel times on a representative sample of arterial roads and freeways in the urban metropolitan area.	To monitor the reliability of travel times on the arterial road system.
Road Maintenance Effectiveness	A cost index which reflects on the proportion of the road network that is being maintained to target conditions and the expenditure per km required.	To monitor the cost effectiveness of road authorities' maintenance functions.
Smooth Travel Exposure	The proportion of travel undertaken each year on roads with roughness conditions less than the specified levels.	To monitor whether roads are providing acceptable travel conditions.
Return on Construction Expenditure	The percentage distribution of programmed expenditures by benefit cost ratio (BCR) range.	To monitor the predicted economic benefits to the community from road authority capital programs.
Achievement Index	The achievement index for a project is the benefit cost ratio (BCR) of a project when the decision to fund the project is made, divided by the post completion BCR; a random / representative sample of projects is analysed.	To monitor the actual delivery of economic benefits sought when capital projects were completed.
Serious Casualty Crashes per Head of Population	The number of crashes involving hospitalisation or death per year, normalised per 100,000 head of population.	To monitor the incidence of major safety failures in the road system.
Serious Casualty Crashes per Vehicle-km	The number of crashes involving hospitalisation or death per year, normalised for travel.	
Road Fatalities per Head of Population	The crash experience expressed in terms of fatalities per year, normalised per 100,000 head of population.	

Performance Indicator	Description	Purpose
Road Fatalities per Vehicle-km	The crash experience expressed in terms of fatalities per year, normalised per 100 million kilometres of travel.	To monitor incidence of major safety failures in the road system.
Persons Hospitalised per Head of Population	The crash experience expressed in terms of persons hospitalised per year, normalised per 100,000 head of population.	
Persons Hospitalised per Vehicle-km	The crash experience expressed in terms of persons hospitalised per year, normalised per 100 million kilometres of travel.	
Social Cost of Casualty Crashes per Head of Population	The social cost to the community of crashes involving hospitalisation or death per year, normalised for population.	
Social Cost of Casualty Crashes per Vehicle-km	The social cost to the community of crashes involving hospitalisation or death per year, normalised for travel.	
Greenhouse Gas Emissions	Gross emissions of CO ₂ , calculated from fuel sold for road use and appropriate emission factors, normalised for travel.	To monitor the extent of greenhouse emissions from traffic.
User Transaction Efficiency	The annual cost of servicing vehicle registrations and driver licenses normalised by the average number on the registers.	To monitor operational efficiency of maintaining registers of drivers and vehicles.
User Transaction Additional Cost	The additional cost of adding vehicle registrations and driver licenses normalised by the number added to the registers.	To monitor additional operational efficiency of adding new drivers and vehicles to the registers.