

**Garnaut Issues Paper 5
Transport, Planning & The Built
Environment**

April 2008

Submission

Industrial Logistics Institute

Associate Professor Kim Hassall



About the Institute:

The Industrial Logistics Institute was established in 2007 by a group of experts drawn from the fields of: network optimization, information systems e-Business, Sustainable Corporate Logistic systems, logistics pricing, transport economics and information technology. It is the international consulting and teaching division of several leading national and international experts.

All Institute associates hold extensive transport and logistic expertise both at the corporate, academic and transport policy levels.

Part 1 – The Road Freight Transport World – and what we do not know about it

In 1984 the National Road Freight Industry Inquiry (the May report) was released. Some 500 pages long the report was a then comprehensive look at the Trucking Industry in Australia. In November 2001 the Quinlan Report into the Long Distance trucking sector was released. It too was some 500 pages and in many ways still mirrored many of the problems of the former May report. In fact many of the problems were still the same. Both reports considered at length the Economic performance of “the industry” and the problems associated with its performance.

There are many ways to chop up the Australian Road Transport Industry:

- Hire and reward vs ancillary operations
- Long distance vs short distance
- Interstate vs Intrastate
- Rigid truck vs Articulated truck operations
- Owner driver vs Fleet operations, and
- Specific commodity operations vs General freight operations etc etc..

The focus of both the May and the Quinlan reports were the “hire and reward” sector of the Australian Trucking Industry. This is the sector of the industry that performs transport for money. In the United States it is known as the “for hire” sector. There is a social perception that the transport industry is composed of big articulated trucks running up and down the highways. There is also a perception that these poor truckies are badly remunerated and the industry totters on bankruptcy on a month to month cash-flow basis. This perception needs to be put in context. The number of fleets operating in the long-distance hire and reward sector account for 4% of fleets in the industry. Both the May and Quinlan reports are extensive resources that have been devoted to that 4 percent of our national fleets. Operators may ask where are there equivalent resources that have been devoted to the other 96% of Australian fleets? No such report, especially for the Ancillary sector, which spans some 85.5% of the Australian Road Transport Fleets, has ever been undertaken. The Bureau of Transport Economics undertook the only meaningful analysis of the Ancillary sector in 1986 and proposed that further work be undertaken into this sector in 2004 (Working Paper 60).

Even the long distance Owner Operator, who many consider the backbone of the industry, and who certainly gain the attention of the ATC occasionally, account for about some 2% of the industry fleets.

The number of fleets involved in “short distance” one truck hire and reward sector number some 8.6% of industry fleets, some four times more than their long distance counterparts. In all, the hire and reward fleets account for 14.5% of industry fleets and yet their influence is considered absolutely major. At the NSW Road Transport Association Conference in Terrigal in 2002 Professor Quinlan admitted to believing that the problems in the long distance transport industry were probably due to the behaviour of the hire and reward sector. Is the 14.5% sector therefore responsible for more than its share of the fatal accidents and serious injuries than the other 85.5%? One major problem in proving this suspicion is that the Fatal Crashes and serious injury data held in the Australian Transport Safety Bureau (ATSB) cannot determine

whether a crash was related to hire and reward or an ancillary operator. If the Quinlan suspicion is true, that 4% long distance ‘hire and reward’ tail is wagging the other 96% of the industry dog, with regards serious incidents. If this is true there is an amazing black hole in our knowledge of the behaviour of the industry, namely, what road transport sector actually has the fatal and serious crashes. Austroads via the NRTC commissioned a small consultancy to see if the question could even be progressed. The Austroads findings (CSIRO and CarrsQ) “Truck Crashes by Industry Sector” could be interpreted that the general carriers (read as ‘hire and reward’) may be responsible for greater than 50% of the accidents. This would mean that our knowledge of the other 50% of truck crashes is exceedingly poor.

Table 1 Structure of the Australia Transport Industry by Segment

Hire & Reward Fleets	Total Fleets	Percent of Total Fleets
1.Long Distance Interstate - Single truck	1 961	0.9%
2.Long Distance IntraState - Single truck	2 433	1.1%
3.Long Distance Interstate - Total Fleets	3 283	1.5%
4.Long Distance IntraState - Total Fleets	5 245	2.4%
Total Hire and Reward Long Distance (3+4)	8 528	3.9%
5.Short Distance Hire & Reward and Forwarding	23 282	10.6%
6. Total Hire & Reward Fleets	31 810	14.5%
Ancillary Fleets	Total Fleets	Percent of Total Fleets
7.Agriculture	121 923	55.7%
8.Wholesale and Retail	27 856	12.7%
9.Building and Construction	17 959	8.2%
10.Manufacturing	11 568	5.3%
11.Other Ancillary Fleets	8 562	3.9%
12.Total Ancillary Fleets (7 to 11)	187 057	85.5%
Total Fleets Australia (6 +12)	218 867	100.0%

Source: Structure of the IndustryTransEco 1996, NRTC “Who carries what where”

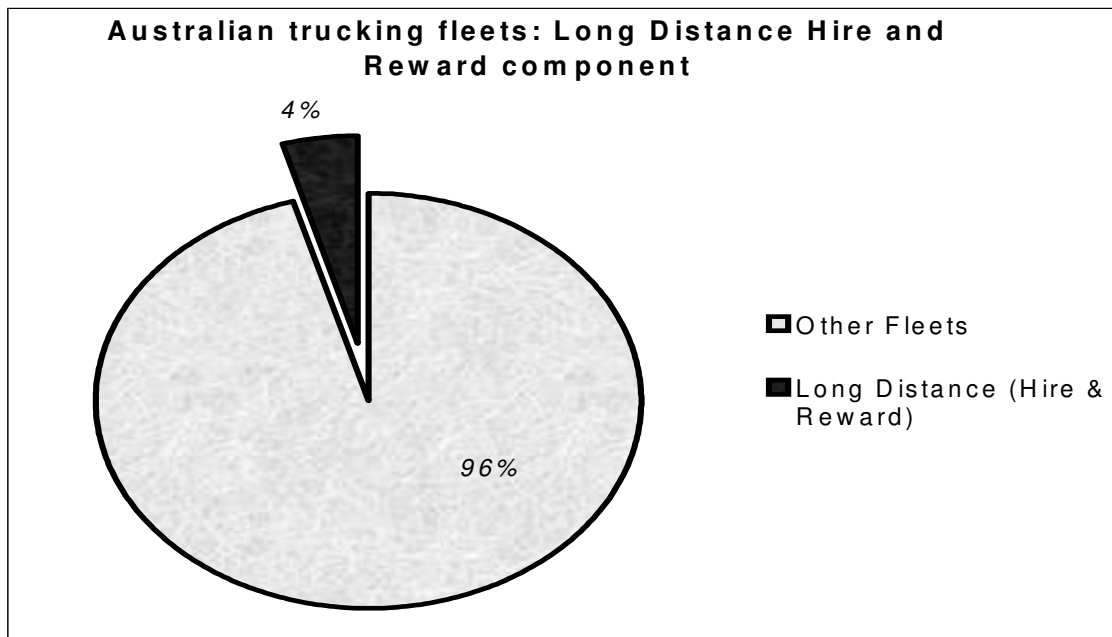
Note: Recent unpublished estimates based on the drop in rigid trucks estimate total fleets at about 200,000

Currently industry analysts do not know even how many of the ancillary fleets even perform long distance work and what the rate fatigue rates may be. The ancillary sector is dominated by the trucks in the agricultural, retail, building and manufacturing commodity groups. In all these fleets outnumber their hire and reward counterpart by a factor of six to one and yet nothing like the Quinlan, May or even Neville (Beyond the Midnight Oil) reports have focused on this sector. Our lack of knowledge often allows regulators to think that the industry revolves around the hire and reward sector only, but in essence nothing is further from the truth. This regulatory focus also has regulators moulding regulations for the long distance hire and reward sector with scant regard for the ancillary operators that get caught up in this hire and reward focus. Some commentators could refer to this as ‘ice berg regulation’, by regulating the tip you can see, not the 85% you can’t.

One of the major Quinlan recommendations was for a form of “Operator Licensing” to be implemented. This idea was first mooted in the 1984 May report and we got the Federal Interstate Registration Scheme, FIRS, instead. In 1993 the National Road Transport Commission re-examined “operator licensing” and we got “alternative compliance” instead. In part one reason that the 1993 proposal found little favour, was

that some regulatory authorities saw that besides their already existing vehicle licensing divisions, they would also be implementing perhaps an even bigger “transport operator licensing” division. One of the other bigger issues is that operator licensing would need to apply to all trucking fleets and not just those in the hire and reward sector. This would range from farmers taking grain to railhead, construction companies dumping landfill, and the retailer

Figure 1: Where Long Distance Transport Fits in



The voice of the ancillary operators is often much more muted than that of the hire and reward sector, however, two major ancillary operators are major ATA members.

One entire chapter of the May report (Chapter 11) focused on the need for industry consultation and research. Some 17 years later we still have little knowledge of six sevenths of the trucking industry fleets, however, we have had several major examinations of the other one seventh. This is still true in 2008!

Comment: A major research review needs to be undertaken into the behaviour of the Ancillary Trucking Sector. The last review was undertaken in 1986. There is scant knowledge of 87% of the Australian Trucking fleets, which represent some 60% of trucks. Research funds have been sorely misplaced in not addressing this need for the last 20 years. Ancillary Operators have a totally different work profile to their “for hire” counterparts.

In Brief the units of freight activity are fleets, we know very little of the behaviour of Australia’s fleets. Some 85% of them are not for hire and have totally different operating patterns than the 3PL fleets that service major customers in the “for hire” or “hire and reward” business.

Table 2 Re-Estimates of Australian Trucking Fleets in 2000

Fleet Structure of the Australian Road Transport Industry								
Vehicles 4.5 Tonnes and Over								
Industry Segment	Number of Vehicles in Fleet							TOTAL
	1	2 - 4	5-9	10-19	20-49	50-99	100+	
Hire & Reward	21,762	7,803	1,454	508	211	42	30	31,810
Agriculture Fishing Forestry	93,389	26,509	1,223	729	72	1	0	121,923
Manufacturing	6,514	3,668	801	329	154	82	20	11,568
Building and Construction	13,069	4,171	483	154	51	31	0	17,959
Wholesale and Retail	16,419	9,217	1,675	421	31	72	21	27,856
Electricity, Gas Water and comms	82	46	15	5	5	0	5	158
Other services	5,251	1,859	297	104	47	20	15	7,593
Sub-Total	156,486	53,273	5,948	2,250	571	248	91	218,867

Source: Translog Consulting 2000, based on TransEco 1996

The world is not made up of just General Freight Operations

Australia's lack of knowledge not only extends to much the urban transport task and to almost the entire 'Ancillary sector', but also to the operations of specific specialist vehicle types. Table 17 lists 25 vehicle classes that have been generally designed around the 'specific' commodities they carry. Four Vehicle classes are non specific, or general purpose vehicle groups.

The task for these vehicles is only measured on a very rough tonnage basis, at a very low industrial commodity classification level. Operationally the 25 specific commodity vehicle classes are highly significant to the both the urban and long distance tasks but the proportion of the freight task they perform is conjectural. However, it will be significantly higher, on a tonnage basis, than the general freight task. Some commodity based transport associations have also emerged to represent their operating members, for example: furniture, taxi trucks and courier, bulk tanker and refrigerated operators to name just a few.

Table 3 Commodity Specific Vehicle Technology

	Operational Sector	Specialist Vehicles	PBS Potential Interest Rating
1.	Petroleum/ Chemicals	Yes	1
2.	Other Tanker	Yes	1
3.	Quarry / earth / mining	Yes	1
4.	Over Dimensional	Yes	1
5.	Car Carrier	Yes	1
6.	Volumetric parcels	Yes	1
7.	Steel	Yes	1
8.	Grain	Yes	1
9.	Building Materials	Yes	4
10.	Logging	Yes	2
11.	Waste	Yes	1
12.	Container/wharf	Yes	1
13.	Agricultural Other	No	5
14.	Taxi Trucks	Yes	5
15.	Refrigerated Operations	Yes	2
16.	General Freight Other	No	3
17.	Concrete	Yes	3
18.	Mini Skips	Yes	5
19.	Furniture	Yes	2
20.	Horse movements (long trailer)	Yes	5
21.	Retail	No	5
22.	Livestock	Yes	5
23.	Glass	Yes	2
24.	Courier	No	5
25.	Security Collections	Yes	5

Source: Hassall 1996, ATA Conference Brisbane, Raptour

Many of these commodity groups will also look towards further productivity from PBS and in all probability from cheap as chips optimization software. The Potential PBS interest scale, a rating from 1 to 5, has been drawn from discussions with operators but is far from conclusive although indicative of where not only interest lies but where development capital also resides.

The main unit of behaviour for road transport is the fleet. It is interesting that:

- 55% of all Fleets in Australia are farmers.
- 60% of vehicles do not do transport for money, and
- 60% of vehicles are also in this “ancillary” category.

Vehicle use based on averages as calculated by the NTC and the ABS are highly distorted in the current pricing regimes.

Access to Transport Efficiencies through Cheap Optimization – a possibility?

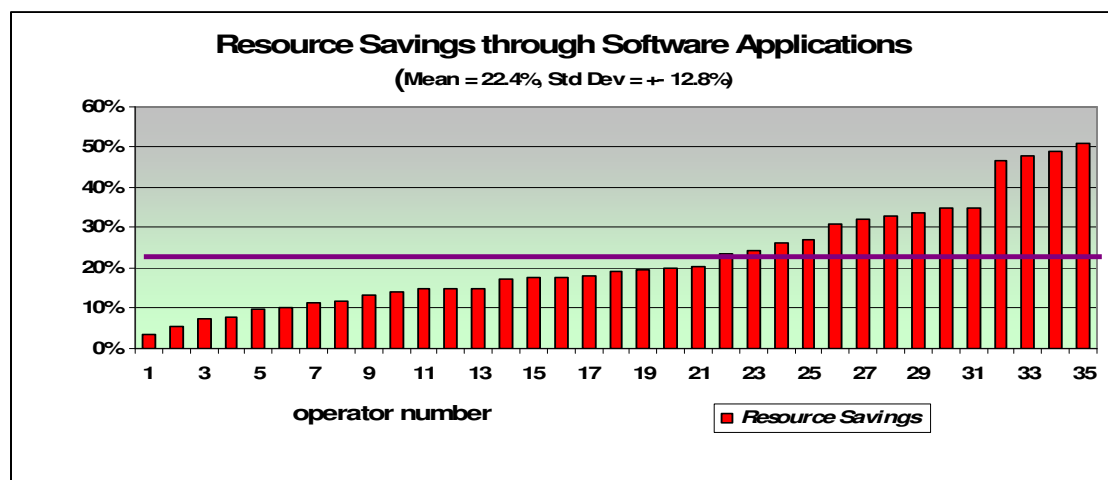
Optimization Software Costs are a Barrier!

It may come as a surprise that even an industry which is believed to be relatively efficient, when put under the microscope, is possibly anything but efficient. Unfortunately the tools required to prove this proposition have generally been out of the reach of the small medium enterprises or even medium enterprises. Affordable tools that are within the reach of mere mortals are generally about \$20,000 per annum per site at the cheaper end, and range up to 400,000 Euros for packages owned by large 3PL's such as Deutsche Post. These can have maintenance agreements per annum of \$100,000.

Optimization Case Studies:

In 2005 some 35 industry based transport network problems were addressed with 'minimalist' optimization tools. The results were perhaps better than expected in so far as the mean benefit of using optimization against the 'business as usual' alternative was on average about 22.5% more beneficial. For the hire and reward sector of the transport industry that may expect about a 6% pre-tax return on its operations, this improvement is highly significant.

Figure 2 Raptour Systems Case Study Savings – Sorted Lowest to Highest

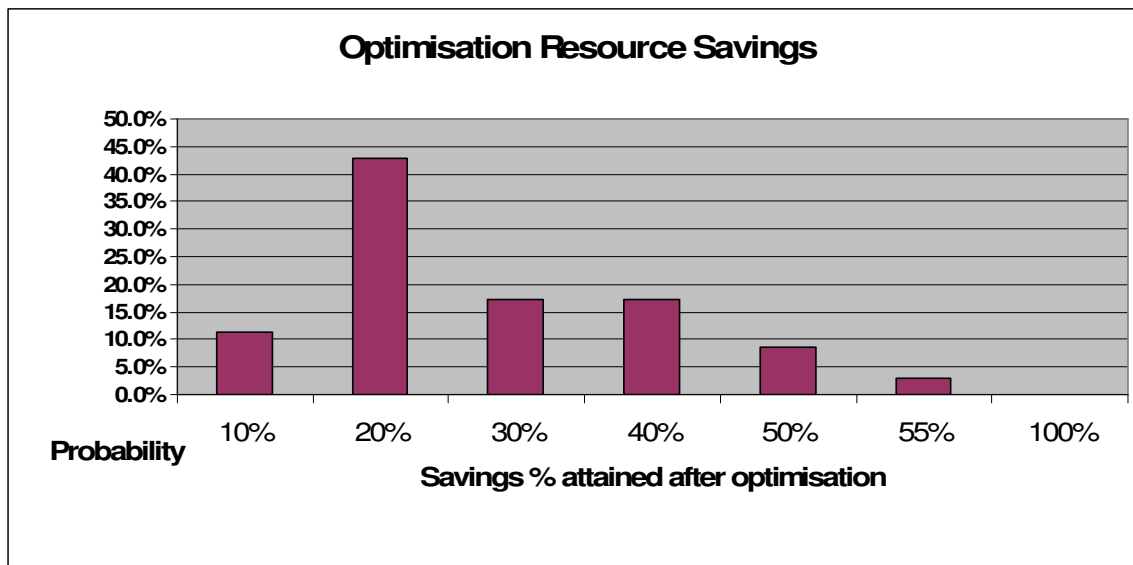


Source: Raptour Systems 2005

Figure 2 presents the findings of the 35 single and multi depot Raptour resource scheduling case studies. 'Resource' savings is a generalist term that may apply to vehicle numbers, operational costs, driver hours or kilometers, depending on how it was interpreted by the transport company when interpreting the solution.

Figure 3 is another way of reading the benefits presented in Figure 2. The basic findings are that 42% of the time an operator may expect to achieve savings of 20% and some 35% of the time operators may expect to save between 30% and 40% of either their trucks, drivers, kilometers or costs.

Figure 3 Probability density function of resource savings



Source: Raptour Systems 2005

Optimization by specific commodity types

The case studies from the within the transport operations being run are presented in Figure 2. From a conservative perspective there is about a 1/5th expected saving through using an optimization tool. Highest group average savings are about 38% and what was most unexpected was that there was a 22% average improvement through the use of optimization tools. General transport, who did not specify a particular commodity, and express had extreme ranges in benefits, 5.5% through to 38%.

Table 4 Case Studies – Transport Saving by Commodity Group

Commodity Group	Highest Savings in Group	Group Average	Lowest Savings in Group
Bakery, Grocery, Cakes, Confectionery	48.0%	37.6%	27.2%
Bottled Water, Soft Drinks, groceries	19.6%	15.5%	11.9%
Hardware, electrical, video, telecommunications	51.1%	23.8%	7.5%
Refrigerated: foods, meats, dairy, poultry, Fruit & Vegetables	32.0%	18.4%	10.1%
Horse floats, petcare	33.0%	25%	17.8%
Bus Operations	49.0%	24.3%	10.1%
Furniture, Retail Goods	35.0%	39.2%	23.4%
General Transport and Express	33.7%	17.5%	5.5%
Across Group Averages	37.7%	22.4%	14.2%

Source: Raptour 2006

As a random sample of transport operations the benefits of optimization are very, very significant. What however, is more significant is that such benefits can be brought to

market for the ordinary transport operator at a fraction of currently existing software costs. Considering the fact that several million dollars has been spent in bringing PBS into the transport environment for the top end of town what is the equivalent impact for small operators on getting hold of cheap optimization software? At a guess the benefit at a comparative national level will be several factors higher than the impact of PBS because of the cheap take-up potential of the software package by one to 20 truck operators.

The Emergence of Performance Based Standards

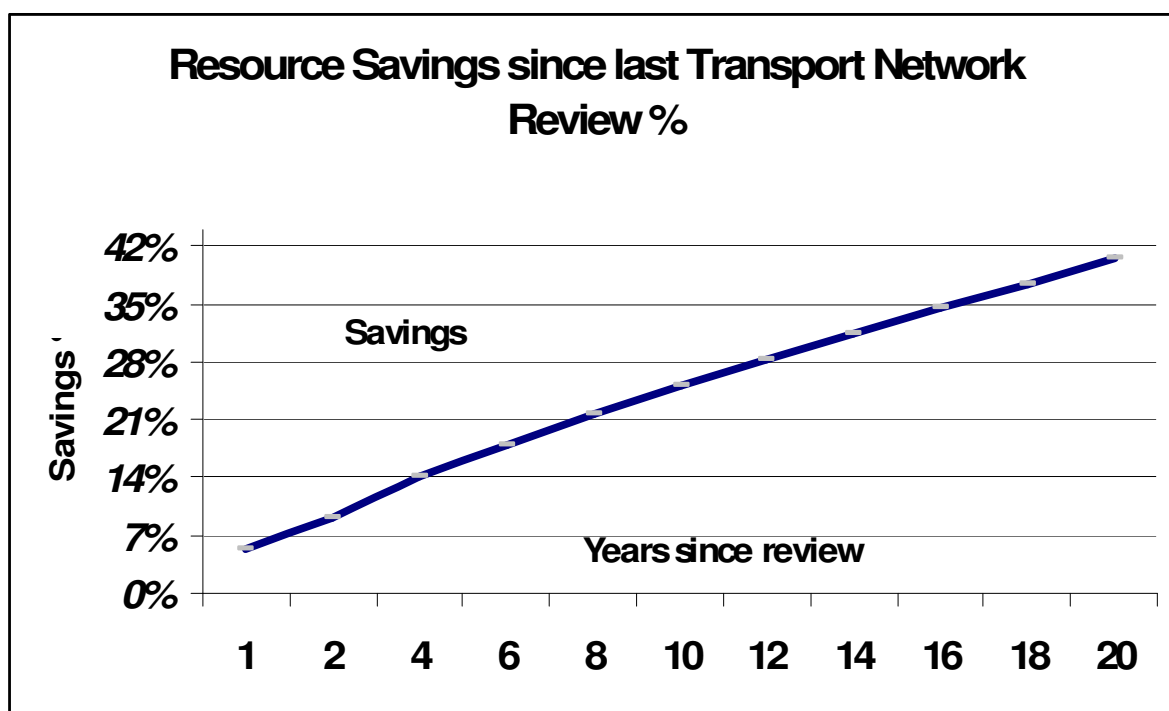
The initial development of the Performance Based Standards (PBS) Program in Australia commenced in 1999. In 2002 a significant working group within the OECD was formed and this group reported in November 2005. Australia was at the forefront of this project, however, other nations are becoming highly interested in not only larger more efficient vehicles but PBS as a unified approach to productivity and safety. At the City Logistics IV conference in Langkawi, Malaysia, in 2005 the Netherlands released images of their prototypes for both B-Doubles and B-Triples, even though they were not part of the OECD working group¹. The Netherlands target for their B-Triple pilot program was for 300 such vehicles to be operative by July 2007. This is happening and reflects a dynamic regulatory regime that is embracing change and recognizing the importance of high productivity vehicles to its national economy.

Figure 4: Current Dutch B-Triples



Australia too is beginning to focus on the next generation of high productivity vehicles, as such existing vehicles as B-Doubles and multi-combination vehicles have now become part of the fabric of Australian Road Transport. The next generation of vehicles which may well be commissioned under the Performance Based Standards banner.

Figure 5: Resource savings through PBS, Optimization and Network Restructuring Strategies



Hassall et al..2007, T-Log Conference (Tsinghua University)

Conclusions: From a road freight perspective

From the perspective of altering road freight behaviour far more data needs to be collected as to what is the nature of fleets in Australia. The last comprehensive collection was done in 1986.

However, it is not only fleet data that we lack such major questions as

- How many farmers use B Doubles, and
- How many ancillary fleets do long distance linehaul transport are just 2 indicative questions that no regulator or agency in Australia has a clue about.

This is indicative of our lack of knowledge and also reflects badly on existing road pricing structures.

The former NRTC framework, continued on by the current NTC, for Performance Based Standards has an important role. On current unpublished analysis PBS can save industry 5% of truck kilometres, nationally and deliver benefits of \$250 million dollars per annum ongoing for at least the next 20 years. This also delivers a greenhouse benefit. This estimate of savings is for trucks not Light Commercial Vehicles.

Also the role of hypothetically “free” or very cheap Vehicle Routing Optimization Software could deliver benefits some 4 times this PBS Benefit figure, but the federal government would have to host a public domain web-based portal to do this. From an

innovation perspective governments should initiate such developments but certainly not for free. “Software as a Service” subscriptions are happening around the world, and this could happen here with great effect.

PART 2 – Two Small Public Transport Observations

Public Transport 1 – Consideration “Park and Ride”

New multi storey parking facilities should also be incrementally implemented at public transport hubs of significance. This would encourage close proximity walking to public transport hubs. However, the structure of the “*park and ride*” ticket will have to be totally re-evaluated to the park only, or the “catch the train only ticket.” If a driver decides to drive 15 kilometres to a park and ride station then the driver will hardly be thrilled because a zone 3 ticket has just become a zone 2 ticket and there is no financial benefit for them in driving 15 kms to a “park and ride” station. Ticketing has to become more efficient by charging for distance not more aggregated killing potential Park and Ride passengers, who should be fostered. Also private equity is interested in the park and ride parking stations as they can be developed for retail purposes.

Some 22% to 25% of Victorian Public transport is park and ride but most of these passengers link into a closest parking area. To a more convenient hub of choice far more passengers could be attracted. The non coarse ticketing zone must be implemented for this purpose.

Public Transport 2 - Consideration “SMS a Mini Bus to drive to a Public Transport Hub “

Suburban catchments of about four or so suburbs, should have a peak hour mini bus shuttle service that integrate to minor and major public transport hub transfer points. As these mini buses, two tonne, eight or ten seater buses, are in direct competition to the taxi services, perhaps the taxi services should be allowed to run them. However, a totally different fare system is necessary for the pick up and movement to hub 1, or 2 or 3 of choice. The passenger will then be incurring a normal Public Transport fare.

Hopefully a licence plate for these peak jumbo hub interchange taxis would be more like \$2000 dollars compared to \$400,000 for a dedicated taxi plate. Perhaps the new task of inter connecting people to public Transport hubs should direct a rethink to the entire taxi plate licensing arrangements that are so lucrative to State treasuries.

Fares under this proposal would be about the size of existing flagfalls or cheaper. Phone and SMS should be the contact medium.

Appendix 1

Research on Performance Based Standards gets recognized.

http://www.environment.unimelb.edu.au/news_events/BeyondEP/Beyond_EP_Issue3.pdf

University of Melbourne Interdisciplinary Awards for Sustainability and Environmental Writing

The Interdisciplinary Awards for Sustainability and Environmental Writing were established by the Office for Environmental Programs, with the support of the Deputy Vice Chancellor (Research) Office. One award is for faculty members at The University of Melbourne, and another is for postgraduate students. In each case nominations are invited from all areas of the University for research completed within the preceding three years; for the postgraduate award it is for research completed as part of a postgraduate qualification within the preceding three years.

Associate Professor Kim Hassall is the inaugural recipient of the faculty award for his work in logistics, which combines his engineering and transport knowledge. His research on **Performance-Based Standards** for the National Transport Commission and the OECD has allowed a new dimension to urban logistic productivity and sustainability, and has been described as “The most important Transport Productivity Initiative in Australia for the last decade” by Tony Wilson, CEO of the National Transport Commission. Kim’s work started in 1999 when the National Transport Road Commission adopted the framework for Performance Based Standards as the next major National Productivity Initiative for Road Freight Transport in Australia. The framework was based on relatively inflexible prescriptive regulations, and potentially prevented Australia from benefiting from the productivity gains resulting from the use of smart heavy vehicles developed overseas. Performance Based Standards are supposed to help reduce the impact of road transport, but because there are only two axle groups on rigid vehicles, productivity gain is limited: smaller vehicles means that numbers of road journeys are high, with consequent increases in noise, pollution, and fuel consumption.

Overseas SMART heavy vehicles used for delivery include rollcoupled roadtrains with self-steering axles, over-sized container trucks, tri-drive combinations, quad-axle semi-trailers, large urban rigid trucks and such modular concepts as the Super B-Double or B-triple. With Australia Post, Kim showed that urban delivery vehicle productivity could be improved under Performance Based Standards. Using his (?) new four-axle design, he calculated that Australia Post fleet mileage could be reduced by 6 million kms a year, most of it on local road networks. The new truck has the capacity to reduce Australia Post rigid truck fleet numbers by up to 20% and operating kilometres by 16%. There would also be significant reductions in fuel consumption and tyre wear. Conditional registration for the Australia Post Urban Rigid Truck was given by VicRoads in July this year. There is also considerable potential for the new truck to assist with delivery of supermarket goods ordered online. When one considers the various studies that have shown (e.g., in Britain) that the biggest fuel consumption in food delivery occurs between the supermarket and home,

not in the transporting of bulk food from, for instance, Australia to Europe, clearly the impact of this research will be high.

The Interdisciplinary Postgraduate Award for Sustainability and Environmental Writing has been given to Philip Pegler, and Zoe Metherell, for their report on the effects of Fire and Phytophthora on heathy-woodlands in the Grampians National Park. Phil and Zoe are Masters of Environment students, with Horticulture and Landscape Architecture backgrounds respectively. Their work in Australian Ecosystem Management was considered of such calibre that the School of Anthropology, Geography and Environmental Studies decided to publish it, and Parks Victoria are using the principles espoused in the report to assist with management practices in the Grampians National Park. By using a space-for-time substitution study, Phil and Zoe examined the effect of time since fire on the heathy-woodland ecosystem in the Grampians, as well as the impact of phytophthora (*Phytophthora cinnamomi*). They found that a fire interval of less than 8 years will eradicate populations of species such as *Hakea decurrens*, and long fire intervals will result in population decline. Burning areas infected with *P. cinnamomi* could reduce competition from resistant vegetation, and therefore assist regeneration of heath species sensitive to phytophthora. However, when assessing whether a particular area be burnt, they suggested that although fire stimulates reproduction and is essential for some species to reproduce, managers should check for fecundity of fire-sensitive species in order to prevent the destruction of reproductively immature populations. Phil works with Parks Victoria in the field; Zoe works as a Landscape Architect. For both, the interdisciplinary approach encouraged by their studies in the Masters of Environment has lead to improved understanding of their work; for both they are using their first degree, and their different work experiences, for environmental benefits, particularly in enhancing biodiversity. For both, combining work and study had been a huge, but rewarding challenge.