INTRODUCING HIGH PRODUCTIVITY VEHICLES INTO AUSTRALIA: TWO CASE STUDIES WITH DIFFERENT REGULATORY MECHANISMS.

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ABSTRACT

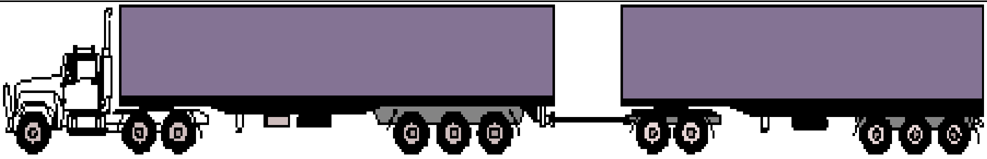
The Australian Road Transport Industry has undergone significant changes over the last 30 years. There have been three reviews and increases in the mass carrying limits of trucks. These occurred in the mid 1970s, the Economic Review of Vehicle Limits (ERVL), in the mid 1980s, the Review of Road Vehicle Limits (RoRVL) was undertaken, and the mid to late 1990s, the Mass Limits Review, which utilised the introduction of “road friendly” suspension systems to allow higher mass to be carried was implemented in most regions. Mass limit increases were however, just one means of delivering productivity gains. In the mid 1980s the adoption of a variation of the Canadian B-train (the B-Double) was introduced into Australia. This vehicle although longer could achieve payloads some 30% to 40% higher than the more conventional tractor-trailer combinations. In 1999 the National Road Transport Commission also adopted, and further developed another Canadian concept, that of “Performance Based Standards” (PBS). This effectively allowed for flexible truck design, as long as the vehicles performed against a set of up to 18 specific technical performance criteria. The Performance Based Standards approach to vehicle design has enormous implications for Urban Freight movements.
Hit Words: High Productivity Vehicles, Performance Based Standards, B-Double, Australian Truck Design, Freight Transport, Freight Innovation, Urban Productivity.

CASE STUDY I: THE INTRODUCTION OF THE B-DOUBLE TRUCK INTO AUSTRALIA. ADOPTING AN EXISTING TECHNOLOGY.

Background:

The Australian continent is large geographically occupying 7.7 million square kilometres in area but housing only some 20 million inhabitants. The large distances as well as the agricultural and mining nature of Australian exports have often driven long distance road transport to become highly efficient. However, although Australia operated double and triple road trains (where the trailers were attached with a draw bar and converter dolly) the take up of new multi trailer articulated technology was still not achieved easily. The introduction of the two trailer, articulated combination vehicle, a variation of the Canadian B-train, which was first introduced by Canada in the late 1970s, was introduced into Australia in the mid 1980s. Its adoption and variations to the Canadian B-train, became known as the B-Double in Australia. But despite the proven safety record and large productivity gains the full acceptance of the B-Double took some eight years before the vehicle class became well established.

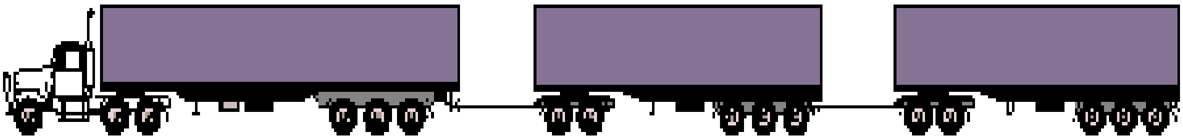
Figure 1: Long Distance Double Road Train and Triple Road Train Combinations



11 Axle Double Road Train

Length 36.5m, Width 2.5m Height max 4.3m

Weight 79 tonnes GVM (85.7 Tonnes with mass management accreditation*)



16 Axle Double Road Train

Length 53.5m, Width 2.5m Height max 4.3m

Weight 115.5 tonnes GVM (125.2 Tonnes with mass management accreditation*)

*Note *: In Australia higher mass operating limits are available to operators who are accredited to a mass accreditation scheme.*

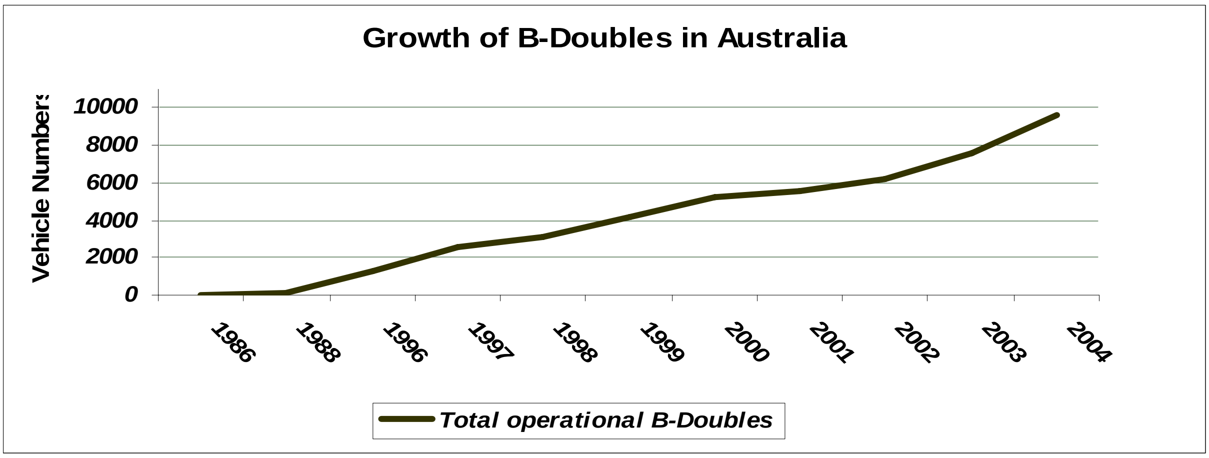
The growth of this new articulated technology

Unlike the road train which was very much restricted to the remote and country highway regions, (See Figure 1) even up to distances of a hundred kilometres or so from the major cities, the usual B-Double configurations (See Figure 2) all very much operate on both long distance routes as well as within the major urban arterial networks within all capital cities. The smaller 19 metre mini-B-Double, not listed in Figure 2, has general access in all capital cities and can operate at the same Gross Vehicle Mass Limits as its big brother the 25 meter B-Double.

Concerns with the introduction of the B-Double

As with most new technology regulators were concerned with the length, weight, noise, speed and the perceived time to overtake these vehicles. This list was very much both a Local Government and a State jurisdictional concern. Between 1988 and 1992 there was also a further element that arose in the debate and that came from the railway freight industry in the State of Victoria, which is a major manufacturing region within Australia. The competitor mode did not want its declining share of the freight market eroded. By 1994 the trials of the vehicles on limited networks, regional and urban, and the sensibility associated with the large productivity gains won the argument for the large scale introduction of these vehicles. Since 1996 the numbers of B-Doubles in Australia has grown by 28.7% compounding per annum.

Table 1: B-Double growth in Australia 1986 to 2004.



Source: National Transport Commission2005, Based on State Registration authority data.

Table 2: Australian B-Double population by year

1986	1988	1996	1997	1998	1999	2000	2001	2002	2003	2004
7	70	1265	2604	3130	4161	5247	5507	6233	7548	9578
% Urban Travel				13.4%	20.1%	16.3%	16.1%	15.9%	13.7%	16.1%

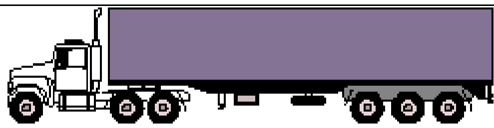
Source: State Registration authorities: Survey of Motor Vehicle use Australian Bureau of Statistics

The Associated Urban Impacts of B-Doubles:

The B-Double has developed into the new face of long distance road transport in Australia. However, the impact of their introduction has also been felt at the urban interface. The B-Double, by helping to dampen the growth rate of long distance trips, has also dampened the numbers of long distance vehicles entering the urban environment when completing long distance trips between major cities. Secondly, the use of these larger vehicles for dedicated distribution centre to distribution centre interchange movements within cities also has a significant trip savings benefit. Table 2 shows that total urban kilometres task undertaken by B-Doubles is about 15% of the total Australian B-Double task. However, the dedicated interchange and long distance tasks cannot be split from this data.

Table 3 highlights an Australian Postal example of the “urban trip saving” when the higher productivity B-Double vehicles enter the destination State capital cities when completing long distance trips The partial loads that can be accommodated within the front trailer of a B-Double (the A trailer) in effect saves some 6,500 partial truck loads per annum being required for the capital cities of destination. As an absolute minimum these partial truckloads, even if they could be consolidated which is contrary to their time sensitive nature of the cargo, would save a minimum of 1,000 single articulated movements per annum and 1,750 large rigid truck movements per annum.

Figure 2: Comparing Standard B-Doubles against the common 6 axle articulated truck.

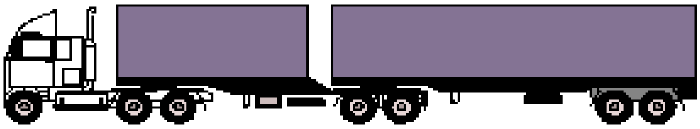


6 Axle Single Articulated Combination (the work horse of the national fleet)

Length 19m, Width 2.5m Height max 4.3m

Weight 42.5 tonnes GVM (45.5 Tonnes with mass management accreditation)

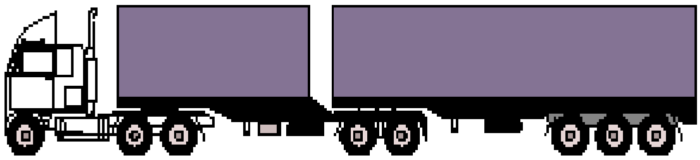
Usual Australian B-Double Configurations



B-Double: 7 axle configuration

Length 25m, Width 2.5m Height max 4.3m

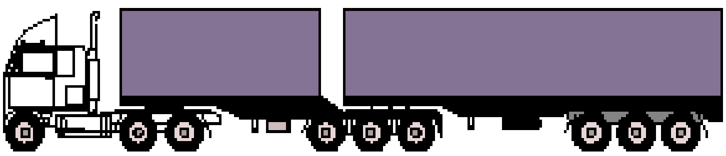
Weight 55.5 tonnes GVM (57 Tonnes with mass management accreditation)



B-Double: 8 axle configuration

Length 25m, Width 2.5m Height max 4.3m

Weight 59 tonnes GVM (62.5 Tonnes with mass management accreditation)



B-Double: 9 axle configuration

Length 25m, Width 2.5m Height max 4.3m

Weight 62.5 tonnes GVM (68 Tonnes with mass management accreditation)

Source: http://www.ntc.gov.au/ViewPage.aspx?page=A02300407400170020

Table 3: Australian Postal Corporation operated B-Double linehaul services

Annual Long Distances trips per annum (Interstate between Capital Cities)	**10,192**
Average Load Factor (Forward and backhaul legs)	**82.2%**
Proportion B-Double services (Forward and backhaul legs)	**69.1%**
Trips requiring both B-Double Trailers	**64%**
Partial truck trips saved in urban areas per annum	**6,522**

Source: Australia Post, Mail Network & Distribution, Transport & Distribution, pers comm..

CASE STUDY II: THE DEVELOPMENT OF THE HIGH PRODUCTIVITY URBAN RIGID TRUCK THROUGH PERFORMANCE BASED STANDARDS

In 1999 the Australian National Road Transport Commission (NRTC) (now renamed the National Transport Commission, the NTC) extended the Canadian and New Zealand frameworks for the development of Performance Based Standards for flexible truck design. These frameworks in brief, suggested that as long as a vehicle performed against some 18 specific technical performance criteria then prescriptive regulations need not apply to the weights and dimensions of a specific vehicle. In effect the operator could design their own truck. Whilst the OECD also formed an international working party for this project in 2002, which is expected to report in early 2006, several major new truck designs were being implemented in Australia under permit.

Some two dozen assembled high productivity vehicle development case studies were reviewed by the NRTC (NRTC, December 1999b). These comprised rigid truck and trailer combinations and multi-articulated vehicles, which could be up to and beyond 50 meters in length and up to 170 tonnes Gross Vehicle Mass. Each of these designs was also associated with significant productivity benefits, however, none of the designs was focussed on urban pickup or delivery operations until the Australian Postal Corporation proposed an urban delivery vehicle that was some 2.35 metres longer than was allowed under existing regulation.

The NRTC's International PBS Demonstration day at Mangalore Airfield

As part of a convened international Performance Based Standards Conference, February 2003 Melbourne, the NRTC organised for the exhibition of some two dozen high productivity vehicles to be displayed at a regional airfield outside Melbourne. This exhibition was not dissimilar to the display that had been assembled in Delft 2002, as part of the 7th International Truck Weights and Dimensions conference with the exception that the Australian display was a dynamic display for the articulated vehicles being exhibited. There was only one rigid truck exhibited and that was to demonstrate an internal load securing device. As rigid vehicles out number articulated vehicles in Australia by 17 to 3 respectively then even small productivity shifts for rigid vehicles mean a considerable amount of productivity for the future urban distribution operation. However, Australia is coming to terms with tuning the PBS philosophy to the urban task.

Current regulatory constraints

The road transport industry has been regulated by a prescriptive regulatory framework, defining vehicle weights and dimensions and through a permit application system. PBS has the ability to change from this prescriptive framework and to still put an “equivalently performing” vehicle on the road. These PBS approved vehicles can deliver both significant safety and huge productivity benefits to the operator. The National Transport Commission has established a framework of approvals, testing and accreditation for the approval of such vehicles seeking operational approvals under the Performance Based Standards process. This PBS approvals process is different to the State approved permit system, (See NTC, 2005), by the fact that it is a national process and not restricted to a particular region or jurisdiction. This does not however mean that the vehicle can operate anywhere. The approvals will be very specific on the road classes and regions for future operations.

Stringent PBS Standards that need to be complied with

The prospect that all 18 revised criteria need to be examined may not be strictly true, as certain criteria are more specific for articulated vehicles. However, all measures should perform no worse than the benchmark performance values set by the NRTC for PBS operations.

The PBS compliance measures that the proposed vehicle need to comply with are:

Table 4: Proposed PBS Vehicle Performance Criteria

1. Startability 2. Gradability 3. Acceleration 4. Overtaking 5. Tracking ability 6. Low speed off tracking	7. Frontal Swing 8. Tail swing 9. Steer tyre friction 10. Static Rollover 11. Rearward amplification 12. Yaw Damping	13. High Speed Transient Off tracking 14. Standard axle repetition 15. Horizontal Tyre forces 16. Bridge weight limits 17. Australian Design Rules, and 18. Australian Vehicle standards.

Source: NRTC 1993. This list is still not totally agreed as yet by all the jurisdictions.

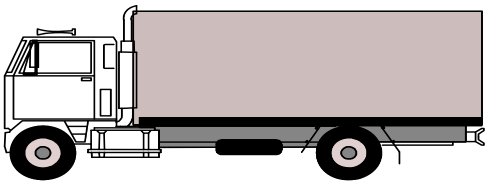
Incremental Changes to different Types of Urban Truck Operations

Generally there are two types of urban truck tasks. These are often described as multi customer pick-up or put-down operations, Figure 3 (milk runs), or Depot to Depot transfers, commonly referred to as Interchange activity, Figure 4. Vehicles in some more complex operations may do both.

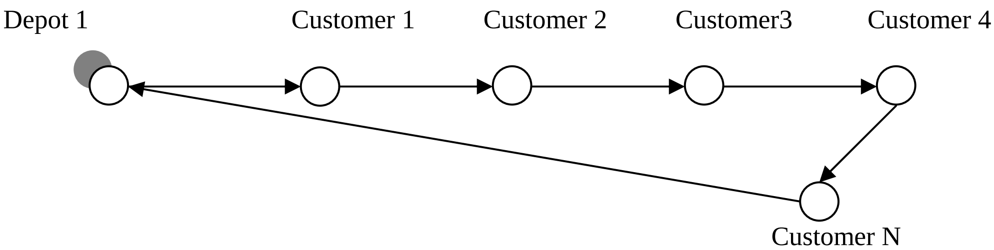
Both these Figures represent the potential productivity gains balanced across the factors of length, if a common heavy 2 (or 3) axle rigid truck were to be allowed an extra metre in length and, an extra 1 tonne of payload. For both these cases the impact of “small” regulatory and dimensional increases in mass and length, assuming only small access restrictions are encountered, generates a productivity benefit that can make a significant impact into the future growth of an urban trucking task. In fact this dimensional increase, 1 meter length and 1 one tonne extra load capacity, when modelled would almost fully dampen the urban rigid truck kilometre growth in Australia over the next 20 years. (Hassall, 2003a.) However, these findings will almost certainly be different for different countries.

Figure 3: 2 Axle Rigid Truck (single drops “milk run”) Minor dimensional Improvement.

Vehicle Details: Length 12.5M (+1M) Height 4.3M, Mass 15 T GVM (+1T)



Network Configuration:



Enhanced Productivity:

Mass benefit	Network Factor	Mass weighting	
12.5%	0.83	0.4	= 4.17% +
Length Benefit	Network Factor	Length Weighting	
20%	0.83	0.6	= 9.96%
Total Operational Productivity			**= 14.13%**

Source: Hassall,2003a.

For these two hypothetical and simple networks, the product benefits are 14.1% and 10.4% respectively. Such gains are very significant for urban transport operators from both an efficiency, and potentially, a profitability perspective.

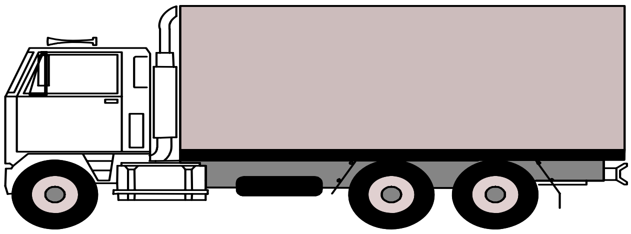
The Concept Australia Post Urban Delivery and Interchange PBS Proposal

If Figures 3 and 4 approximately reflect the benefits of “incremental” changes to productivity of a standard rigid truck, Figure 5 reflects the concept configuration of the heavy 4 axle rigid Performance Based Standards delivery vehicle. This is the first rigid vehicle proposal being evaluated under the PBS program. This vehicle is double the load of the standard heavy 2 axle rigid truck and with enhanced steering features it has the same access potential and turning circle as the heavy 3 axle rigid truck.

The benefits from this particular vehicle for the Postal Corporation, as it is phased into the fleet across a period of a 7 year vehicle replacement cycle would be: a load productivity benefit of + 37.7%,a kilometre saving of -20% of total rigid vehicle urban kilometres. Although not visible from Table 7 the actual truck number savings are almost proportional to the kilometre savings, and estimated as a saving of about –19% of total urban rigid vehicle assets. (Refer Table 6)

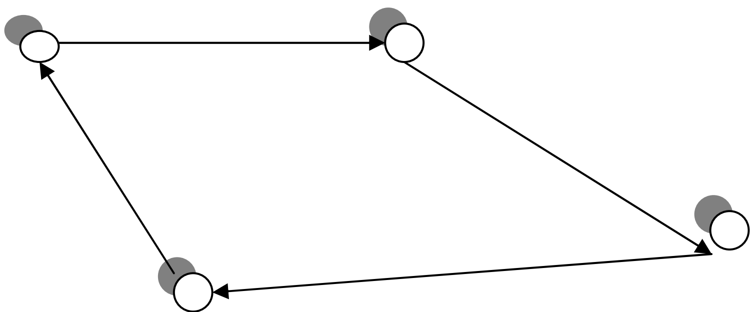
Figure 4: 3 Axle Rigid Truck (multi depot) Minor Dimensional Improvement

Vehicle Details: Length 12.5M (+1M) Height 4.3M, Mass 22.5 T GVM (+1T)



Network Configuration: "Multi Depot Drops"

Depot1 (LF=95%) Depot 2 (LF=90%)



Depot 4 (LF=85%) Depot 3 (LF=90%)

Enhanced Productivity:

Mass benefit	Network Factor	Mass Weighting		
9.909%	0.9	0.4	= 3.272%	+
Length Benefit	Network Factor	Length Weighting		
14.28%	0.9	0.6	= 7.771%	
Total Operational Productivity			**= 10.43%**	

Source: Hassall,2003a.

This Performance Based Standard Urban rigid vehicle (see Figure 5), is hypothetical in concept but is currently being modelled against both static and dynamic simulation performance criteria, which are required by the NTC standards. The standards for such evaluations are the types of packages akin to an Adam's simulation package. (NRTC, 2003).

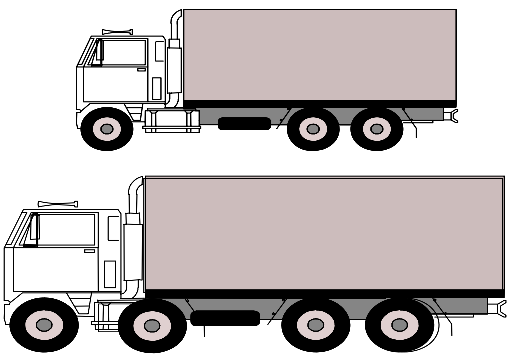
The newer regulatory approvals process for the possible adoption of Performance Based Standard vehicles may save significantly on the lead times experienced in Case Study I. The conceptual development of this urban delivery vehicle has attracted national attention and has secured developmental funding from both industry and government for further mechanical engineering design and the economic analysis for the development of a Social Impact Statement that will also be submitted as part of the approvals process.

Without doubt the Postal network restructure outlined in Appendix A will yield even more productivity when this specific new network is combined with the benefits of Performance

Based Standards (PBS) and a specialist urban delivery vehicle. PBS has however, been the avenue for new multi combination articulated vehicles and has not as yet been thought of as being the catalyst for urban productivity. A radically designed Urban Rigid PBS vehicle may well change this mindset.

Figure 5. Current 3 Axle Rigid and Proposed PBS 4 Axle Delivery Interchange vehicle.

12.5 Metres vs 14.85 Metres



The regulatory process for PBS is being developed as an overarching national approach; at least in theory. So the difficulties that were experienced in Case I, where new technology can be vetoed, or delayed, by specific States or regions, can be minimised. In effect the B-Double impact has been beneficial to the urban transport operation. The Case Study in Appendix A produced exceptional benefits which may not be replicated by small operators, but the potential benefits of PBS has a wide audience. Certainly all Case Studies, I, II and Appendix A, have and will yield significant potential benefits, to both urban and regional transport operations.

Table 5: Desktop and simulation sensitivity analysis for the Urban Concept Vehicle:

3-Axle Rigid Truck (28ULD)				**Heavy 2-Axle Rigid Truck (20ULD)**			
Million Kilometers per annum = 17.9m				**Million Kilometers per annum = 10.1m**			
Operation factor		**Units = 203**		**Operations Factor**		**Units =169**	
0.3		**Milk Run**		**0.9**		**Milk Run**	
		Load Productivity	0.4286			Load Productivity	1.0000
Hops per duty	**8**	Access	0.6400	**Hops per duty**	**9**	Access	0.4129
		kms	-0.2222			kms	-0.1818
0.7		**Interchange**		**0.1**		**Interchange**	
		Load productivity	0.4286			Load productivity	1.0000
Hops per duty	**5**	Access factor	0.7800	**Hops per duty**	**5**	Access factor	0.7800
		kms	-0.2000			kms	-0.2000
		28ULD prod factor	**0.316**			20ULD prod factor	**0.450**
Weighted Productivity				**37.7%**			
Est Km Reduction		28 ULD Truck = -20.6%				20ULD Truck = -18.36%	
AVERAGE WEIGHTED Rigid truck km reduction						**= -19.84%**	
Estimated Total Km Reduction						**=- 5.55 Million kms**	

Source: Australia Post Transport 2004 (pers comm)

APPENDIX A: CASE STUDY OF NETWORK PRODUCTIVITY – THE COMPLETION OF THE NEW URBAN POSTAL NETWORK

Background

Australia, despite its area of 7.7 million square kilometres, is a highly urbanised nation. The five largest cities have approximately 12 million residents, Sydney being 4.2 million, Melbourne 3.6 million and Brisbane, Perth and Adelaide being between 1.1 to 1.7 million each, and they account for 60% of the population. In total the 16 largest cities, 15 of which are costal, account for 70% of the population. Although there is a perception that the essence of Australia revolves around the “tyranny of distance”, this is only partially true as the individual urban environments are the large sinks for transport demand. The largest network transport operator in the nation is unsurprisingly the national Postal Authority, Australia Post. It runs a fleet of over 10,000 vehicles and engages some supplementary 5,600 contractors and the urban task is 80% of this corporation’s own fleet kilometre task. Between 1994 and 2000 a second comprehensive review and reconstruction of the urban postal network was undertaken for Sydney and Melbourne. This second review was considerably different in network structure to the previous major network review, which was implemented in 1985 and intended to last for 15 years.

The second network restructure, after only 12 months since its completion, has, despite forecast freight increases being larger than national GDP, as a generic rule of thumb, has contradicted this trend. Australian GDP (production) seasonally adjusted, has run at an annual compounding average of 3.85% per annum over the last nine years. It is an Australian finding that tonne kilometres roughly follow GDP, with interstate operations being higher at about GDP times 1.25. However, the major postal kilometre growth for the two largest cities and their surrounding regions had declined by almost 0.8% per annum compounding each year, over this ten year period. So from a potential growth expectation of plus 40% over the ten years examined, a decline of –8% was instead seen. What was the underlying reason for this finding? The major contributing factor was both the network processing restructure and the ensuing, associated urban transport network restructure whose planning was begun in 1994/95 and the physical completion occurring in 2004. Also see Hassall 2003b, examines the initial benefits of the network reconstruction prior its completion in 2004.

Prior network History

The immediate past network restructure had been completed in 1985. It was intended to be in place for 15 years. However, product growth, the need for better technology and the realisation that the network design was less than perfect all led to another network overhaul being planned in 1994 through to 1999. The 1985 network restructure produced a “star” network configuration comprised of six mini-letters processing centres and six mini-parcels processing centres in both Sydney and Melbourne. All the letters centres had an associated transport depot and the majority of parcels centres also had a transport depot. Two further features were also prevalent in the planning of this network:

- many of the mini processing centres were also co-located to passenger transport so that large car parking facilities would not consume valuable land space, and
- there was a prevalent belief that the optimum staff numbers in a processing centre was around 400 staff per centre.

In the new network restructure both these planning constraints were totally discarded. This meant that a new world of logistics philosophies, strategies, planning tools could be incorporated into the planning processes.

Disadvantages and advantages of the multi depot /processing centre network

Traditional expansion of especially manufacturing industries often generated the associated transport depot and warehouse with every new factory. Within a period all factories were interchanging products in a network that had N^2 links connecting all nodes.

The continued duplication of transport depots and warehouses is capital intensive however the resources can provide a layer of stop gap risk management in times of network crises of huge unexpected demand. The vehicle utilisation in a multi depot environment is often less than that obtained from at least a centralist transport and distribution approach, irrespective of the number of factories or processing centres. Getting the optimal number of transport depots to retail or manufacturing plant ratio correct is dependent on several factors. Getting the response to major clients right is essential and having more than one depot can achieve this aim.

The New Network Restructure: 1999 to 2004 - The Urban Hubs

After four years planning the physical construction of the new network began in 1999. The singularly most important construct in the new network was the advent of the “hub”. This was not a centralist hub but more of a multi land use arrangement which involved a large retail business centre, a local delivery centre and the addition of a transport transit centre.

These integrated mini streaming centres were both a generator of there own product through the retail centres, as well as being the coordinating pickup agency for large customers. By having a large city broken up into more than one dozen areas does allow customers to be serviced by a near transport hub. This does lower the kilometres performed in the network on collection duties for large customers as the customer will most often be serviced from the closest network hub.

The Mega-Processing Centres: one parcels centre, one letters centre

The hub concept was important in supporting a central processing facility for the letters network and one for the parcels’ network. The hubs were receiving centres from retail and pickup customers and could generate product for both the processing mega-centres. This stream was a parcel and a letters stream transported by a common central truck fleet.

Figure 6: New Hub and Mega Consolidation network

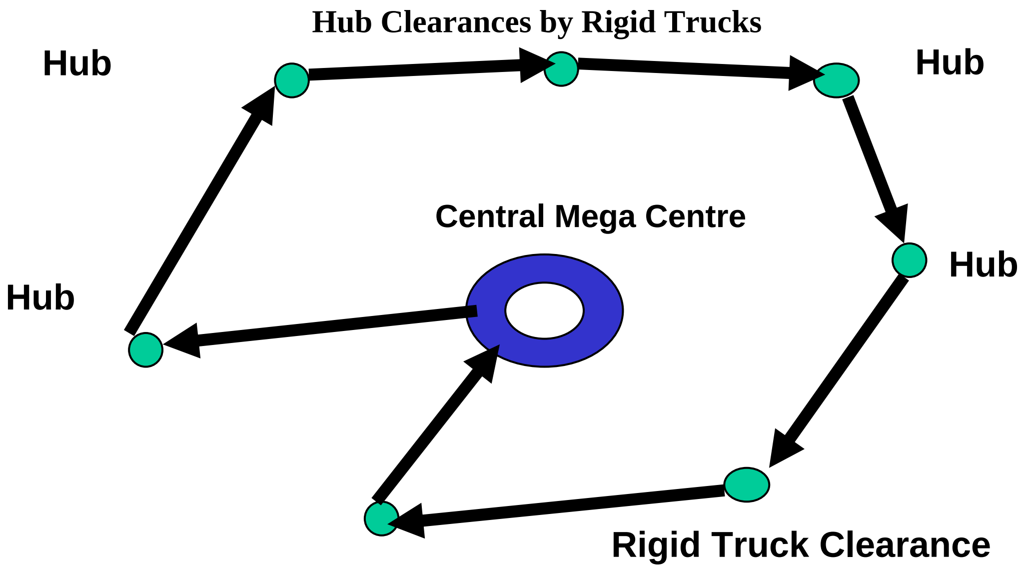


Table 6: Fleet Vehicle Numbers: 1994 to 2004 **(City & Regions: New South Wales and Victoria)**

Vehicle type	Gross Vehicle Mass (tonnes)	Number of Vehicles 1994/95	Number of Vehicles 2004	% Change
Light Commercial Vehicles	1.0 – 2.5	1027	759	-26.1%
Medium 2-axle Rigid	11.9 – 13.0	343	115	-66.5%
Heavy 2 & 3 -axle Rigid	15.0 – 23.0	247	279	+12.9%
Local/Regional Articulated	39.0 - 43.0	0	44	New Category
Sub-Total	**1.0 to 43.0**	**1,617**	**1,197**	**-25.9%**
Linehaul – Articulated Trucks *Long distance national*	42.5- 63.0 T	26	35	+29.1%
Total	**..**	**1,643**	**1,232**	**-25.0%**

Source: Australia Postal Corporation. (Pers Comm)

As can be seen in Table 6 the hub structure allowed for the clearances and sweeps of the new hubs with some 25% less vehicles. In supporting the new hub and mega centre network there was a significant change in vehicle use.

The most significant changes in network use was a drop of near 50% of kilometres, and –66% in numbers, for the medium 2 axle rigid vehicles. The heavy rigid vehicle numbers increased but with lower utilisation as they began to do more city work, being replaced on their regional runs by the local/regional articulated truck category. The use of these Local/Regional semi-trailers also indicated that there are major urban uses for use of local prime movers. Within 9 years these local/regional prime movers had grown to a use level of 5.3 million kilometres per annum. Despite the drop of 25% in New South Wales and Victorian fleet vehicle numbers, the kilometre saving was –8% which would indicate increased utilisation of the vehicle servicing the new hub and mega-centre network. (Refer Table 7)

Lessons and Observations

The case study is interesting as it raises issues as to how inefficient traditional networks may inherently be. Australia Post Transport is considered at the forefront of transport innovation in planning and aspects of vehicle and trailer design. And yet a total shift in transport network operating efficiency was partially an unintended consequence of a processing network restructure

Table 7: Vehicle Kilometre Usage: 1994/95 to 2004 (Regions: New South Wales and Victoria)

Vehicle type	Gross Vehicle Mass *(tonnes)*	Total Annual Travel 1994/95 *(million km)*	Total Annual Travel 2004 *(million km)*	% Change
Light Commercial Vehicles	1.0 – 2.0	26.657	22.912	-14.0%
Medium 2-axle Rigid	11.9 – 13.0	10.080	5.070	-49.7%
Heavy 2 & 3-axle Rigid	15.0 – 23.0	20.753	20.125	-2 7%
Local/Regional Articulated	39.0 – 43.0	0.55	5.292	862%
Sub-Total	1.0 to 43.0	**58.04**	**53.40**	-8.0%
Linehaul – Articulated Trucks *(Interstate long distance national)*	42.5 – 63.0	7.229	8.271	+14.4%

Source: Australia Postal Corporation. (Pers Comm)

The outcome, however, has been highly desirable for both the responsiveness of the network, the economies of processing scale, and the transport economies of network density. The 25% drop in commercial vehicle numbers was staggering and the drop in urban and regional kilometres of 4.6 million kilometres per annum is a highly socially desirable outcome. This initial quantum advance should put considerable emphasis on continued future planning to tap even further efficiencies within the urban transport and distribution network.

Where will these efficiencies come from? Two areas have been identified. Firstly, an even further push to outsourcing “own account” operations, and secondly to make use of the newly “draft legislated” Performance Based Standards (PBS). Many operators will have limited possibilities to reconfigure their transport network. This is because the customer owns the warehouses, distribution centres and retail drop off sites. However, again it is possible that Performance Based Standards may become very useful to such operators.

CONCLUSION:

The adoption of high productivity vehicles has been a feature of the Australian transport environment. In the mid 1980s the modified version of the Canadian B-Train was introduced, known as the Australian B-Double, and 20 years later this vehicle had considerable impact, not only in the long distance operations but also to a lesser extent on urban operations The Case study in Appendix A outlined what significant urban impact savings can achieved through a network restructure, but where is the next generation of productivity, especially for urban transport, coming from? Australia is certainly focussed on the tool of Performance Based Standards for innovative and non standards vehicle adoption for specialist tasks, and this includes urban operations.

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