

Valuing freight transport time and reliability - user benefits

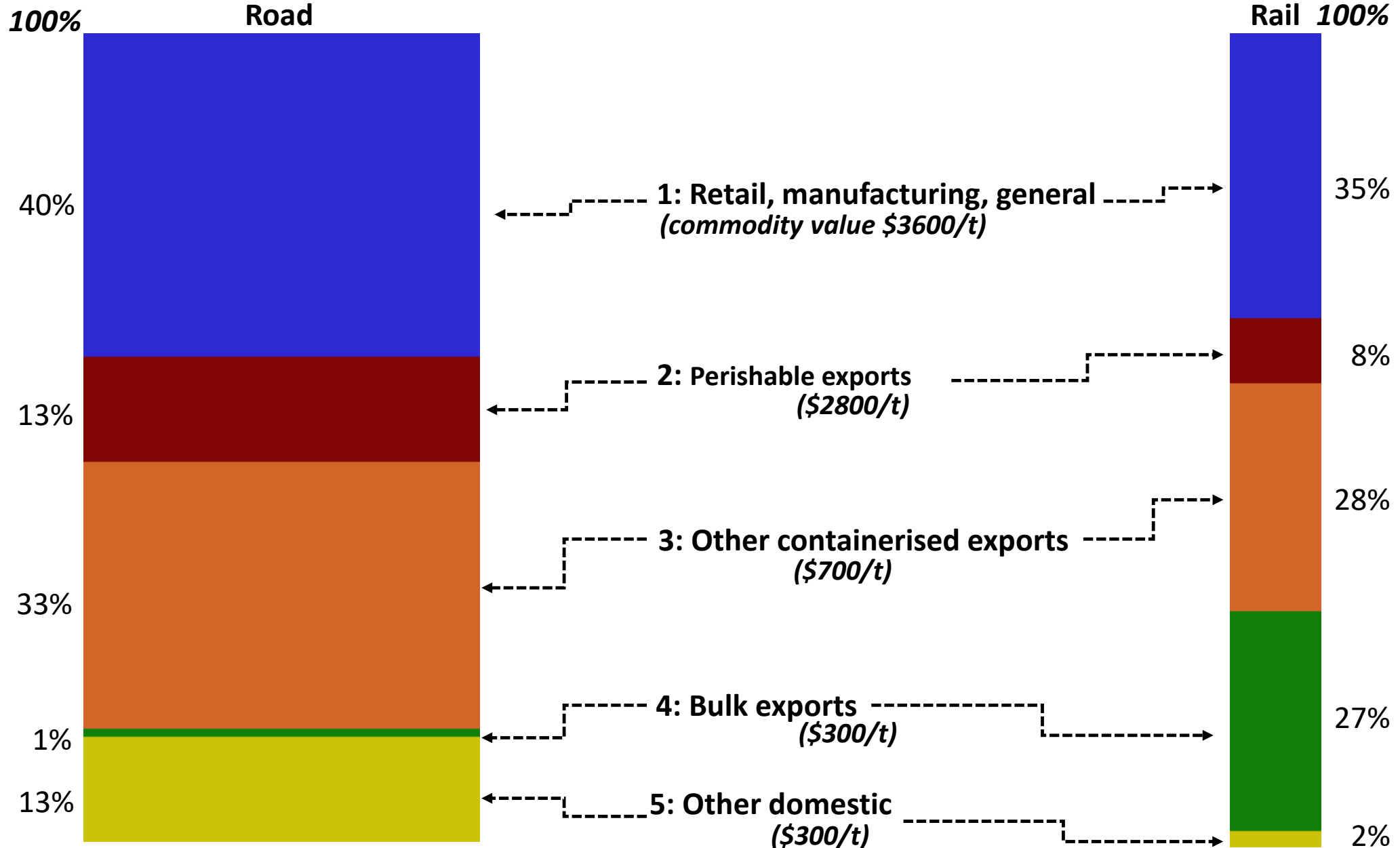
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Scope and Issues

- Part of NZTA research programme:
 - *“Valuing time and reliability for freight transport beyond the allocation of marginal vehicle and driver utilisation costs”*
- EEM compares scheme user benefits with relevant (capex/opex) costs, eg for PT user benefits:
 - In vehicle time, waiting time, access/egress time, transfer time
 - Travel time reliability
 - Station/stop quality; vehicle quality and comfort
- But for freight, current EEM largely **omits potential benefits to NZ shippers** of roading schemes:
 - **This study aims to plug this gap**
- Potential freight shipper benefits include:
 - Time value of early/late receipt of freight (including stockholding costs)
 - Travel time reliability (reduced variability)
 - Service frequency
 - Loss/damage to freight
- Covers NZ freight market:
 - Not international transport, but includes domestic legs
 - Road/rail principally, some coverage of coastal shipping
 - Modally neutral
 - Focus on heavy freight movements
 - **Excludes** transport operator costs.

NZ Land Freight Transport Task

Net Tonne Km by Mode and Commodity Group (NFDS 2014)



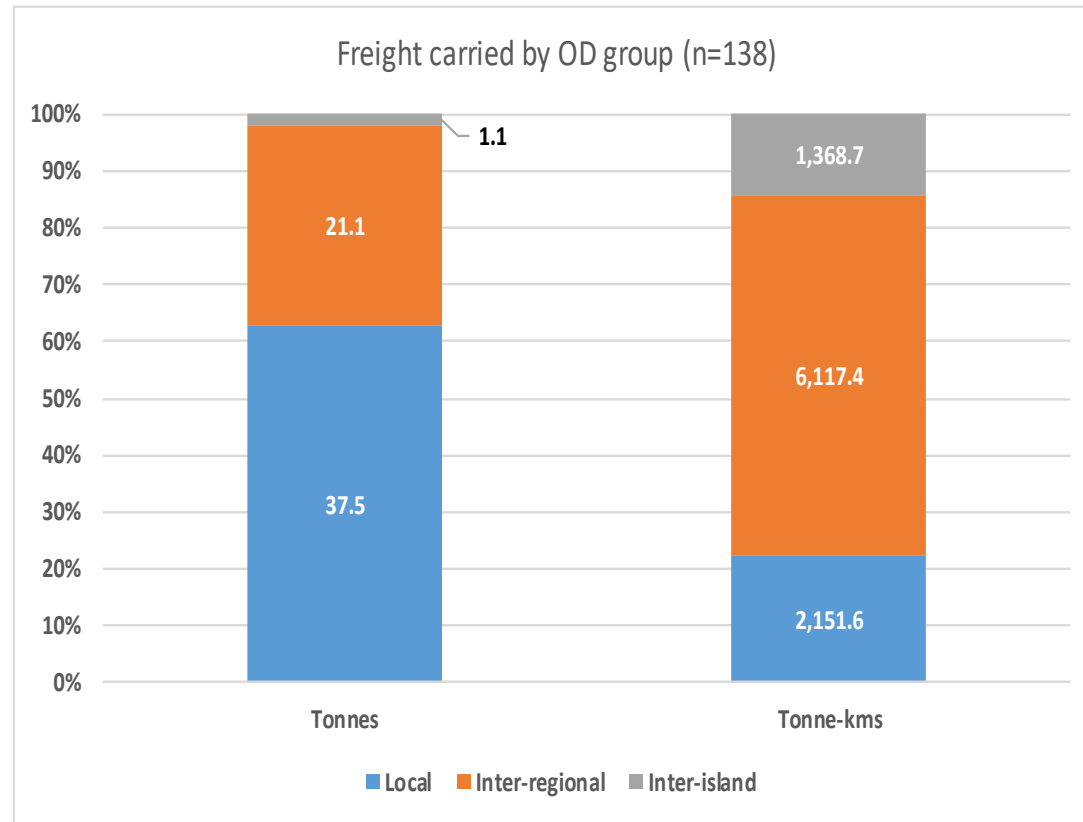
Market survey overview

- **Original intention (project proposal stage)**
 - **Not** to do a major survey -- use values from Kim PhD for commodity group 1; 'triangulate' with international literature for other commodity groups
 - Found this would not give adequate set of values for whole of NZ freight sector – no independent check on Kim's results; international literature inadequate (very wide range of results); structure of NZ economy very different from most other developed countries.
- **Modified approach adopted**
 - Personal interview survey of NZ freight shippers, covering large proportion of heavy freight movements
 - Contingent valuation' approach – shipper willingness-to-pay for enhancements to current freight travel time, reliability, service frequency and other factors
 - 59 interviews (143 market segments) covered c 23% of NFDS total tonnage, 34% of total tonne km.
- **Extensive data set on NZ freight sector and traffics**
 - Company data – size, turnover, employees, etc
 - Commodity segment = commodity group by one of 3 O-D groups, ie within a region, inter-regional, inter-island.
 - Data on tonnage, O-D, trip length and time, commodity value, transport price
 - Modal data – chosen mode(s), alternative modes available, reasons for preferred mode, carrier preference factors
 - Service factors – importance of price, fast journey time, reliable journey time, frequency, freight loss/damage
 - Willingness to pay (maximum) for enhanced service.

Selected freight characteristics (1)

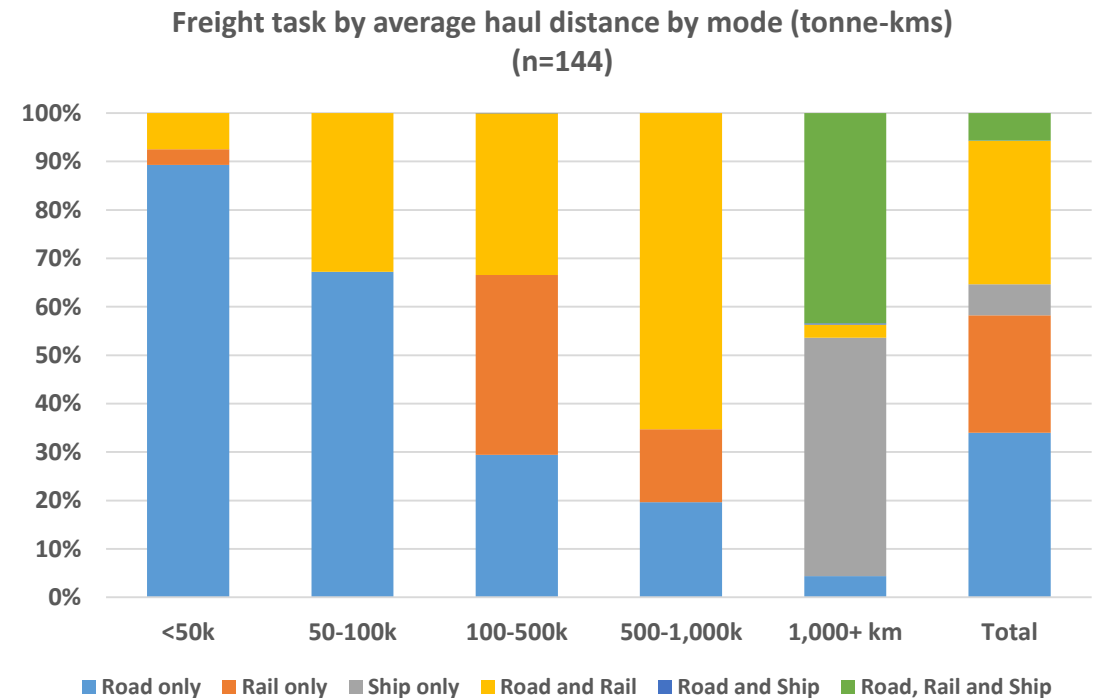
Freight task by O-D category

- Local traffic 62% t, only 22% tkm (ave haul 57km)
- Interregional 35% t, 63% tkm (ave haul 290km)
- Interisland 2% t, 14% tkm (ave haul 1245km)



Freight task by mode by haul distance

- Market shares by mode show a strong pattern of variation with haul distance
- Local movements (<100 km) - road c80% of total
- Inter-regional movements (500-1000 km) - road/rail c70%
- Longer distances (mostly inter-island), ship only and road/rail/ship dominant

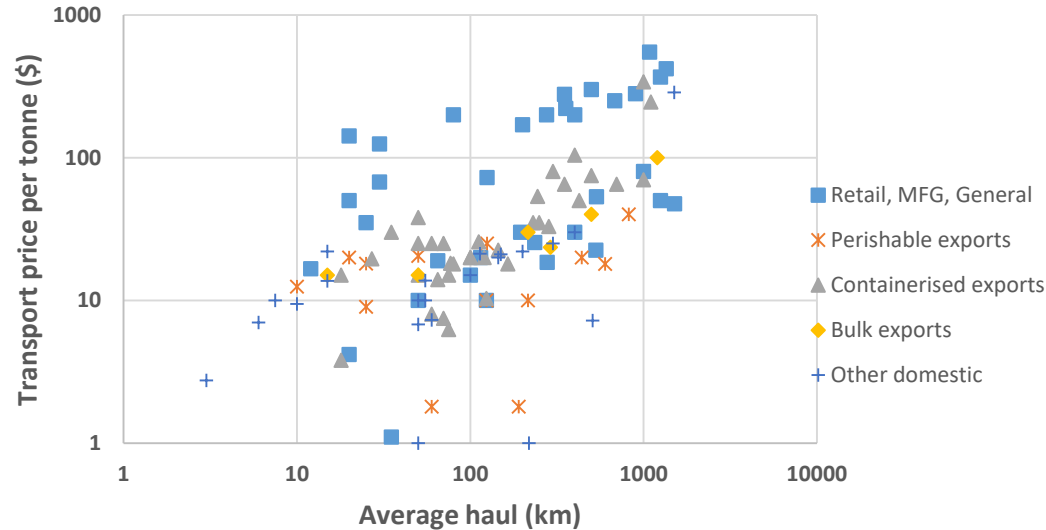


Selected freight characteristics (2)

Transport price per tonne vs distance

- For given distance, prices per tonne are
 - Lower than average for commodity groups 2 (e.g. raw milk, fish), 3 (e.g. logs) and 4 (steel, coal)
 - Higher than average for groups 1 (retail, manufacturing) and 5 (e.g. liquid fuels)

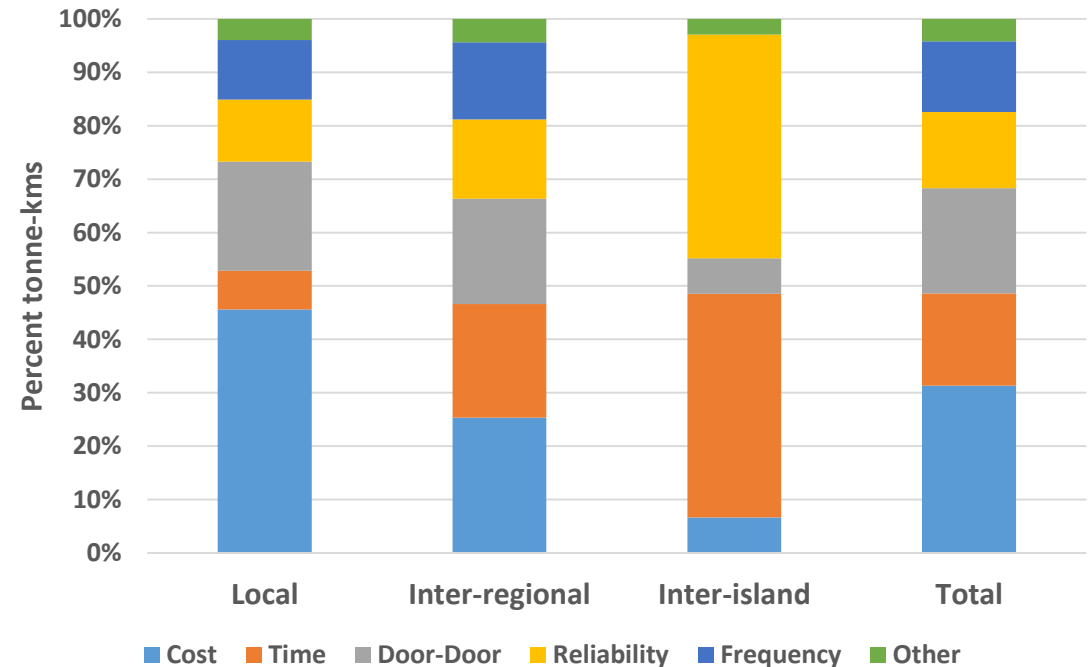
Transport price per tonne vs haul length by commodity group - log scales



Road preference factors by O-D category

- For traffic that could change from road haul:
 - Local hauls - cost dominant factor
 - interregional hauls - cost, time, door-door, reliability, frequency similar importance
 - Interisland - reliability and time dominant

Road preference reasons by OD group (n=114)



Willingness-to-pay questions

Time

- *What is your actual (expected) journey time, and is it fixed?*
- *Where a potential trade-off between price and expected journey time, what is:*
 - (a) the **maximum extra price** willing-to-pay (“WTP”) in return for a shorter journey time (10%/25%/50% shorter)?*
 - (b) the **minimum price discount** willing-to-accept (“WTA”) in compensation for a longer journey time (10%/25%/50% longer)?*

Note: WTA low response and interpretation problems -- not dealt with in this presentation

Reliability

- *Is variability in travel time enough to cause concern; if yes, what % of journeys affected and their average lateness?*
- *Where a potential trade-off between price and reliability, what is:*
 - (a) the **maximum extra price** willing-to-pay in return for a more reliable journey (late 25%/50%/100% less often):*
 - (b) the **minimum price discount** willing-to-accept in compensation for a less reliable journey (late 25%/50%/ 100% more often)?*

WTP time & reliability - results

- Value units:- per (net) tonne; TT per 1 hr reduction in expected TT; reliability per 1 hr reduction in TT SD
- **Expected TT.** Over all survey respondents, time savings worth average \$0.45/hour
- Time savings valued much higher by group 1 (ave \$1.13/hr) - over **4 times** value for other groups
- **TT reliability.** Few respondents with a reliability trade-off, but some high values; overall average \$2.52/hr SD
- Reliability valued much higher by group 1 (ave \$8.95/hr SD) – about **16 times** value for other groups.

Willingness to pay: time	Respondents with trade-off \$/t/hr	All survey respondents \$/t/hr
Group 1	\$10.98	\$1.13
Groups 2-5	\$3.45	\$0.26
All groups average	\$5.45	\$0.45
Willingness to pay: reliability	\$/t/SD hr	\$/t/SD hr
Group 1	\$28.44	\$8.95
Groups 2-5	\$27.96	\$0.57
All groups average	\$28.33	\$2.52

New time and reliability values for EEM

Commodity Gp	This study results	Recommended new EEM values		
		HCV 44t gross (HCV II)	HCV 50 t gross	Weighted 40% 44t, 60% 50t
Time				
	Per tonne per hour	Per truck per hour		
Group 1	\$1.13	\$19.66	\$23.35	\$21.87
Groups 2-5	\$0.26	\$3.86	\$4.50	\$4.24
All groups ave	\$0.45	\$7.53	\$8.51	\$8.12
Reliability				
	Per tonne per hour SD	Per truck per hour SD		
Group 1	\$8.95	\$155.73	\$184.93	\$173.25
Groups 2-5	\$0.57	\$7.52	\$9.88	\$8.93
All groups ave	\$2.52	\$42.18	\$47.65	\$45.46

- Values in \$2017 (for \$2002, as per EEM, divide by 1.47).
- Values in tonnes can be extrapolated to HCV I, MCV, LCV (or any other size of truck)
- **Time values.** Group 1 time values consistent with Kim's NZ PhD values
- Time values replace current EEM value (stockholding value, \$3.18/truck/hr in \$2017)
- **Reliability values.** Reliability apparent high values but per 1-hr change in SD of travel time
- New benefit in EEM, currently no value for reliability from shipper viewpoint.

Frequency, loss/damage, other issues

- Similar WTP questions covered service frequency and loss/damage – great majority had no/minimal willingness-to-pay for improvements
- 87% thought service frequency was an important/ very important factor in choosing a carrier
 - But only 4 respondents willing to pay more for better frequency
 - Indicates general satisfaction with existing frequencies
- Loss/damage not seen as substantial issue, good standard already
- General comments from respondents:
 - Network resilience important as well as reliability
 - Safety management important in choosing carrier
 - Congestion big issue (not just AKL region)
 - Potential for greater use of rail – but dependent on reliability and availability enhancements

Conclusions

- VoT estimates derived very consistent with Kim's NZ PhD figures (group 1)
 - also within the (wide) range of values from the international literature
 - shipper VoT substantially higher than current EEM shipper values for travel time
- Very limited comparisons possible for VoR estimates
 - not able to compare with Kim's figures; great range of international values
 - reliability highly valued by a significant proportion of shippers (esp group 1)
- Survey approach appears to give reliable and robust results
 - contingent valuation methodology with personal interviews appears successful
 - arguably more realistic results and less costly than 'full' multi-variate SP.
- Resultant VoT, VoR values appropriate for direct inclusion in EEM
 - for project evaluation, may apply to freight traffic volumes in aggregate
 - or may distinguish group 1 and groups 2-5 if data available (eg . where more retail and manufacturing in mix than average, such as the Auckland region)
- Up with world's best practice for valuation of freight shipper benefits???
 - waiting on verdicts of peer reviewers!!!