A policymaker’s guide to transport reliability

Results from International Transport Forum study

Presented by
Steve Perkins (ITF) and Peter Kain (BITRE)

with assistance from Jari Kauppila, ITF
• The International Transport Forum
• Reliability trends
• Measuring reliability
• How much reliability
• Reliability policy instruments
• Policy conclusions
The International Transport Forum

- an inter-governmental body within OECD family.
- a global platform for transport policy makers and stakeholders

The Forum

- organises a Conference for Ministers and leading figures from civil society each May in Leipzig, Germany
- Australia and the UK co-hosted the 2009 Forum in Leipzig

Australia

- an active participant in Forum events... and in the International Transport Forum-led programme of international research such as the transport reliability study

<table>
<thead>
<tr>
<th>Reliability study by the Forum, Australia and...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
</tr>
<tr>
<td>Finland</td>
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<tr>
<td>Japan</td>
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<td>The Ukraine</td>
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“The central question of this report is whether appropriate levels of reliability are sought and supplied”
Demand for reliability has increased

- The decline in transport costs (following improvements in transport infrastructure, vehicles and equipment) has facilitated and complemented product specialisation (with outsourcing, regional warehouses and just-in-time systems).

- This capitalising on specialisation is predicated on affordable and reliable transport costs...

... but this has also created a dependence.

Increasingly complex scheduling, made possible through improved reliability, creates an ongoing need for reliability...

... but “reliable fast” not “reliable slow”!
Reliability trends

Circularity of the demand for reliability

- High supply of reliability
- High demand for reliability
- High reliability expected
- High costs of unreliability
What Counts

- Reliability will get more important
- But one size doesn’t fit all
- Heterogeneity “granularity” is critical

Policy Response

- Robust assessment is possible
- Use cost–benefit analysis to decide
- to build, manage, price, or inform
Presentation outline

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Policymakers think about traffic conditions in terms of averages—
but this is not how users remember it!

Figure ES1. Travellers’ perception of traffic conditions

- How traffic conditions have been communicated to users
- How users experience traffic…
  ...and what they remember
Width of the travel time distribution

Previous policy focus on reducing average time

Distribution (not average) of transit times is the key—and provides a far better policy focus
It is important to monitor reliability (for providers and users)
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Market mechanisms with standard products/services...

- consumers want different product quality
- reflecting that, suppliers offer quality differentiation
- …and this may lead to…
- price differentiation

Applying this to “reliability”…

- demand for reliability is “granular” so product differentiation could be efficient
- users would trade-off between reliability and price

BUT

- can we product differentiate in rail network reliability? ✓ (sort of!)
  and in road reliability?  *Maybe!*  *We cannot sell paths/slots in road as easily as we can in rail but opportunities exist for some product/price differentiation eg toll roads and high-occupancy (HOT) lanes*
Why is working out “optimal” reliability a problem?

Market may provide options with different levels of reliability—at a price.

The “Express Lane” fruit and vegetables train has a 15% premium for guaranteed delivery within a given (short) time window.
Why is working out “optimal” reliability a problem?

...but policy is challenged when product (reliability) differentiation is not technically or economically feasible.
Why is working out “optimal” reliability a problem?

Asking users whether reliability matters does not really help in working out how much reliability to supply! Users will prefer high levels of reliability particularly if they do not have to incur the cost.

"Reliable freight service is critical"

Source: City of Chicago Department of Transportation (2003).
Why is working out “optimal” reliability a problem?

So... what is the ‘right’ level of reliability?

Determining this can be difficult because

- if costless to users, then a high level will be demanded by all
- if provided at a higher cost than is valued by users, then community welfare declines.

The policy challenge is to identify those options that can increase reliability at a cost that users are willing to pay.
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In principle, network users can adapt and influence reliability

- users can adapt their behaviour to achieve higher levels of reliability
- shippers control some aspects of reliability

... which reinforces the importance of cost–benefit analysis
Four government policy instruments influence reliability... ALL the policies should be considered—and be subject to cost–benefit analysis.
1. Build

The level and quality of infrastructure are reliability parameters ... and allowing for reliability can alter what and how we build.

Table 4.1  Economic evaluation of long life pavements:
one km of 3-lane motorway surfacing (present value $000s)

<table>
<thead>
<tr>
<th>Contributing factors</th>
<th>Traditional surface</th>
<th>Advanced (low maintenance) surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial works costs</td>
<td>480</td>
<td>1440</td>
</tr>
<tr>
<td>Maintenance works</td>
<td>1080</td>
<td>280</td>
</tr>
<tr>
<td>User costs (delays)</td>
<td>1280</td>
<td>520</td>
</tr>
<tr>
<td>Traffic management costs</td>
<td>260</td>
<td>170</td>
</tr>
<tr>
<td>Residual value</td>
<td>-40</td>
<td>-90</td>
</tr>
<tr>
<td>Net Present Value</td>
<td>3060</td>
<td>2320</td>
</tr>
<tr>
<td>Difference in NPV of costs</td>
<td></td>
<td>-740</td>
</tr>
</tbody>
</table>

Reliability policy instruments

2. Manage

...for example, through coordination of activities
Where it is practical to apply, prices can be crucial in delivering an efficient level and usage of reliability.

- infrastructure managers inform users what it costs to deliver a given reliability
- users communicate how they value reliability and structure their network use accordingly
# Reliability policy instruments

4. Inform

<table>
<thead>
<tr>
<th>State Route/Interstate</th>
<th>Route Description</th>
<th>Distance (miles)</th>
<th>Average Travel Time (minutes)</th>
<th>Current Travel Time (minutes)</th>
<th>Via HOV (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self</td>
<td>Auburn to Renton</td>
<td>9.8</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Bellevue to Bothell</td>
<td>9.7</td>
<td>10</td>
<td>10</td>
<td>10</td>
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<tr>
<td></td>
<td>Bellevue to Everett</td>
<td>26.1</td>
<td>27</td>
<td>27</td>
<td>27</td>
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<tr>
<td></td>
<td>Bellevue to Federal Way</td>
<td>24.6</td>
<td>26</td>
<td>26</td>
<td>25</td>
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<tr>
<td></td>
<td>Bellevue to Issaquah</td>
<td>9.6</td>
<td>9</td>
<td>10</td>
<td>10</td>
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<tr>
<td></td>
<td>Bellevue to Lynnwood</td>
<td>14.9</td>
<td>15</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Bellevue to Redmond</td>
<td>6.0</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Bellevue to Renton</td>
<td>11.2</td>
<td>11</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Bellevue to Seattle</td>
<td>10.6</td>
<td>11</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
Reliability policy instruments are:

- Build
- Manage
- Price
- Inform

BUT
Optimising reliability requires use of Cost Benefit Analysis.
Reliability policy instruments

Summary: impact of the policy instruments

1. Future policy focus on reducing variability
2. Use price to provide choice, such as tolled roads
3. Use information to mitigate the effects of unreliability
Reliability policy instruments

How governments are responding

Road network vulnerability planning
Reliability policy instruments

How governments are responding

Impact of ramp metering on travel time and buffer time

Source: Bhouri & Kauppila 2010

(Used in Australia too!)
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Infrastructure provision and management policy should shift from covert to overt strategies for managing reliability.

Reliability needs the policy prominence such as is traditionally given to congestion.

The key reliability policies are:
- monitor reliability
- recognise the policy instruments of build, manage, price and inform
- assess those policy instruments by cost-benefit analysis
Thank you