

With its knowledge input, the AVV Transport Research Centre shares responsibility for improving the traffic and transport system in the Netherlands.

AVV Transport Research Centre

Travelling time reliability

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MuConsult B.V.

Onderzoek- en adviesbureau op het gebied van Verkeer en Vervoer, Ruimtelijke Ordening en Arbeidsmarkt, Amersfoort. Tel. +31 (0)33 - 465 50 54

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Travelling time reliability

Full diaries, business appointments, strict delivery times. Everyone and everything has to be on time. But as traffic gets ever heavier, this is no easy task. Is there congestion, has there been an accident or can you get straight through? Will you arrive late or will you be much too early?

Introduction

Until a short while ago, mobility policy focused mainly on reducing travelling times. But we have recently come to realise that travelling time reliability is at least as important to travellers, hauliers and shippers. So there is now a new subject on the policy agendas of parties in the mobility sector.

The aim of reliability policy is to improve the predictability of travelling times. This will enable waiting times to be cut and connections improved, and will allow businesses to deploy their equipment and staff better. The importance of travelling time reliability for passenger and goods traffic has been acknowledged by government and local authorities. In this regard, the Mobility Memorandum contains a specific ambition to have 95% of rush-hour movements arriving on time by 2020. Local authorities are also formulating ambitious targets in their policy and elaboration memoranda.

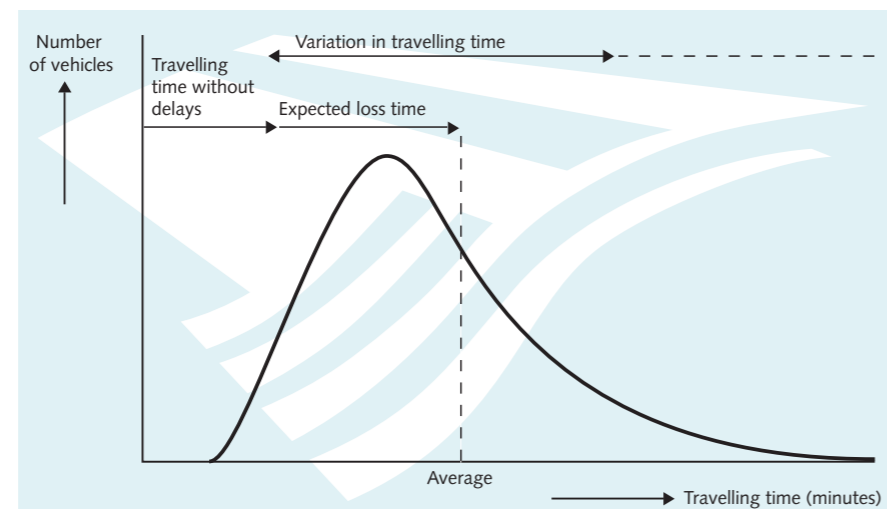
The question this now raises is how the reliability ambitions can be achieved. They require knowledge on a range of different aspects, such as an understanding of the actual reliability of travelling times and how users rate this. The importance of reliability compared with other quality aspects of the transport system such as speed, safety and the environment must also be established. A thorough knowledge of the operation and effects of tools that can be used to influence reliability is required.

As a player in the field, the AVV Transport Research Centre intends to develop these insights further. To this end, it is conducting surveys and developing tools. The results will be made available to the Policy Directorates, Regional Services of the Directorate General for Public Works and Water Management and the local authorities that are setting up and implementing reliability policy. This brochure takes a look at the main features of current knowledge on travelling time reliability and the directions in which new knowledge is being developed.

Definition

Travelling time reliability is the duration of the journey, taking expected delays such as daily road congestion or public transport connections into account. Journeys can actually turn out to be shorter or longer depending on the extent of congestion or transfer problems. Travelling time reliability is therefore the spread around the average expected travelling time, including the expected loss time that can be anticipated. This is explained in figure 1.

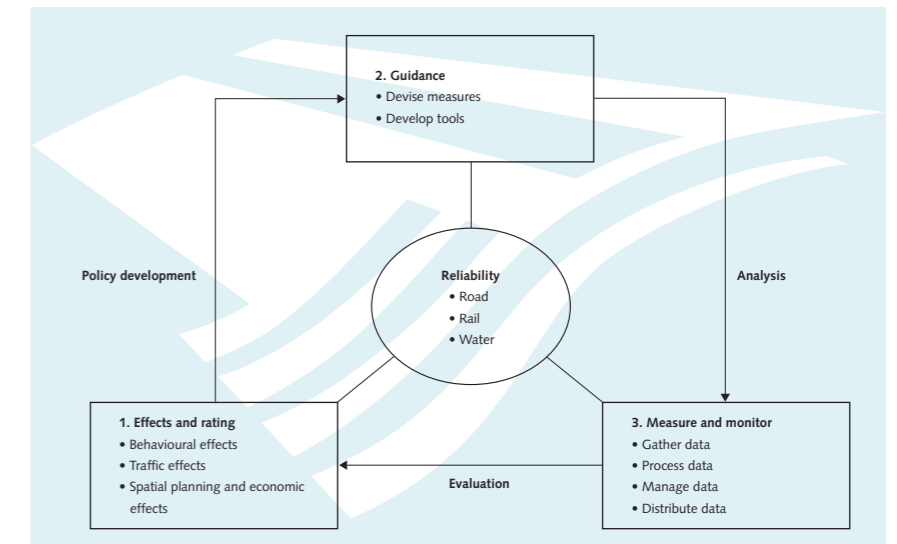
Figure 1: Travelling time reliability



Developments in travelling time reliability

To develop the policy, a knowledge of reliability is required. At AVV, this knowledge is based on three related building blocks.

Figure 2: Building blocks for policy development



1. Behavioural effects and (economic) rating

Exactly how important is reliability to travellers, hauliers and shippers? To get to the bottom of this, we need to survey the effects of reliability on means of transport, times and preferred routes of (different groups of) travellers, hauliers and shippers. The perception of reliability is also important: how do travellers, hauliers and shippers rate the reliability of travel by road, water and rail? What are the benefits of a reliable travelling time? This knowledge is needed to enable properly substantiated decisions on investments in infrastructure to be made from the point of view of the parties concerned.

2. Guidance options

What policy strategies and measures could help improve travelling time reliability? There could be measures which influence the variation in demand for transport or which increase the use of the capacity. To influence demand, mechanisms such as pricing tools which affect the length of the rush hour could be used, for example. Influencing supply requires (selective) building and measures to enhance the use of the existing road and network capacities. Finally, measures could be introduced to improve the perception of travelling times, especially through campaigns run by market parties.

3. Measure and monitor

In order to be able to determine whether the policy objectives are being achieved, we need to be able to measure developments in travelling time reliability. What indicators do we need to do this? What information do we need to establish the values of these indicators? What is the best way to obtain, manage and disseminate the information?

All the necessary surveys in the three knowledge building blocks have already been conducted. These are discussed in more detail below.

1. Behavioural effects and (economic) rating

Behavioural effects

AVV is studying the value that travellers, hauliers and shippers place on reliability. It is also studying the changes in behaviour caused by changes in reliability. Consider, for example, the effect an improvement in the punctuality of public transport would have on the number of people using it. Or take the role of reliability in the implementation of multi-modal transport concepts. Another example is the role of information systems in improving the predictability of travelling times both before and during the journey. The insights obtained will enable local authorities and road managers to pursue an efficient, effective and, above all, user-oriented reliability policy.

Behavioural effects are being surveyed in various ways:

The wishes of travellers and hauliers regarding reliability and reliability policy are being established through user surveys. These are being conducted using questionnaires and discussions with focus groups. In user surveys, respondents are also being asked about behavioural reactions to possible policy instruments. The perceptions and ratings of individual travellers, hauliers and shippers are prioritised in all cases.

The AVV is developing models for assessing developments in reliability and its effects on means of transport, routes, departure times and choice of destination from a quantitative point of view. These models are also intended to help judge the effects of policy measures in advance.

The survey tools for establishing behavioural effects in the area of reliability are still under development. For example, a reliability module was recently created for the National Model System (LMS) and the New Regional Model (NRM): the LMS-BT. More and more experience is now also being gained with dynamic models. These enable traffic flows to be accurately modelled at vehicle level, which in turn enables the effects on travelling time reliability to be worked out at road section/route and connection level. A module has also been developed to measure the 'robustness' of networks, in other words their susceptibility to major disruptions.

AVV is working very closely with model builders, traffic experts and behaviour experts on the development of research methods and models. This is resulting in an ongoing process of renewal and deepening.

(Economic) rating

Rating surveys provide an insight into the economic importance placed on reliability by travellers, hauliers and shippers. When rating infrastructure projects, gains in travelling times would always be included as a major benefit item in cost/benefit analyses. This can now also be done with the gain in reliability. This has proven to be significant. Based on a series of studies, AVV is now developing practical tools for these calculations. Temporary measures have been established for determining the economic value of reliability compared with the value of travelling time, based on expert opinions. The results of large-scale studies of this issue will be available in 2007.

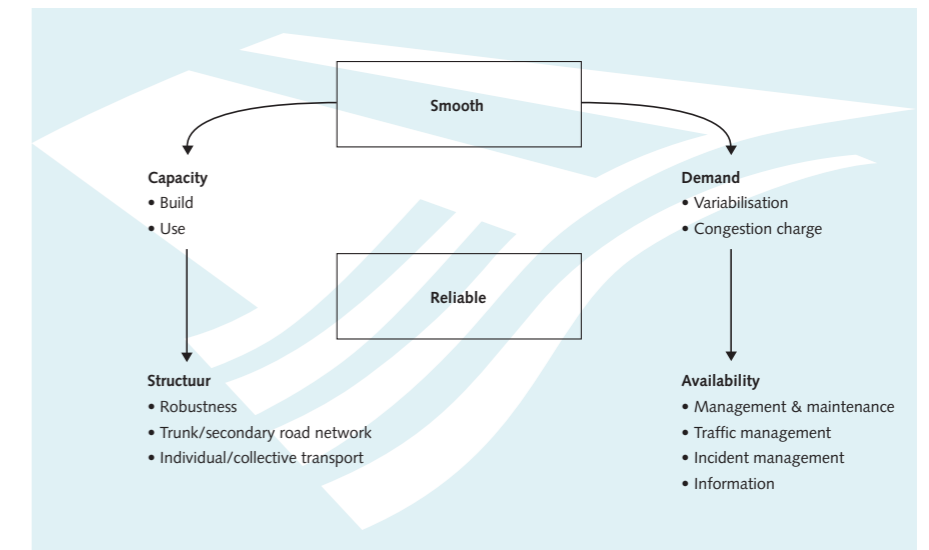
2. Survey of guidance options

Strategies

Classic traffic policy is designed to keep traffic running smoothly. As already mentioned, this includes measures that enhance the capacity of the infrastructure and the use of the existing capacity, and measures that influence demand.

Policy that is aimed at improving reliability requires different measures, despite the fact that these two are related. AVV is conducting research to find out what the best measures are, what measures counteract each other, and what measures can deliver synergy.

Figure 3:
Measures and
relationship



In the case of policy designed to increase 'measured' reliability, a distinction can be made between measures aimed at the structure of networks and those aimed at the availability of capacity at specific times and in specific places. Also to be considered are strategies that influence the perception of reliability, such as improving information on expected travelling times, both before and during the journey.

Structural measures relate to the robustness of the infrastructure. This is the extent to which the infrastructure is able to cope with unexpected events. An important measure in this area is to improve the possibilities for diverting to different parts of networks, particularly the trunk road and secondary road networks (or road, rail and water). Another important measure is the construction of by-passes to maintain a minimum handling level, including in special circumstances. The most vulnerable sections of the trunk road network have already been mapped for such a policy. With the aid of the Architecture for Regional Network Development (ARNO), choices about the desired quality of regional networks can be made gradually.




Numerous measures aimed at the availability of capacity at specific times and in specific places are also being developed. Examples include smart management and maintenance strategies, traffic management and incident management, such as the RWS Netherlands Traffic Management Centre (VCNL)/National Police Services (KLPD) project 'Betrouwbaar op Weg/Har(t) op weg' [Reliable on the road/heart on the road]. This is aimed at regulation strategies and capacity management for proactive traffic flow management. Attempts are being made to limit unexpected delays resulting from accidents by improving incident management. This involves both material and organisational aspects. A Traffic Management Architecture (also known as GGB) has been developed to create an effective, efficient and sustainable

traffic management system for the trunk road network. This creates a link with the networks of joint road managers. It enables national and regional policy starting points to be translated systematically into regulation strategies, tactics and scenarios. Decision support systems for traffic handling are also being developed to improve information provision for network and traffic managers.

Finally, we must mention the specific role played by information systems. By keeping travellers informed about expected travelling times before or during the journey, the predictability of the travelling time increases. Not only can this improve the perception of reliability but it can also reduce the perception of the negative consequences of unreliability. AVV is therefore working on developing and improving systems for predicting travelling times and communicating with travellers both before and during the journey. Current traffic information is delivered to users both by systems on and along the road via service providers. Preparations are currently underway for a national data warehouse which will contain underlying information and distribute it to service providers.

Process aspects

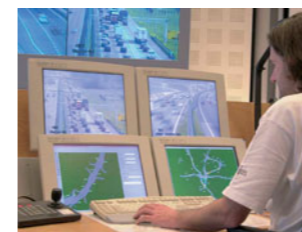
Many different parties are involved in developing reliability policy. Therefore, the reliability survey is looking at:

-  Collaboration between road managers.
 For travellers, the key issue is to reduce the variation in door-to-door travelling times. These journeys are not restricted to individual regions. Road managers can work together both to measure reliability and analyse developments and to formulate a strategy for tackling the problems.
-  Coordination of tools
 Reliability policy requires the use of different tools that relate both to the behaviour of individual travellers and to the traffic system itself. These tools must be properly coordinated.
-  An integrated approach
 Reliability policy extends beyond the traditional classification of transport systems into individual and collective means of transport: the chain approach is becoming increasingly central.

3. Measure and monitor

Travelling time reliability is measured using the so-called standard deviation for travelling time. This measures the spread of the expected travelling time. For example, a traveller may expect to complete a journey in 30 minutes, but is actually faced with a 45-minute journey. If the travelling time is relatively unreliable, the standard deviation is big. The standard deviation is used to measure the actual situation as well as to monitor reliability trends.

Accurate data for determining the standard deviation of travelling times is currently available for the trunk road network. The necessary data for the secondary road network is not yet adequate. It is therefore not yet possible to effectively establish developments in reliability of door-to-door movements. This would require more measurements for the secondary road network. Various methods designed to deliver this data are currently being developed. For example, a system of floating car data is already being used, in which the actual travelling times are measured with in-car GSM. In urban areas, traffic regulation systems could be a source of data. There is still a lot of work to be done in this area. AVV is working closely with regional network managers on the further enhancement of measurement methods and the collection and distribution of concrete data.



The data from the Netherlands Mobility Survey (MON) can also be used at individual movement level. This data source is a continuation of the Mobility Survey conducted previously by Statistics Netherlands. The MON contains a wealth of data on individual people's door-to-door journeys and travelling times. The data can be used to establish the variation in travelling times, with detailed breakdowns into, for example, mobility motives and population segments. This can also give us a better understanding of the reliability of multi-modal mobility, i.e. a combination of different means of transport.

AVV is establishing the reliability of rail travel in conjunction with ProRail, using data from the Timetable Monitor, which contains statistics on delays. Based on insights into the actual situation and backgrounds, measures to help increase reliability will be developed in this area too in the future. This will require an understanding of standard deviations for both the main rail network and regional networks.

Work is ongoing to improve the quality of data and data collection in numerous ways so as to gain better insights into developments in reliability. Improvements in data processing and management are also being prioritised. The aim is to enable users like network managers and traffic managers to obtain high-quality data quickly in the future.

AVV: Knowledge development and use

The AVV Transport and Research Centre intends to tackle the challenges of the Mobility Memorandum with great energy. To this end it is developing knowledge on travelling time reliability as the basis for government and local authority policymaking. The most important themes in the survey were looked at for this purpose. The results should enable managers to develop strategies to improve travelling time reliability. AVV will keep you informed about developments in the survey and its results, including via the website www.rws-avv.nl and through publications in magazines and talks at conferences. For more information on reliability, please contact:

Mieke Bogaerts (+31 (0)10 282 5727; or m.bogaerts@avv.rws.minvenw.nl)
 Arnwald Janssen (+31 (0)10-282 5697; or a.j.t.m.janssen@avv.rws.minvenw.nl)
 Lindy Molenkamp (+31 (0)10 - 282 5912; or l.molenkamp@avv.rws.minvenw.nl)
 AVV Transport Research Centre

Ministerie van Verkeer en Waterstaat
 Rijkswaterstaat AVV Transport Research Centre
 Boompjes 200
 P.O.Box 1031
 3000 BA Rotterdam
 The Netherlands

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