Managing disruptions in public transport from the passenger perspective

A study to assess and improve operational strategies for the benefit of passengers in rail-bound urban transit systems

Anne Durand (anne.durand@minienm.nl), Niels van Oort, Serge Hoogendoorn  nielsvanoort.weblog.tudelft.nl

1. Motivation for the study

Passengers can be seriously inconvenienced by unplanned disruptions in urban transit systems. Yet, there is a lack of passenger perspective in rescheduling research and practice.

2. Research objectives

- Quantify the inconvenience experienced by passengers during an unplanned disruption.
- Develop a tool to build alternative strategies for a given disruption that minimize this inconvenience and that are realistic to implement for traffic controllers.
- Apply the developed framework on a case study.

3. Methodology

- Use of AVL and smart card data.
- Assessment based on 5 passenger impacts translated into a monetary value.
  1. In-vehicle time
  2. Waiting time
  3. Comfort
  4. Denied boarding
  5. Unplanned transfers
- Alternative strategies are developed with a discrete-event simulation (ARENA), based on a what-if approach. The simulation generates data comparable to AVL data.

4. Case study

Metro of Rotterdam (5 lines), The Netherlands.

- Frequency: 18 trains/hour/direction.
- Pre-plan: 12 trains/hour/direction + single-track operation.

5. Conclusions and recommendations

- Contribution of this research: a data-driven approach to take the passenger perspective into account during disruptions.
- Pre-plans have a good basis but there is room for improvement (-12% to -35% in AGC).

Traffic controllers are used to working with timetables and schedules: a punctuality paradigm. During disruptions, passengers benefit more from a regularity paradigm. Operators and authorities need to ask themselves whether the direct and indirect work environment of traffic controllers is conducive to a focus on regularity when needed.

Further research could extend the assessment framework with some non-passenger related impacts (e.g. crews) & investigate the behaviour of passengers during disruptions.