The Effect of Operations Control on Reliability

Case: RandstadRail

Niels van Oort  
Public Transport Consultant / PhD Student

Rob van Nes  
Associate Professor
Outline

- RandstadRail
- Controlling operations
- Actual effects of controlling
RandstadRail

94,000 boardings per day

Two lines; 33 and 27 km | 41 and 31 stops

5 min headway per line per direction

50 Low floor vehicles
RandstadRail (2)
Why controlling?

- High level of quality and reliability
- In urban area
  - Poor punctuality
  - Poor regularity
- High number of vehicles per hour per direction (>24)
- Signalling applied: limited capacity
- Shared tracks with tram and metro
- Operational targets of transit authority
Without controlling?

- Bunching -> Increase in average waiting time
- Overcrowding -> Probability of having a seat decreases
- Uncertainty -> Less satisfied travellers
How to deal with deviations?

Disturbances

Preventing → Coping → Adjusting
Main elements

Preventing unplanned stopping
Punctuality
Dwelling
Timetable
Dispatching room
Actual effects

- Continuous monitoring operational quality
  - To optimize timetable
  - To find and remove bottlenecks

Improvements
- Variation of driving time
- Punctuality
- Customers satisfaction
Variation of driving times

Unplanned stopping

Average delay: 90 s → 20 s

Standard deviation: - 50%
Variation of driving times (2)

Dwelling

Average dwell time 28 s → 24 s
Standard deviation - 70%
Punctuality

Departure punctuality: 70% → 93% <-1, +1>
Driving ahead of schedule: 50% → 7% <-, 0>

15% less waiting time for passengers
Customers satisfaction

![Bar chart showing customers satisfaction for Line 3 and Line 4 between 2005 and 2008. The chart indicates an improvement in satisfaction for both lines by 2008.]
Conclusions

- RandstadRail: High frequent light rail in urban area
- High reliability because of controlling operations
- Still more attention needed to reliability during network and timetable stage

Further (PhD) research

- Optimizing slack allocation
- Infrastructure network design and robustness
- International benchmark of strategic and tactical design parameters of urban public transport
Questions / Contact

Niels van Oort
N.van.Oort@HTM.net

Site PhD Research:
http://www.htm.net/ Pages/ DEF/ 533.html