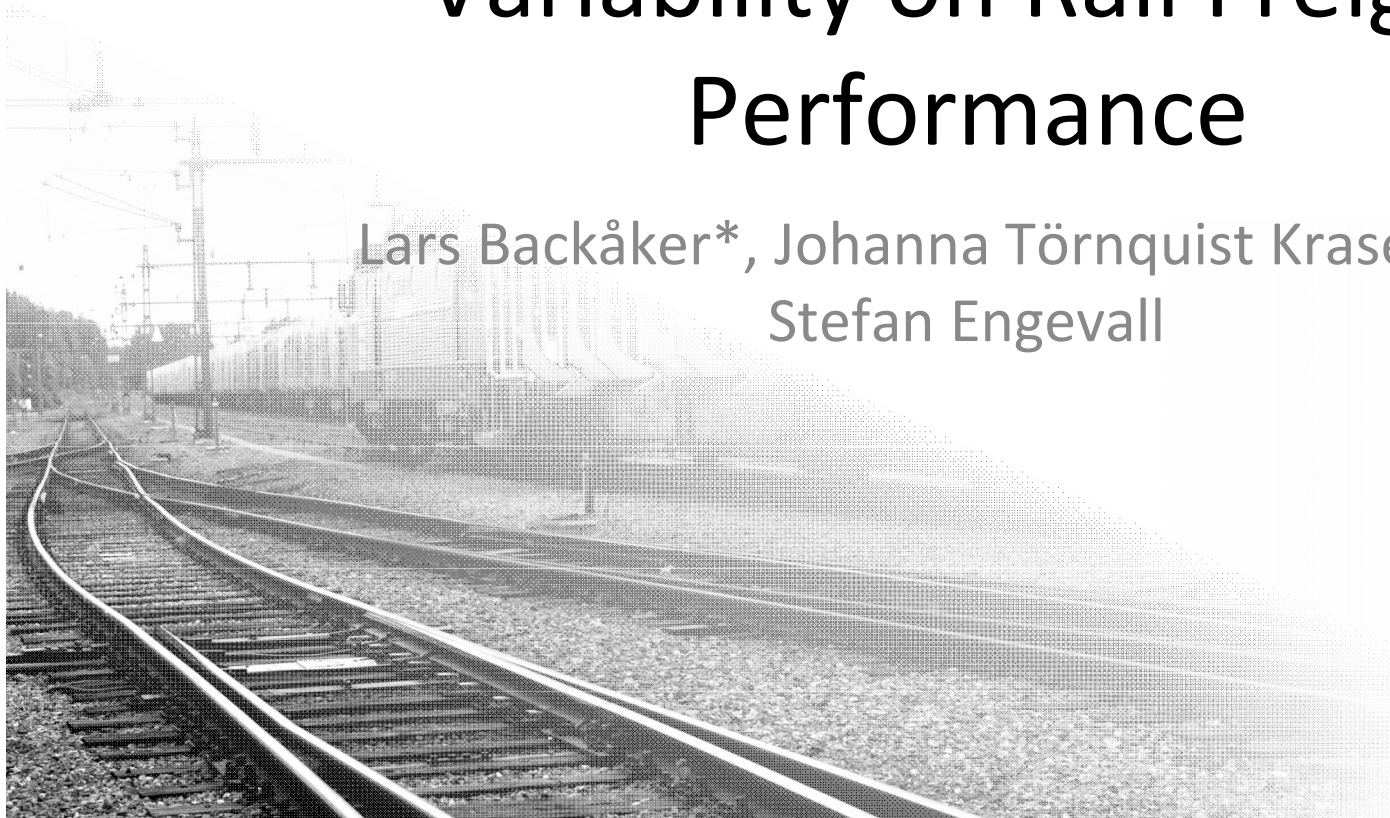


The Impact of Reduced Demand Variability on Rail Freight Performance

Lars Backåker*, Johanna Törnquist Krasemann,
Stefan Engevall



Agenda

“ Rail Freight Transportation

“ Simulation Study

- . Purpose and motivation
- . Approach
- . Case description
- . Results
- . Concluding remarks
- . Future research

Rail Freight Transportation

“ Characteristics

- . Capacitated and restricted service networks
- . Capital intensive operational resources
- . Exhaustive and complex planning processes
- . Heterogeneous markets and differentiated service segment

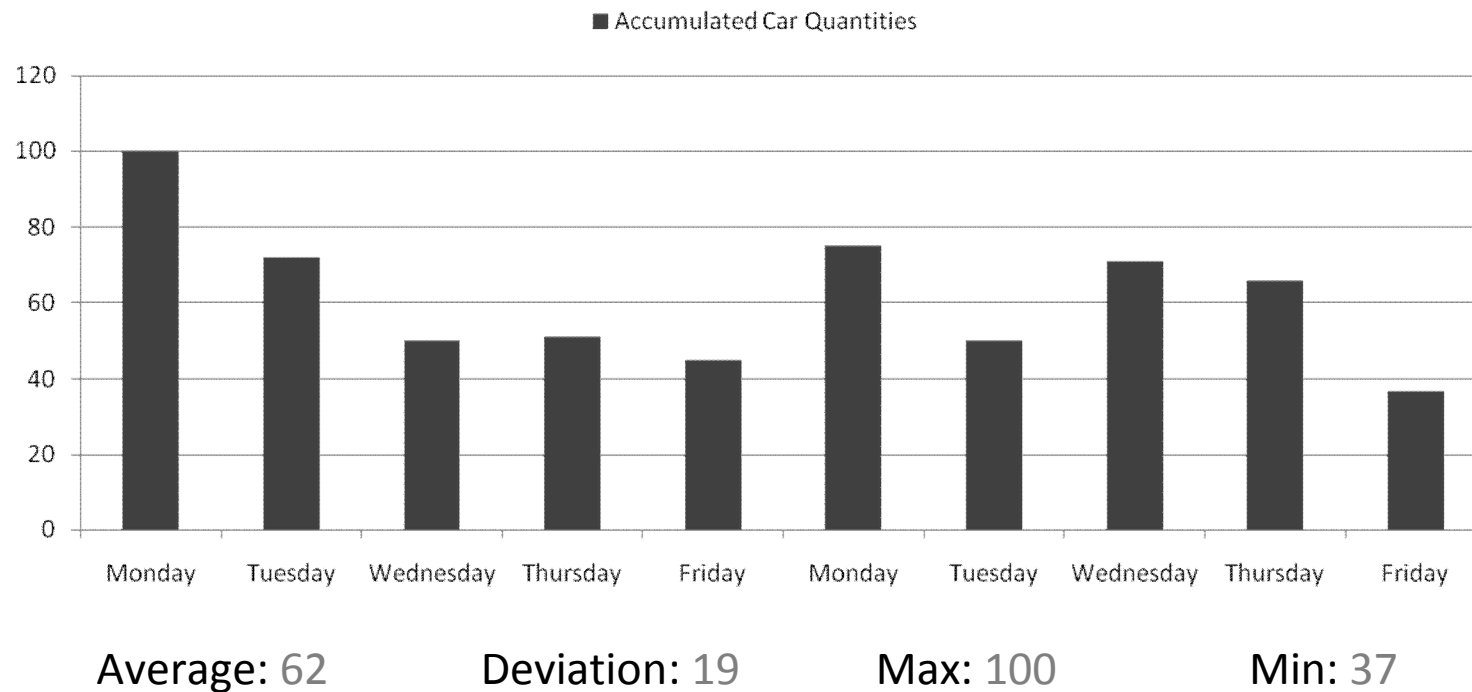
Rail Freight Transportation

“ Customer agreements

- . Transportation relations
- . Service frequencies
- . Departure times
- . Delivery time windows
- . Car specifications
- . Average periodical demand
- . (Demand fluctuations)

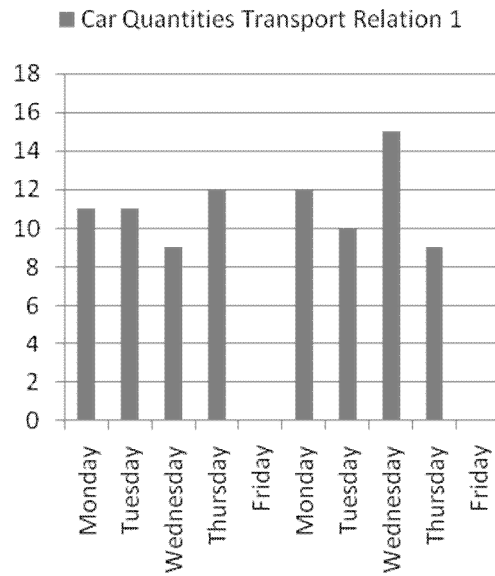
Rail Freight Transportation

“ Daily Fluctuations in Transport Demand

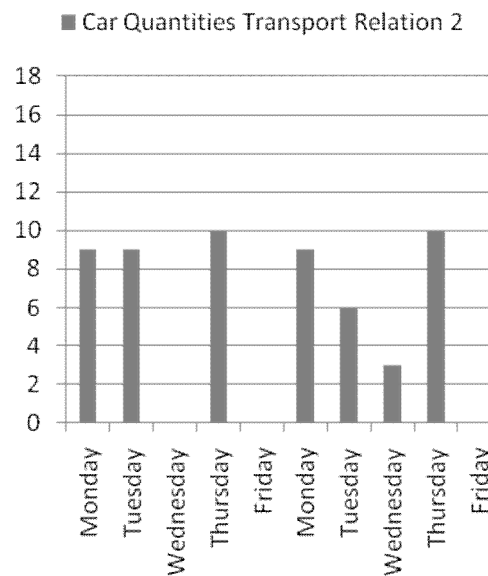


Rail Freight Transportation

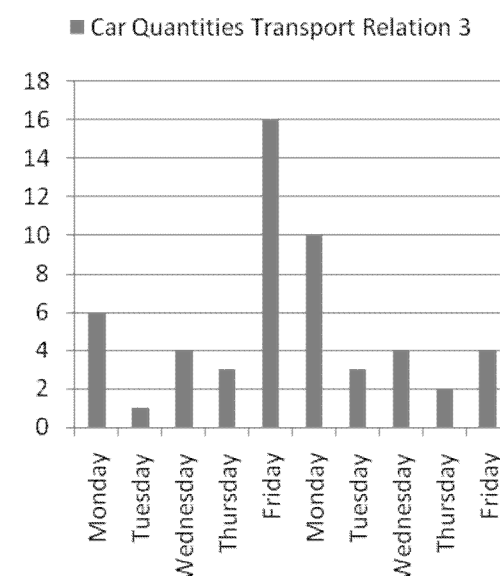
“ Daily Fluctuations in Transport Demand



Average: 9
 Deviation: 5
 Max: 15
 Min: 0



Average: 6
 Deviation: 5
 Max: 10
 Min: 0

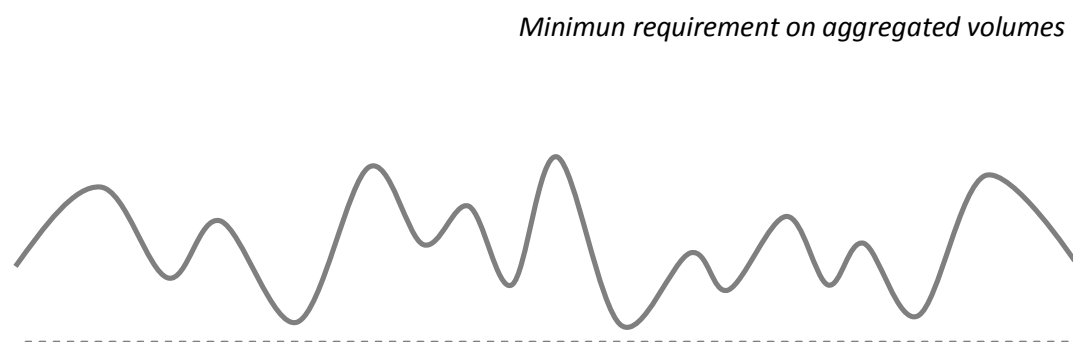


Average: 5
 Deviation: 5
 Max: 16
 Min: 1

Simulation Study

“ Motivation

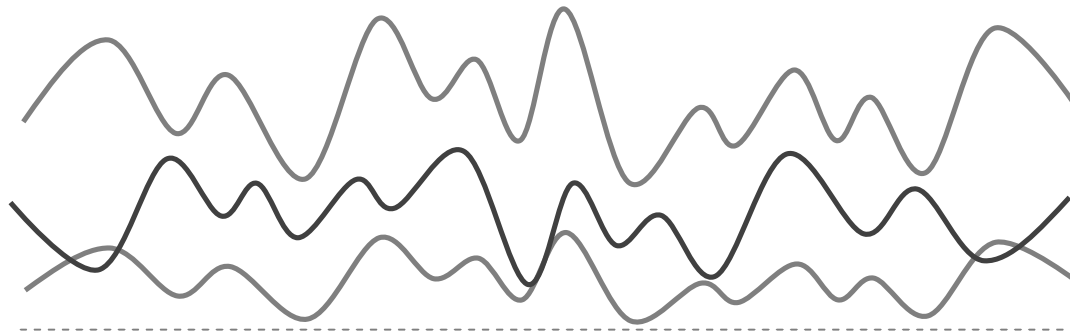
- . Daily fluctuations (variability) in transport demand
- . Currently available customer agreements for reduced variability



Simulation Study

“ Purpose

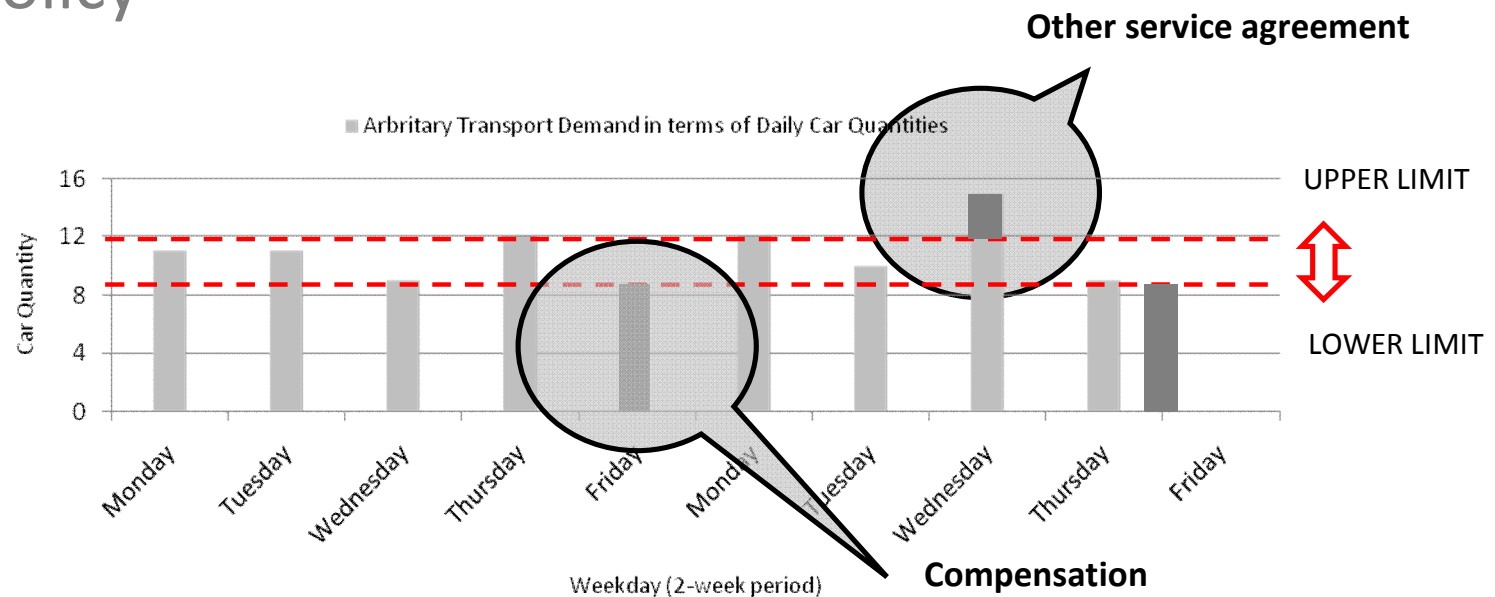
- . We set out to assess the impact of reduced demand variability on rail freight performance



Simulation Study

“ Approach

- . Introduce a volume Variation Allowance (VVA) policy



Simulation Study

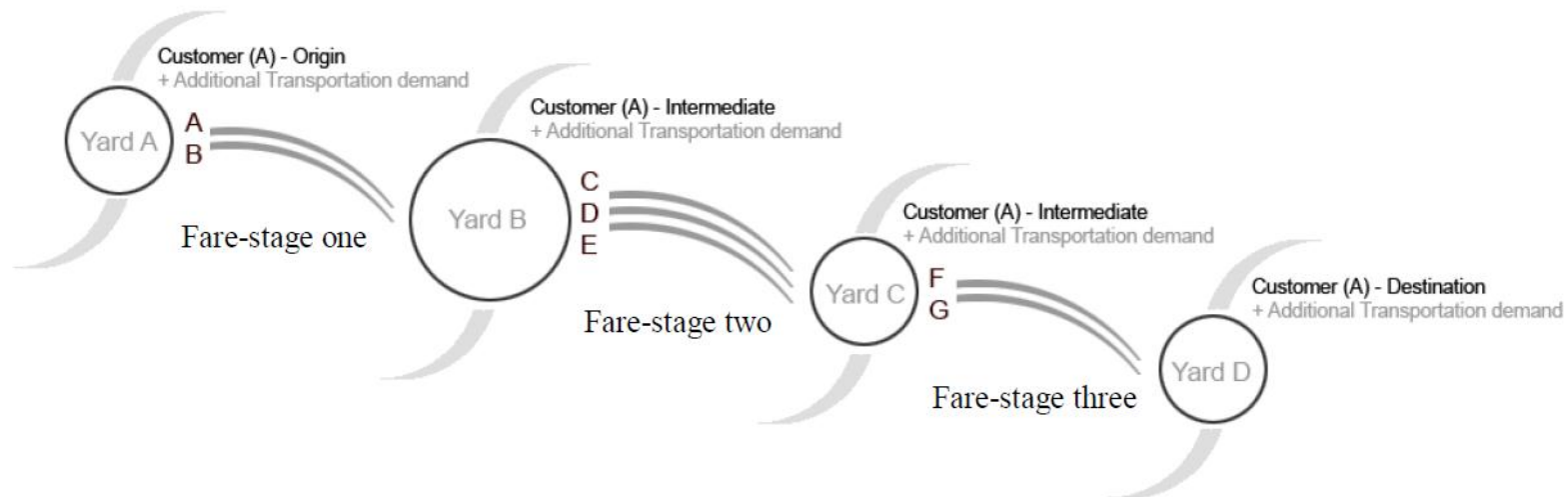
“ Approach

- . Develop two main scenarios based on transport demand from one large customer in the carload service segment
- . Adopt three key performance measures for evaluation
- . Perform simulations in co-operation with Green Cargo using MultiRail and real data

Simulation Study

“ Case description

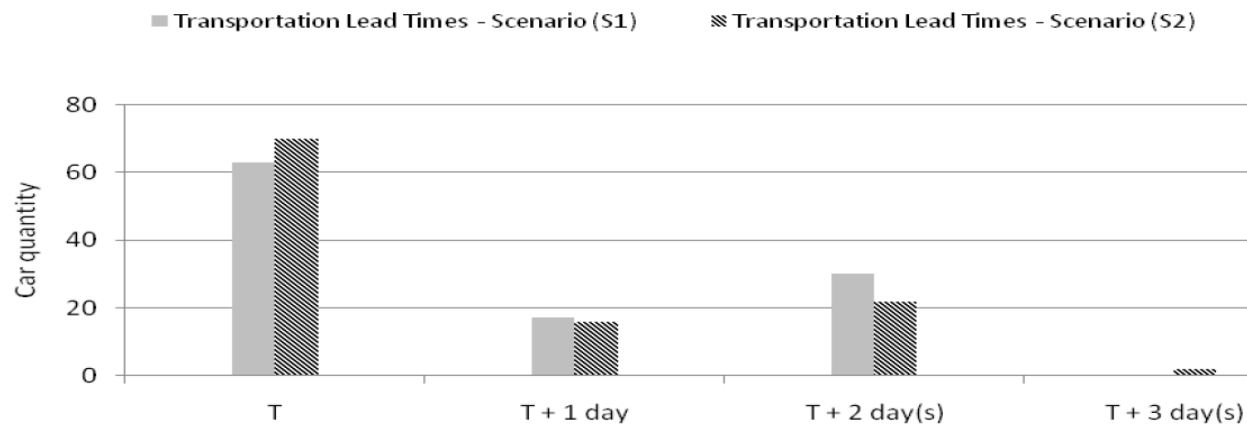
- . Transport relation consisting of four shunting yards, seven trains and 45 active customers



Simulation Study

“ Results

- . Minor reductions in train fill rate and shunting yard work load variability
- . Significantly improved transportation lead times



Simulation Study

“ Concluding remarks

- . Reduced variability in train fill rates and slightly increased capacity in single resources could enable resources elimination
- . Customers are provided shorter lead times than contractually agreed upon
- . Throughput on major shunting yards tend to make effects of single VVA-policy deployments negligible

Simulation Study

“ Concluding remarks

- . VVA-policy deployments could lead to improved planning capabilities considering transport demand of single customers
- . There is an improvement potential in how transport demand is currently assigned to resources (FBFS-booking principle)

Simulation Study

“ Future research

- . Explore on the possibilities of increased planning capabilities provided the advancement of booking information
- . Consider customer acceptance and suitable restriction levels for practical implementations
- . Assess the performance of the FBFS-principle compared to the use optimization algorithms while assigning transport demand to resources

Simulation Study

“ Future research

