Improving railway passengers experience, two perspectives: Travel time well saved and well spent

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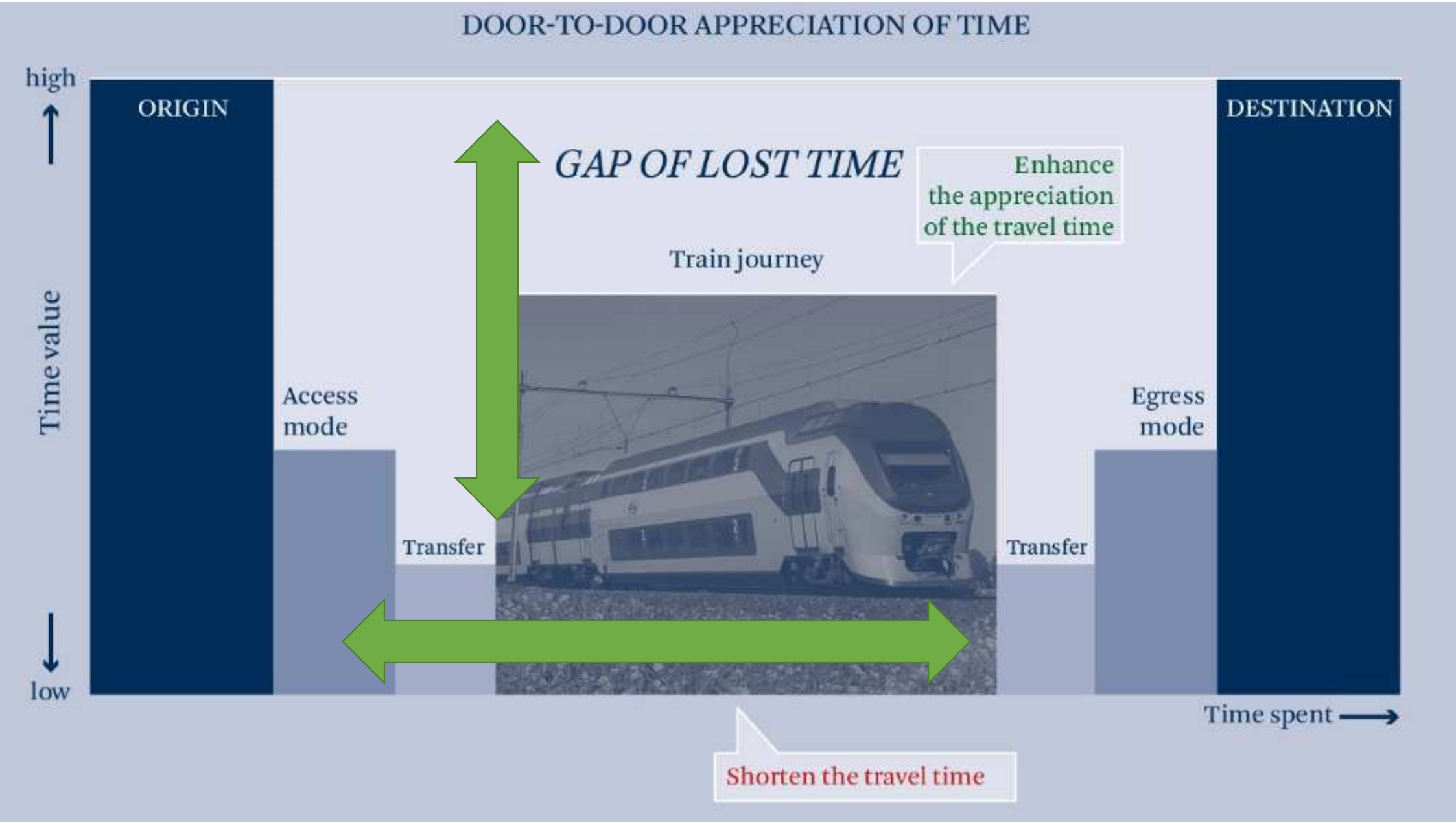
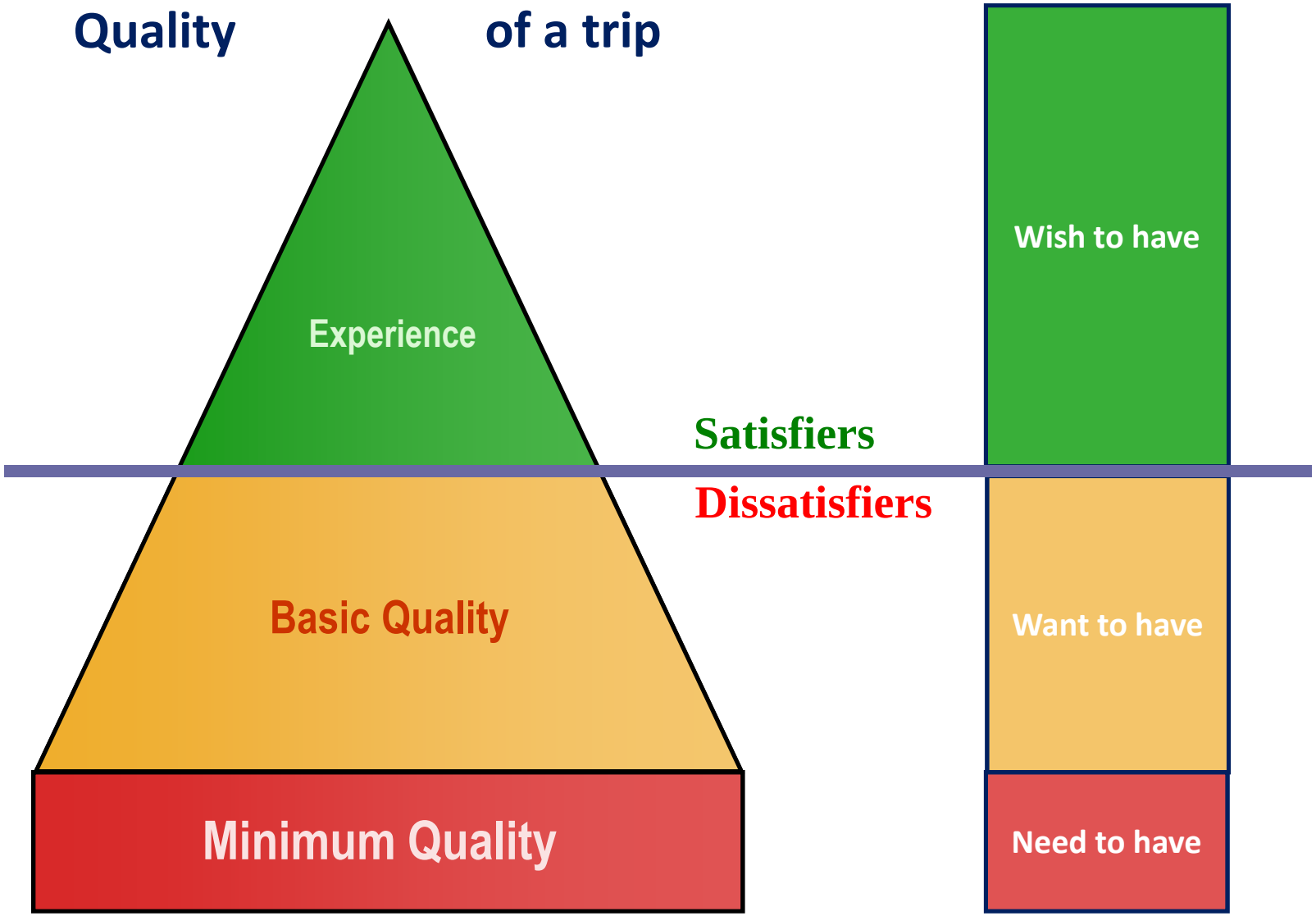

DOOR-TO-DOOR APPRECIATION OF TIME
high
low
Time value
ORIGIN
DESTINATION
GAP OF LOST TIME
Enhance
the appreciation
of the travel time
Train journey
Access
mode
Egress
mode
Transfer
Transfer
Time spent
Shorten the travel time

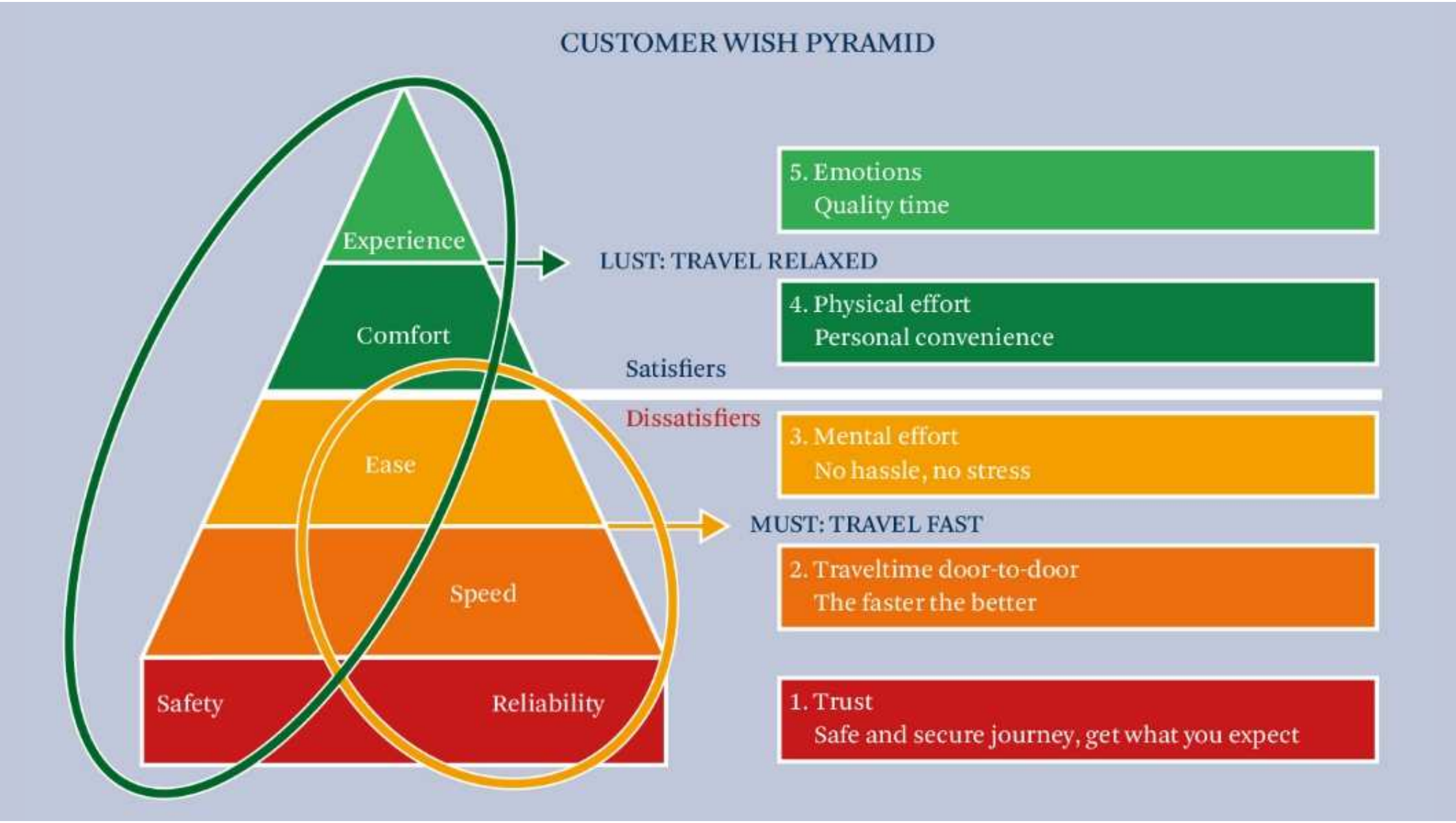

Quality
of a trip
Experience
Basic Quality
Minimum Quality
Satisfiers
Dissatisfiers
Wish to have
Want to have
Need to have

Author (Year)	Strategy*	Solution method (Control objective)	Evaluation	
			Perspective	Scope
Abkowitz & Lepofsky (1990)	HC (forward hw)	Rule-based (Regularity)	Passenger and operator	Single line
Eberlein, Wilson & Bernstein (2001)	HC	Opt.	Passenger and operator	Single line
Chandrasekar (2002)	SA (forward hw) + TSP	Rule-based (Regularity)	Passenger and operator	Single line
Zolfaghari, Azizi , & Jaber (2004)	HC	Opt.	Passenger	Single line
Furth & Muller (2007)	HC	Opt.	Passenger and operator	Single line
Nouveliere, et al. (2008)	SA	Opt (Fuel consumption)	Operator	Single line
Sun & Hickman (2008)	HC	Opt.	Passenger and operator	Single line
Daganzo C.F. (2009)	HC (forward hw) + SA	Rule-based (Regularity)	Passenger and operator	Single line
Daganzo & Pilachowski (2009)	HC (even hw) + SA + SS	Rule-based (Regularity)	Passenger, operator and driver	Single line
Delgado F., et al. (2009)	HC + BL	Opt.	Passenger	Single line
Pilachowski (2009)	SA (even hw)	Rule-based (Regularity)	Passenger and operator	Single line
van Oort, Wilson & van Nes (2010)	HC	Rule-based (Regularity)	Passenger	Single line
Xuan, Argote & Daganzo (2011)	HC (forward hw with virtual schedule)	Rule-based (Regularity + Punctuality)	Passenger and operator	Single line
Batholdi III & Eisenstein (2012)	HC (backward hw) + SA + SS	Rule-based (Regularity)	Passenger, operator and driver	Single line
Cats, et al. (2011, 2012)	HC (target & even hw)	Rule-based (Regularity)	Passenger and operator	Single line
Delgado F., et al. (2012)	HC + BL	Opt.	Passenger and operator	Single line
Ma, Xie & Han (2012)	HC + SA + TSP	Opt (Fuel consumption)	Passenger and operator	Two lines
van Oort, Boterman & van Nes (2012)	HC	Rule-based (Punctuality)	Passenger	Single line
Ampountolas & Kring (2015)	SA (forward hw)	Rule-based (Regularity)	Passenger and operator	Single line
Argote-Carbanero, et al. (2015)	HC (forward hw with virtual schedule)	Rule-based (Punctuality)	Passenger, operator and driver	Two lines
Hernandez, et al. (2015)	HC	Opt	Passenger and operator	Two lines
Teng & Jin (2015)	HC + SA + TSP	Opt	Passenger and operator	Single line
Liu & Ceder (2016)	HC + SA + SS	Opt	Passenger and operator	Two lines
Sanchez-Martinez et al (2016)	HC	Opt.	Passenger and operator	Single line
Present study	HC + SA	Rule-based (Regularity)	Passenger, operator and driver	Two lines

*) Note:

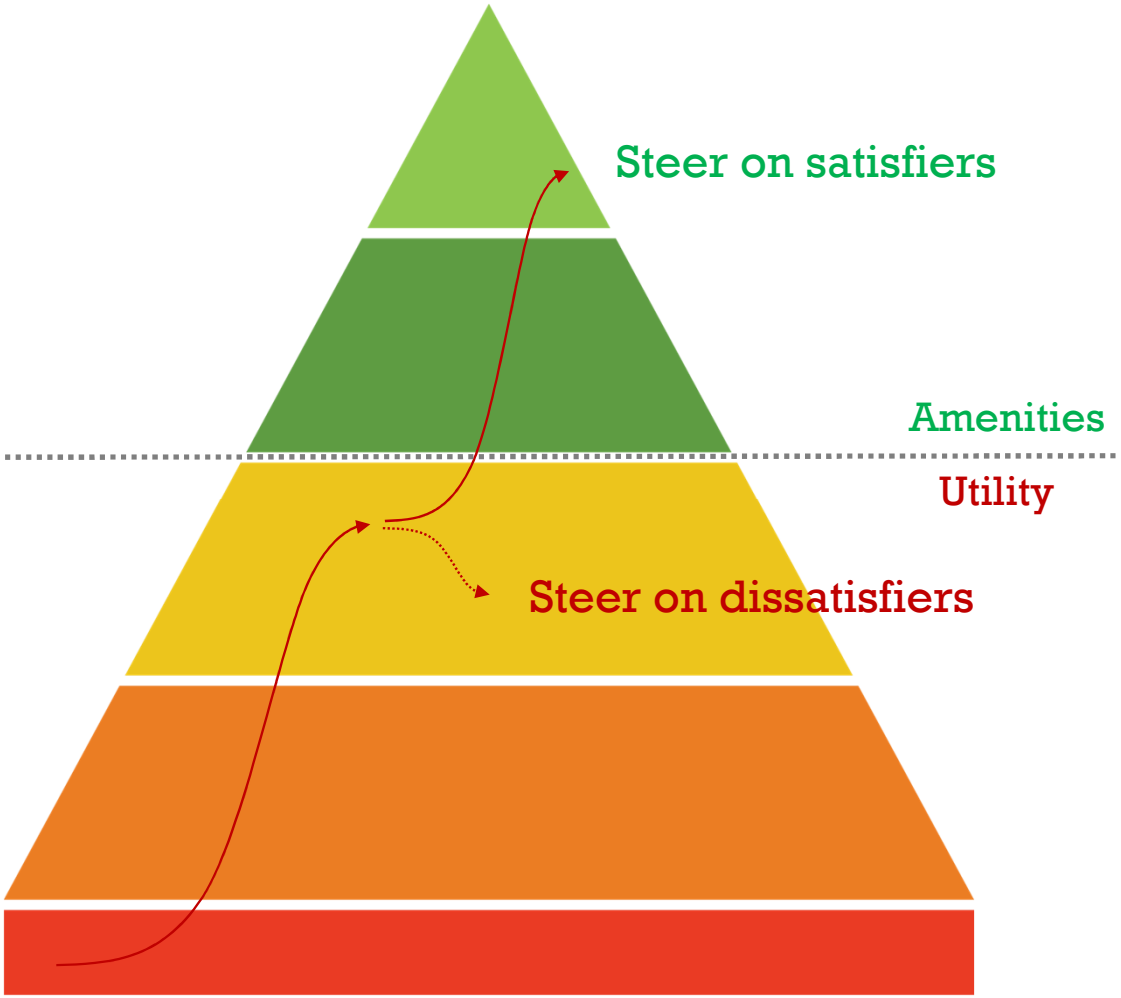
HC = Holding control SA = Speed adjustment SS = Stop-skipping

TSP = Transit Signal Priority BL = Boarding limit

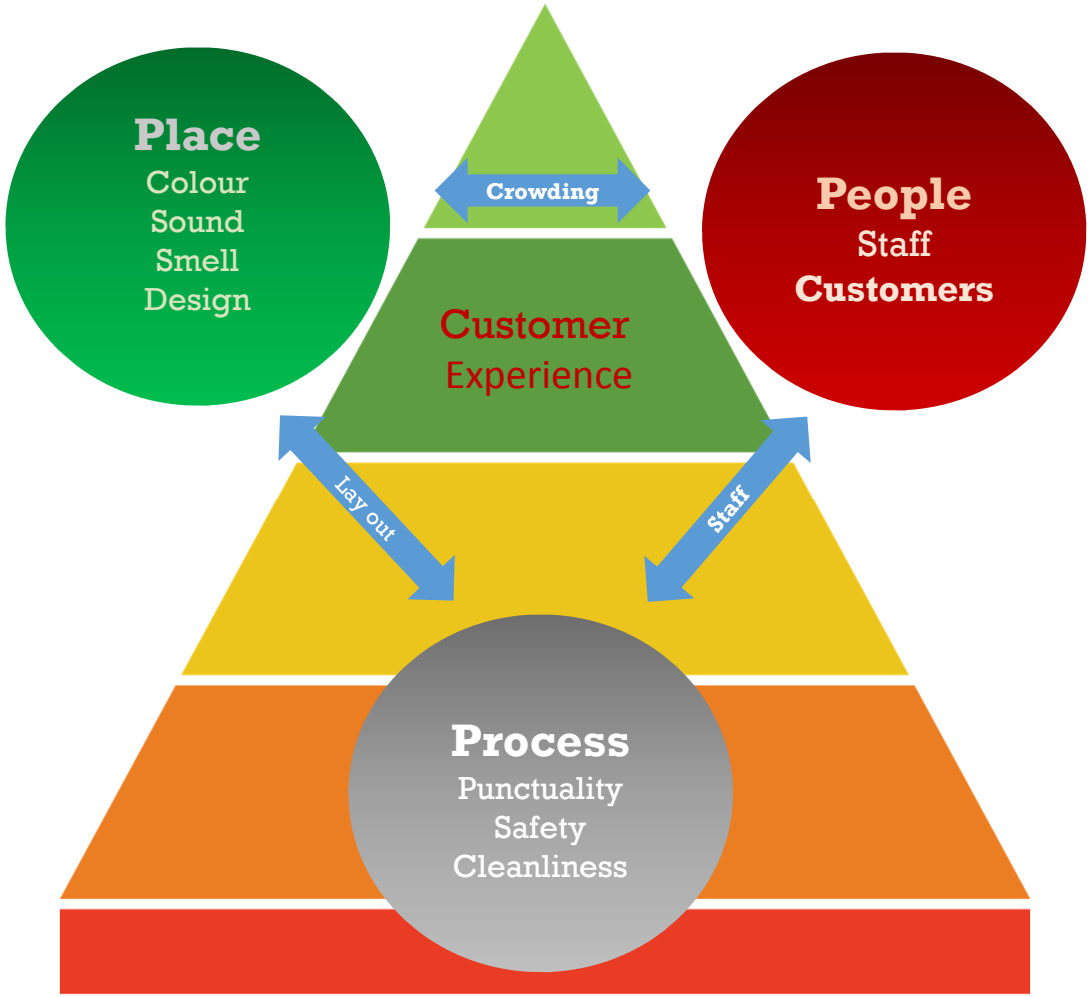

CUSTOMER WISH PYRAMID
Experience
Comfort
Ease
Speed
Safety
Reliability
5. Emotions
Quality time
LUST: TRAVEL RELAXED
4. Physical effort
Personal convenience
Satisfiers
Dissatisfiers
3. Mental effort
No hassle, no stress
MUST: TRAVEL FAST
2. Traveltime door-to-door
The faster the better
1. Trust
Safe and secure journey, get what you expect

Stimulus Organism Response Model

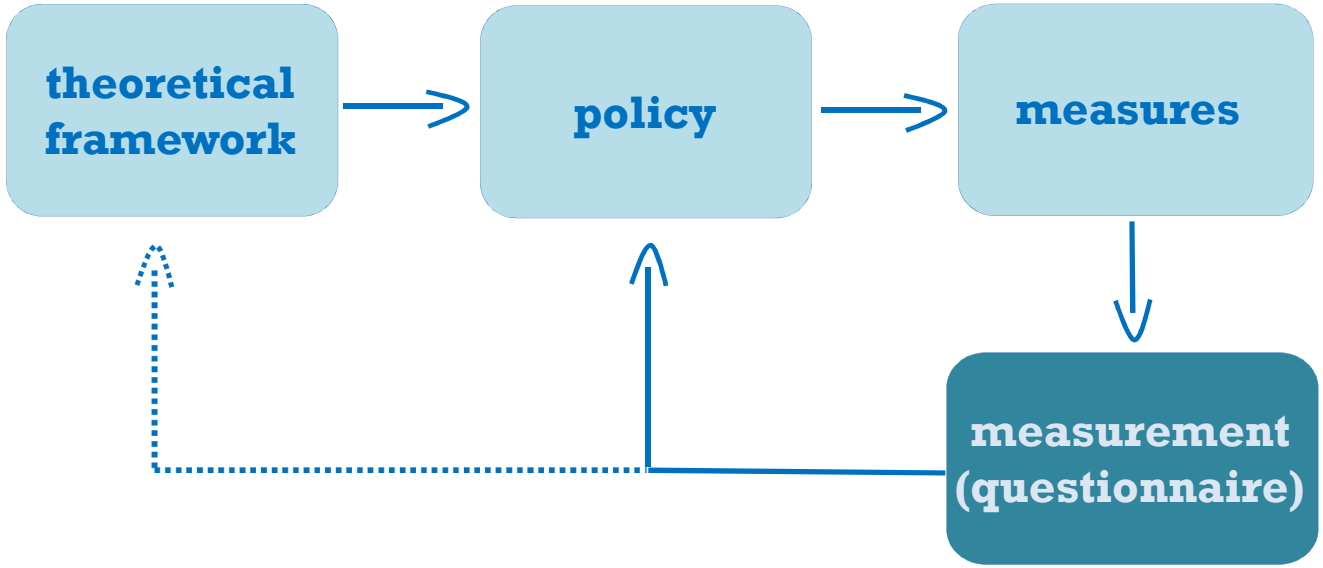
Steering on dissatisfiers ánd satisfiers



Three steering dimensions



Circle of enhancement quality train journey



Rotterdam Central Station

Old situation

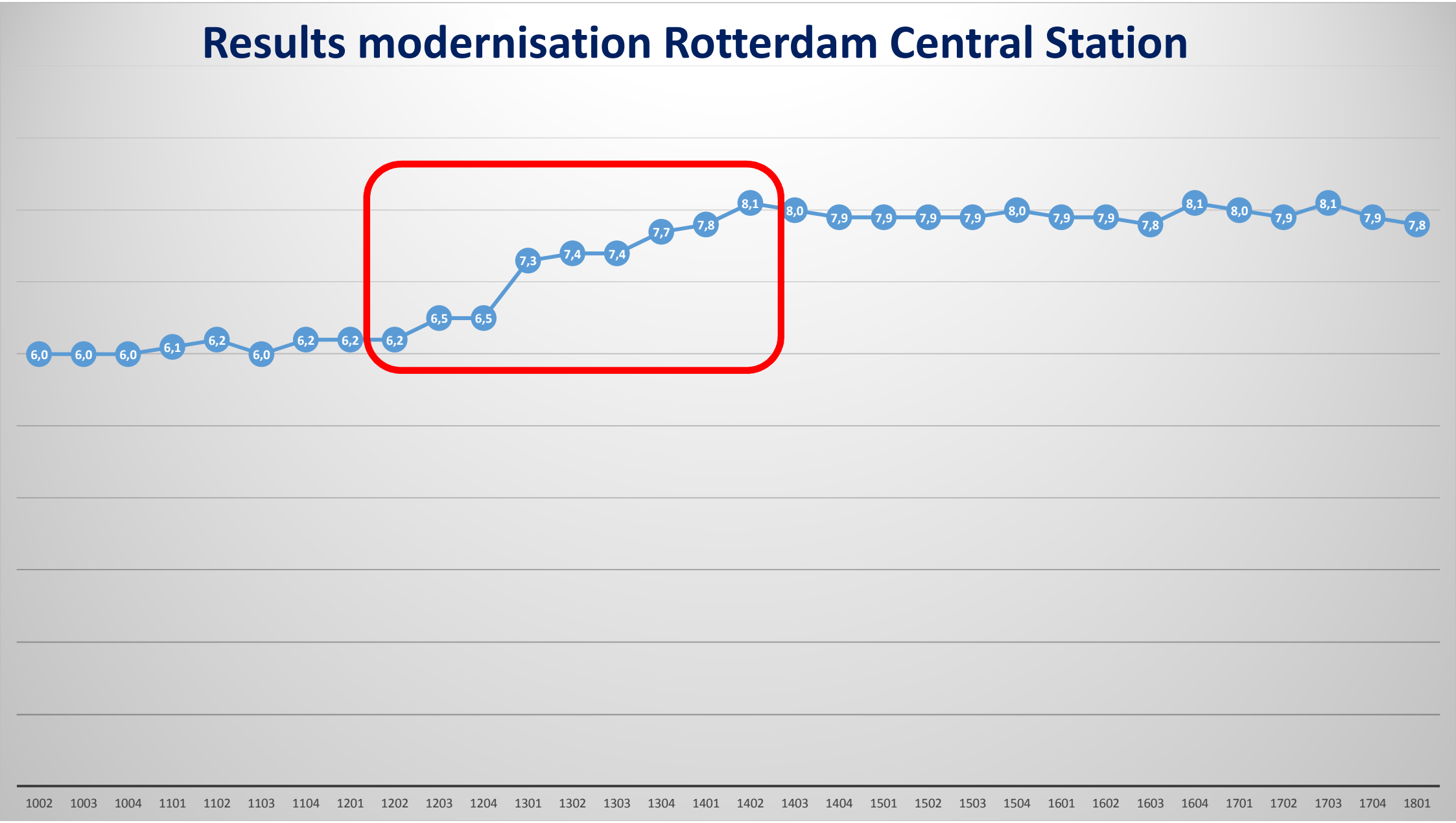
New situation

Rotterdam Central Station

Old situation

New situation

Results modernisation Rotterdam Central Station



Modernisation Dubbel Decker Train (VIRM1)

Old situation

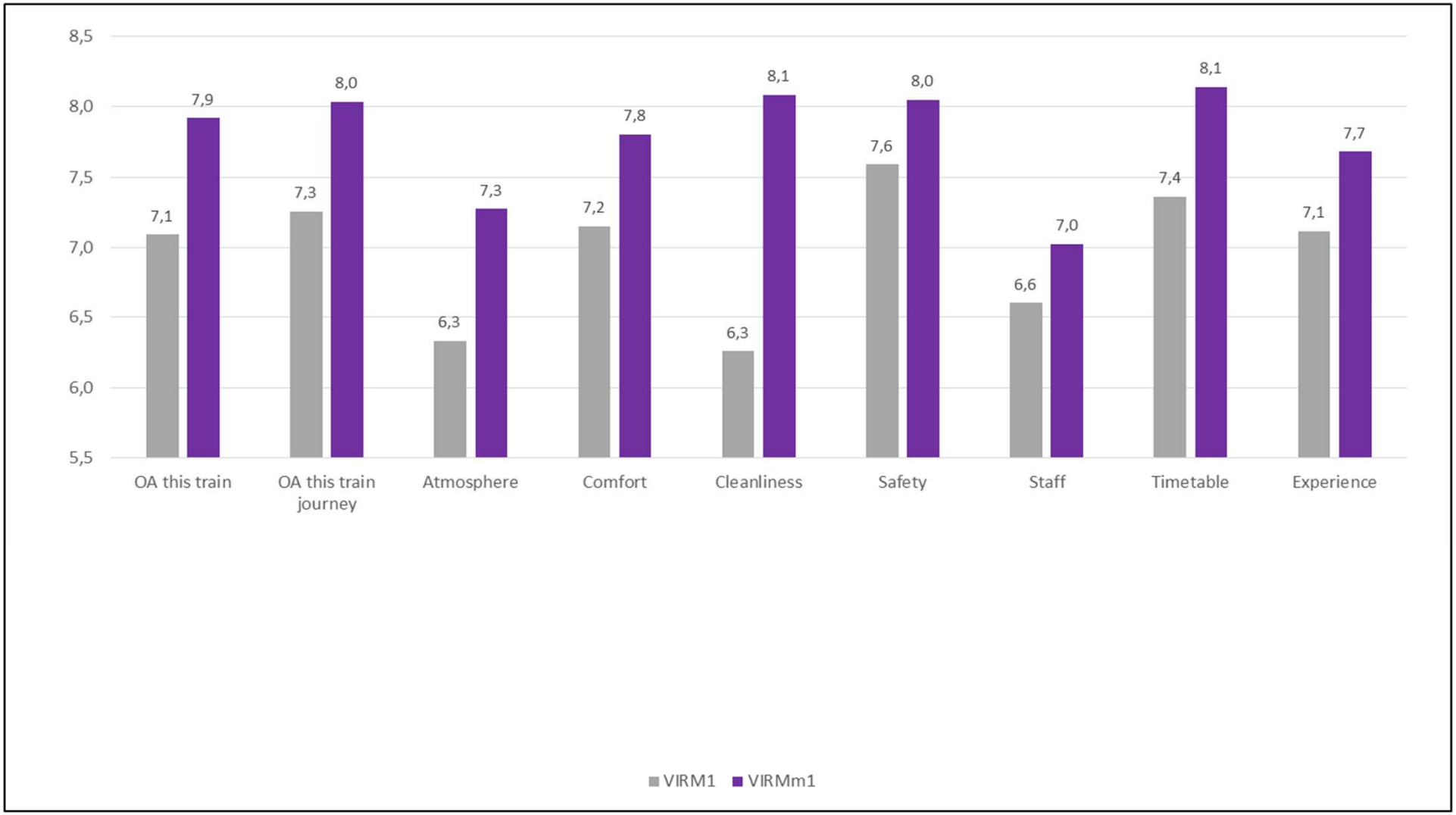
New situation

Modernisation Dubbel Decker Train (VIRM1)

New situation

New situation

Results modernisation Dubbel Decker Train (VIRM1)



Conclusions

- Two approaches to improve level of service; focus on dissatisfiers ánd satisfiers
- Both offer added value for passenger quality (each 50%)
- But when dissatisfiers are at an acceptable level, more attention has to be paid to satisfiers
- It depends on the context what the most (cost)efficient measure is
- **Travel time well saved and well spent**

Questions / Contact

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