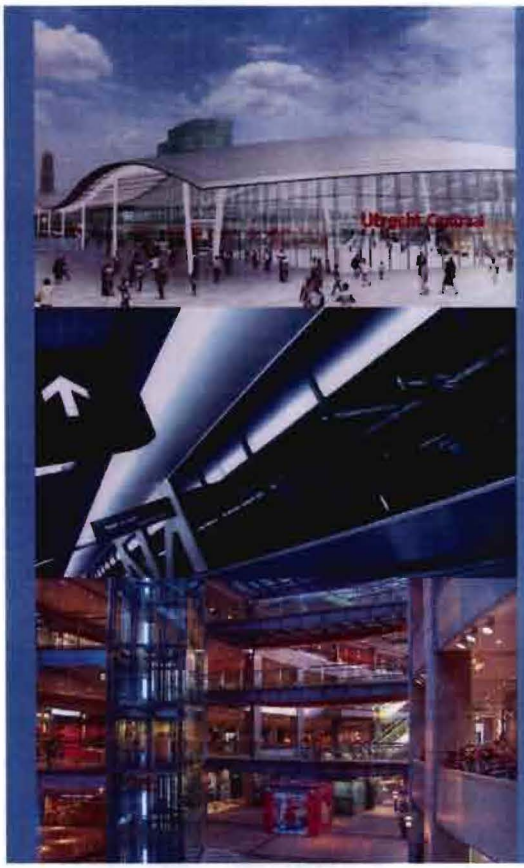
The shopping terminal

focus in customer design preferences

Cloosterman, T.P.J.

Award date:
2009



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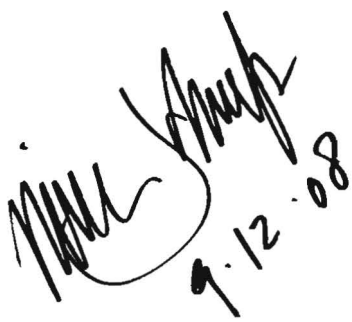
Appendices

TU/e

NPC

T.P.J. Cloosterman 2008



List of Figures

List of Tables

Appendix 1 | Customer desire pyramid

A customer has specific needs which it seeks to satisfy. Mark van Hagen developed the Customer Design Pyramid to explain the different whishes a customer has. In doing this, he defined five conditions which customers value. The order of importance of these conditions is illustrated in the 'customer desire pyramid' (figure 1). The pyramid is based on Maslow's theory of the hierarchy of needs (Maslow, 1954). The pyramid consists of six main elements. Like Maslow's theory, the conditions are preconditional: the lowest condition has to be met in order to focus on the condition above. Safety and reliability are the most basic conditions a railway company has to provide in order to provide the quality a passenger expects. The NS passenger also indicates in this model how important one values the specific condition.

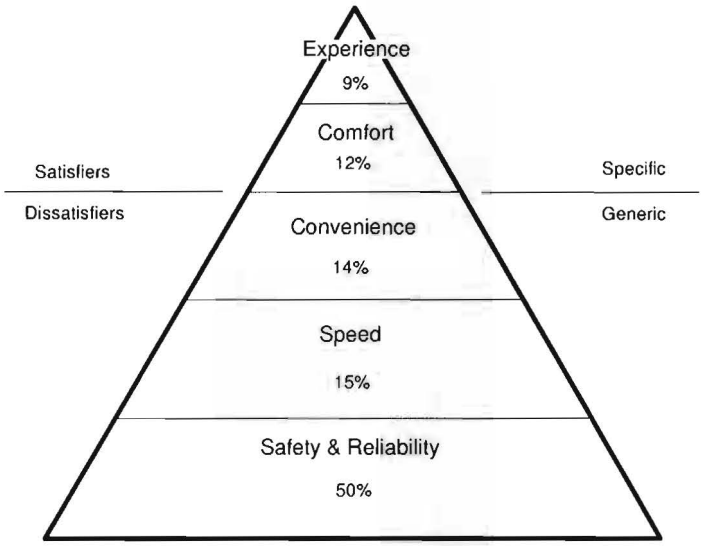


Figure 1 | Customer desire pyramid (Van Hagen, 2003).

The pyramid clearly demonstrates that NS passengers' desire and thus their perception on quality largely depends on safety and reliability: 50%. This percentage has been ascertained by asking passengers how they would divide an amount of €100 euro's on the different conditions. Overall, a train traveller will spend € 50 on safety and reliability, € 15 on speed, and so on. Together with speed and convenience, safety and reliability form the aspects that lead to disappointment when they are not present (to a certain extent): the dissatisfiers.

The dissatisfiers are preconditional in that they have to be present in order for convenience, comfort and experience to become relevant. Moreover, dissatisfiers are generic because they are not dependent on personal preferences as opposed to the specific satisfiers that depend on journey and customer's characteristics (Van 't Hof 2008). Coeterier (2000) clarifies the difference between dissatisfiers and satisfiers by explaining that dissatisfiers determine whether you go to an area whereas satisfiers determine whether you stay in that area.

Appendix 2 | Organizational chart NS

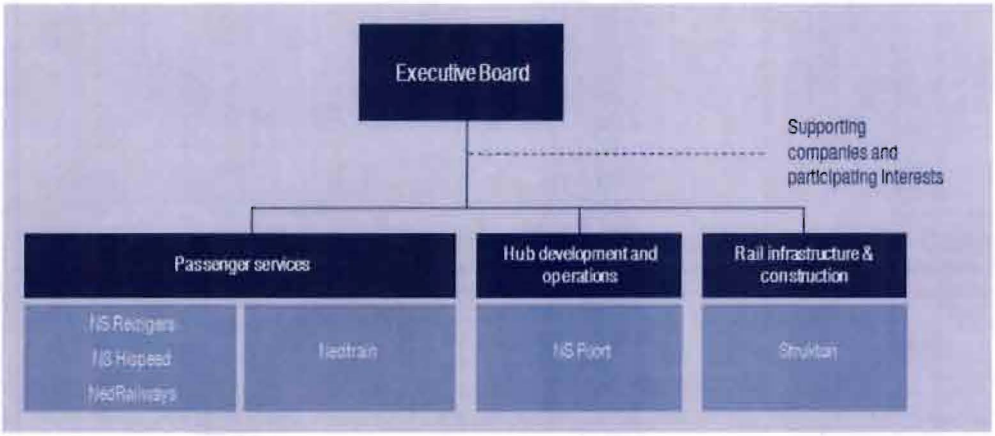


Figure 2 | Organisational chart NS Railway Group (NS 2007)

Appendix 3 | Organizational chart NS Poort

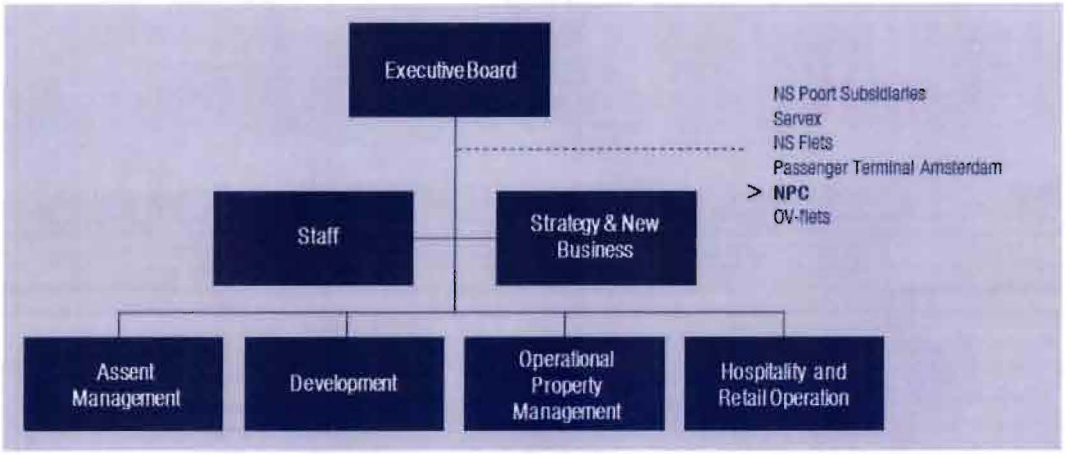


Figure 3 | Organisational chart NS Poort (www.nspoort.nl)

Appendix 4 | Facts and figures NS & NS Poort

Item	Fact
Aantal werknemers NS	25.000
Aantal werknemers NS	25.000
Aantal werknemers NS Poort (excl. dochters)	468
Aantal werknemers NS Poort (incl. dochters)	5000
Aantal in- en uitstappers gemiddeld per dag	2.200.000
Totaal aantal stallingsplaatsen voor fietsen	287.000
Aantal bewaakte stallingsplaatsen voor fietsen	178.000
Aantal bewaakte fietsenstallingen	86
Aantal fietskluizen op stations	18.000
Aantal bagagekluizen op stations	2.500
Aantal camera's op het station en in het stationsgebied	1.500
Aantal uren surveillance per jaar in het stationsgebied	183.000
Aantal liften in onderhoud op stations	186
Aantal roltrappen in onderhoud op stations	129
Aantal rookzones op stations	250
Aantal rookzuilen op stations	550
Aantal stations in onderhoud	384
Aantal euro's per jaar voor verwijderen grafitti	680.000
Aantal m2 grond in realisatie	120.000
Aantal werknemers NS	25.000
Aantal werknemers NS Poort (excl. dochters)	468
Aantal werknemers NS Poort (incl. dochters)	5000
Aantal in- en uitstappers gemiddeld per dag	2.200.000
Totaal aantal stallingsplaatsen voor fietsen	287.000
Aantal lopende nieuwe projecten	61
Totaal aantal m2 in de projectportefeuille	1.700.000
- m2 woningen	663000
- m2 kantoren	527000
- m2 parkeren	289000
- m2 retail	85000
- m2 scholen	51000
- m2 hotels	34000
- m2 divers	51000
Aantal horeca & retail formules	16
Aantal stations met horceca & retail	110
Aantal food-verkooppunten	320
Aantal warme dranken verkocht op stations per jaar	20.000.000

Table 1 | Facts & Figures NS, NS Poort (www.ns.nl)

Appendix 5 | Fast and slow area's at railway stations

According to research by van Hagen and Peek (2001) on customer experience railway stations can be divided into two different areas, a 'fast-area' and a 'slow' area.

- **The fast area |** The fast area is transfer related and is the area at a OV-terminal were travelers transfer from different transport modalities. Services related to the transfer function, pedestrian walking routes, tunnels and traverses, the main terminal hall and the railway platforms are related to this area. This area requires passengers to constantly make travel related decisions. According to NS research (2003), the passengers find itself in a stress mode: the passenger needs little external impulses (like retail), it solely wants to know how its destination can be reached. A logical way finding is essential in this area.

- **Slow area |** After taking all the necessary decisions in the fast area's (routing, planning, buying tickets) a passenger has time to think about spending its time on the railway station. The focus is now less travel related and more open experience related factors of the OV-terminal, like terminal ambience. The traveler switches from 'stress-mode' to a more ' relaxed-mode' (NS 2003). Here a more commercial program is available to spend time.

Many interfaces between fast and slow areas exist (Peek 2003):

- The Fast-area can be an attraction for slow functions: an attractive spectacle. A good example from another industry is the flight deck of an airport. Terminal users watch the fast area (boarding areas) form a calm relaxed coffee bar: a slow area.
- Some spaces can have an slow and fast character (e.g. meeting point)
- Slow areas near fast areas can give a feeling of social security. Retail shops with late opening hours can give passengers a different safety perception. Although the passenger, is not interested in retail, it enhances its quality perception of the OV-terminal.

Appendix 6 | Functional domains

Railway stations have several areas which serve different functions. The NS developed a design vision ("Inrichtingsvisie stations" NS 2003), in which medium/large railway stations have three basic domains:

- **The Entrance Domain** | This domain is the first domain a potential railway passenger will experience. This domain consists of three basic activities. Orientating on the location of the trains, services or shopping areas (1). Acquiring information about the railway services (2) and last, navigating: defining the most effective route to the target. (3) This domain had a dominant logistical function.
- **The Lodging Domain** | This domain has a primary task to make the staying of the railway passenger on the railway station more pleasant. The Lodging domain gives the time spend on railway stations a useful function. This area can be indicated as the main commercial space of the railway station with retail, banking facilities and (social) meeting places.
- **The Travel Domain** | The third domain focuses itself on the facilitating of comfortable and efficient transport to and from the train and the short waiting function. The provision of information, sheltering and last minute commerce are key in this domain.

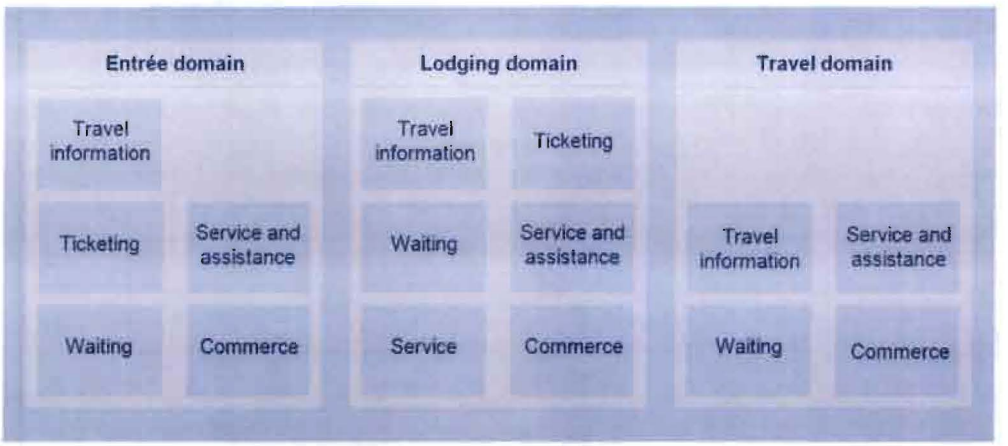


Figure 4 | Functional domains (NS 2003)

Appendix 7 | RIT 95 Privatisation

Due to European Union Regulations (EG-rule 91-440) a segregation between rail-infrasture and railway operators was claimed. The main reason for this thorough change in the railway industry was issued to allow more competition on the railway tracks and thus force the bureaucratic monopolized national railway operators to work more efficient and customer focused. The Dutch government formulated a new structure for rail transport infrastructure and operations. In this new structure, the responsibility of the public infrastructure remained a governmental issue: the state financed all the primary infrastructure. The state also has to create an environment (secondary infrastructure) where rail operators can perform their task in a sufficient manner. The general agreements between the NS and the Dutch government are briefly stated below: (NS 2002, Hoedjes 2006):

- The Dutch government remains ownership of the primary infrastructure and the ground underneath it.
- All other surfaces (secondary infrastructure plus rest) remains property of the NS
- The Dutch Government contributes to the (re) development of railway stations. It will contribute the essential funds, needed to operate a basic railway station: "het basisstation" (basic railway station facility).
- The NS receives ownership of the Dutch railway station and manages and operates them.
- The NS cannot close or open an railway station without the permission of the Dutch state.
- The NS provides passenger transportation on the Dutch main railway network. The NS have received a concession till 2015.

Appendix 8 | NS Passenger profiles

NS defined six passenger profiles future rail terminals will have to cope with. The can be described as follows: (NS 2006-2)

1. **Functionality:** This passenger values speed, efficiency and control. He wants to feel organized, tranquil, confident and wants above all to approach activities purposeful. This passenger type is persistent and business like. Time is a valuable asset.

2. **Safety:** This type of passenger values safety protection and certainty. A clear and safe journey is essential and personal care is greatly valued.

3. **Convenience:** This passenger wants to travel without worrying to much. Convenience and relaxing moments are assets he values. In the extra time, available at railway stations he will search for leisure activities.

4. **Social interaction:** This passenger views travelling as a social activity. Places were social interchange can happen are valued and leisure activities with other people are preferred.

5. **Quality of life:** This type of passenger wants to be inspired and challenged. Distraction is valued and is this passenger always in search of new things, hoping to be surprised.

6. **Individuality:** This passenger does not want to be treated as a number. Personal space is valued and he wants to spend time in a quiet comfortable space. Exclusivity and comfort are central.

Appendix 9 | Data collection transfer and shopper verifiers

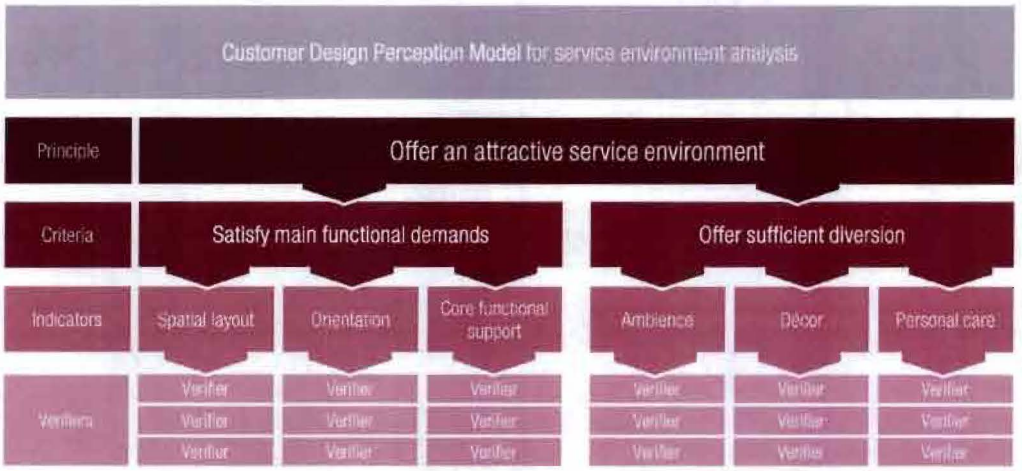


Figure 5 | CP-model

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Verifiers	
Customer information supply	Verifiers	
Core functional support	Verifiers	
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Verifiers	
Décor	Verifiers	
Personal care	Verifiers	
Source		

Figure 6 | CP-analysis tool

Airport literature

Study 1 | Seneviratne & Martel (1991) (derived from Heathington & jones,1975)

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Circulation Space Level changes	Walking distance Available space for movement The need to use stairways, escalators etc.
Customer information supply	Visual information Sound	Comprehensibility Visibility of locations of signs Visual update flight information Auditive information
Core functional support	Processing time	Sufficient facilities for processing
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Lighting Maintenance	Tranquil Cleanliness
Décor	Design	Furniture
Personal care	Seating Concessions	Number of seats available Ease of access to concessions Number of concessions
Source | Seneviratne & Martel (1991)		

Study 2 | Lemer (1992) | a performance view

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Compactness Availability of space Spatial logic Circulation	Curb to gate distance Curb to gate time Crowding Available m2 per person Sightlines Mental map Level changes
Customer information supply	Signing	Visibility
Core functional support	Waiting time Baggage facilities	Service time Service time and capacity
Offer sufficient diversion		

Indicator	Verifier	Description
Ambience	Sound	Sound levels Clarity of message Background noise
Décor	Architecture	Visual character
Personal care	Choice of things to do	Availability of concessions Service level variation Availability social contact

Source I Lemer (1992)

Study 3 I Rhoades, Waguespack and Young 2000, Competition elements

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Circulation	Internal transport
Customer information supply	Visual Display systems	Availability of sufficient information display systems
Core functional support	Baggage facilities	Availability of facilities
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	-	-
Décor	-	-
Personal care	Business services Restrooms Concessions	Car rental services Sufficient availability of clean rest rooms Duty free shops Variety of retail services (regular and specialty) Choice in food and beverage facilities

Source I Rhoades, Waguespack and Young 2000

Study 4 I Barros et al. 2007 I the transferring passenger ('transfers') at airports

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Circulation	Walking distance
Customer information supply	Wayfinding Information Display System Sound	Quality of guidance Quality of signage Quality of directions Quality of flight information displays Quality of Auditive information

Core functional support	Ticketing	Boarding counters
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	-	-
Décor	-	-
Personal care	Seating Office service Rest Rooms Concession	Availability of seating Rental car services Availability of drinking water Cleanliness Quality and variety
Source I Barros, Somasundraraswaran & Wirasinghe (2007)		

Study 5 I Correia et al. 2007 I An integral approach to Level of Service

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Compactness Space Circulation	Travel time Available space per m2 Number of level changes
Customer information supply	Wayfinding Information Display Systems PA system	Signing objects Correct flight information Quality of Public announcements
Core functional support	Waiting time	Processing time
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Security	Provide a secure environment
Décor	Design	Attractiveness
Personal care	Availability of seats Concessions	Numbers of seats Variety of retail facilities
Source I Correia et al. 2007		

Study 6 I Fodness and Murray 2007 I Passengers' expectations of airport service quality

Satisfy main functional demands		
Indicator	Verifier	Description

Spatial Layout	Circulation Spatial logic Availability of space	Fast interchange Boarding capacity Logic airport layout Prevention of crowding
Customer information supply	Signs and symbols	Clear external signs Sufficient visible signs throughout an airport
Core functional support	Baggage facilities Counter facilities	Processing capacity Process time
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Maintenance Sound Air quality	Cleanliness Availability of quiet areas No contamination, odour, temperature.
Décor	Culture Design Image	Presence of local culture of the city at which it is located Display of art Airport should have a current decor
Personal care	Office/study functions Availability of seats Concessions	Availability of conference facilities Presence of business centres Provision of comfortable seating Availability of quiet areas Nationally-known retail outlets present at airports National chain restaurants should be available at airports Local cuisine should be available at airports Availability of specialty retail stores
Source I Fodness and Murray 2007		

Shopping centre literature

Study 1 | Van der Plas 1988

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Circulation Spatial logic	Short, efficient and comfortable Clear spatial design
Customer information supply	Wayfinding	Clear comprehensive wayfinding
Core functional support	-	-
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Sight Air Background sound Security environment	Functional light Air humidity, speed of wind, temperature Sound level, reverberation Safety and sheltering
Décor	Architecture Flooring	Use of materials Safe and image-building
Personal care	Seating Privacy	Comfortable seating Level of interaction possibilities
Source | Van der Plas 1988		

Study 2 | McGoldrick 1992

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Circulation Availability of space Spatial logic	Access to environment Spaciousness Level of crowing Simple general layout
Customer information supply	-	-
Core functional support	Store characteristics	Quality of stores Variety of stores Choice of mega stores
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Sight Maintenance	Quality of lighting Cleanliness

	Air Quality Security environment	Air conditioning Standard of security measurements
Décor	Architecture	General impression
Personal care	Rest rooms Concessions Seating	Toilet facilities Child facilities Baby care Availability of food and beverages Availability of seats

Source | McGoldrick 1992

Study 3 | Bell 1999

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	-	-
Customer information supply	Wayfinding Signing	Easiness to find my way around Shop signs are attractive Signs are cluttered
Core functional support	Quality of brands	Quality of shops Well known brands

Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	-	-
Décor	Architecture	Colour of shops are appealing Shopping area is pleasing to look at
Personal care	Concessions	Available choice of concessions

Source | Bell 1999

Study 4 | Turley & Milliman 2000

Satisfy main functional demands		
Indicator	Verifier	Description
Spatial Layout	Circulation Availability of space Spatial logic	Traffic flow Size of buildings, dead areas Entrances
Customer information supply	Wayfinding IDS Auditive information	Exterior signs Exterior display systems Quality PA system
Core functional support	Verifiers	

Offer sufficient diversion		
Indicator	**Verifier**	**Description**
Ambience	Sight	Height of building Colours in building Lighting
	Maintenance	Cleanliness
	Air quality	Odour Temperature
	Background sound	Music
Décor	Architecture	Architectural style
	Art	Availability of artworks
	Flooring	Quality of floors
Personal care	Seating	Waiting areas

Source | Turley & Milliman 2000

Study 5 | Ng 2003

Satisfy main functional demands		
Indicator	**Verifier**	**Description**
Spatial Layout	Circulation	Freedom of traffic
	Availability of space	Crowding Open spaces
	Level changes	Multi level atriums
	Spatial logic	Mental image Layout of the setting
Customer information supply	Wayfinding	Legibility Availability of landmarks
	IDS	Universal pictograms
	Auditive information	Quality of PA system and acoustics
Core functional support	Choice	Tenant mix
	Security environment	Video cameras, alarm systems

Offer sufficient diversion		
Indicator	**Verifier**	**Description**
Ambience	Sight	Visual accessibility
	Air	Odour Comfortable constant temperature
	Background sound	Ambient noise Music
Décor	Architecture	Colour Not standard
	Art	Useful for wayfinding
	Outdoor elements	Water, plants, greenery

Personal care	Rest rooms Concessions Seating Interaction	Well maintained rest area in common areas Availability of food and beverage facilities / food courts Comfortable seating Public benches

Source I Ng 2003

Study 6 I Dirks & Janssen 2003

Satisfy main functional demands		
Indicator	**Verifier**	**Description**
Spatial Layout	Circulation Availability of space Level changes Spatial logic Adaptability	Accessibility Privacy /crowding Ease of movement Overview Change of formulas
Customer information supply	Wayfinding IDS	Knowledge of place and routing Acquisition of information
Core functional support	Security environment	Feeling of (social) safety
Offer sufficient diversion		
Indicator	**Verifier**	**Description**
Ambience	Sight Background sound Air quality	Lighting Sound Reverberation time Low wind speeds Constant temperature
Décor	Architecture Art	Architectural 'sphere' and ambience Point of reference
Personal care	Privacy for interaction	Need to communicate Need to meet people Personal space

Source I Dirks & Janssen 2003

Study 7 I Verbunt 2005

Satisfy main functional demands		
Indicator	**Verifier**	**Description**
Spatial Layout	Circulation Availability of space Level changes	Clear entrance Clear routing Absence of crowding Compactness Broad walking areas Accessible level changes Sightlines

	Spatial Logic	Humans size
Customer information supply	Wayfinding IDS	Internal wayfinding signs Recognisable points of reference Information desk
Core functional support	Quality of brands Security environment	Recognisability Anchor stores Variety and quality Diversity Organisational capacity
Offer sufficient diversion		
Indicator	Verifier	Description
Ambience	Sight Air Maintenance	Quality of lighting Quality of lighting Cleanliness State of maintenance
Décor	Architecture Art	Design of architecture Investing in decoration
Personal care	Rest rooms Concessions Seating	Availability of restrooms Child activities Availability food courts Places to rest
Source I Verbunt 2005		

Appendix 10 I Screenshots of survey steps

Step 1

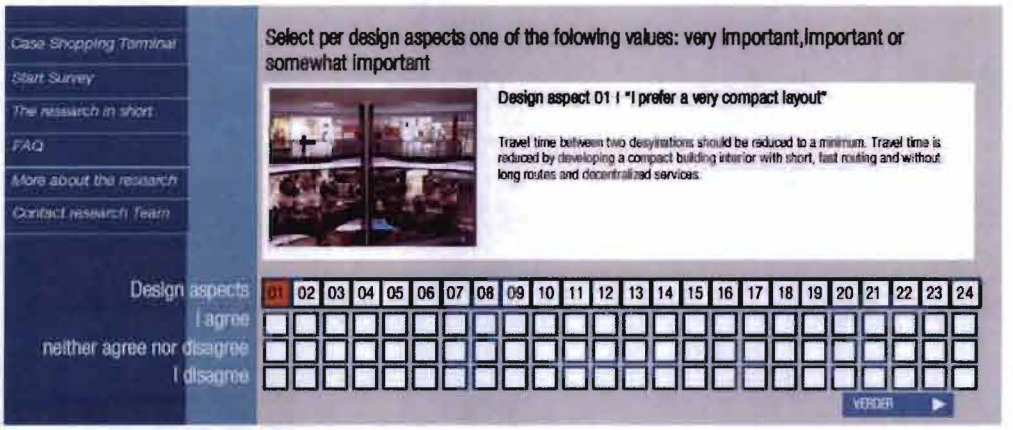


Figure 7 I Screenshot step 1

Step 2

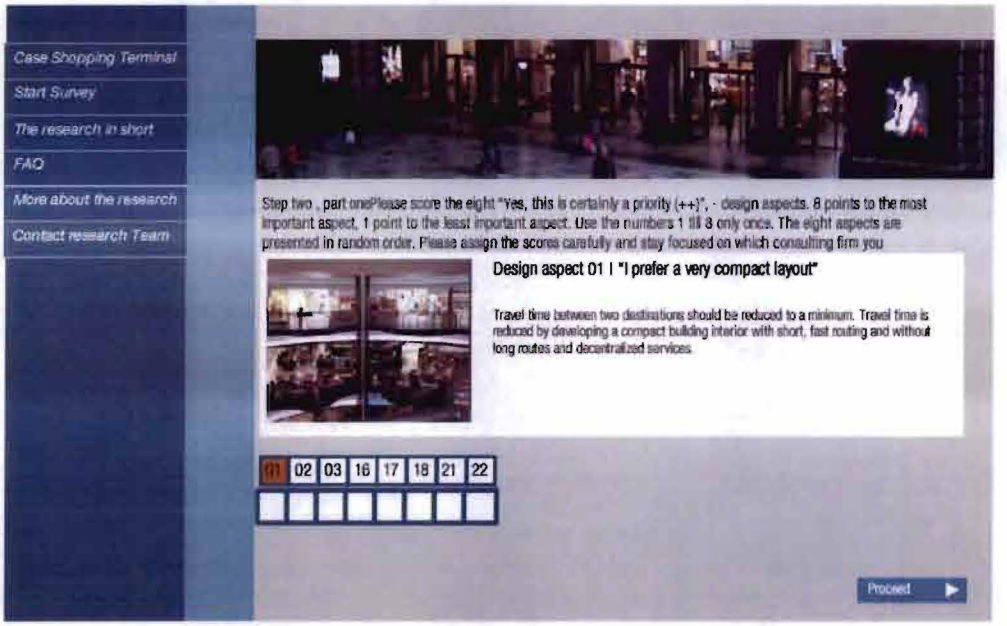


Figure 8 I Screenshot step 2

Appendix 11| Impression site

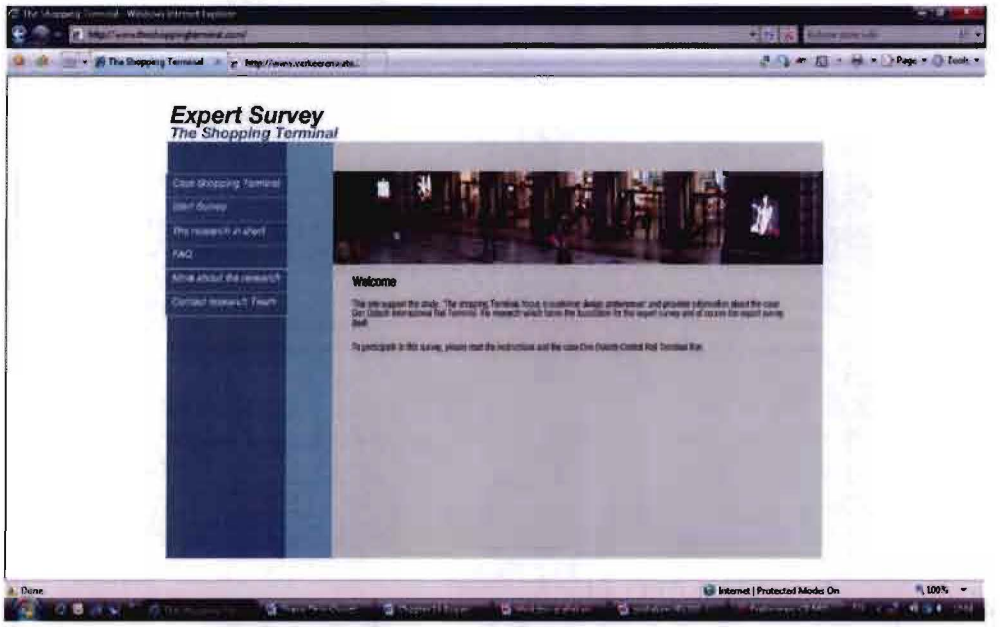


Figure 9 | Screenshot Welcome

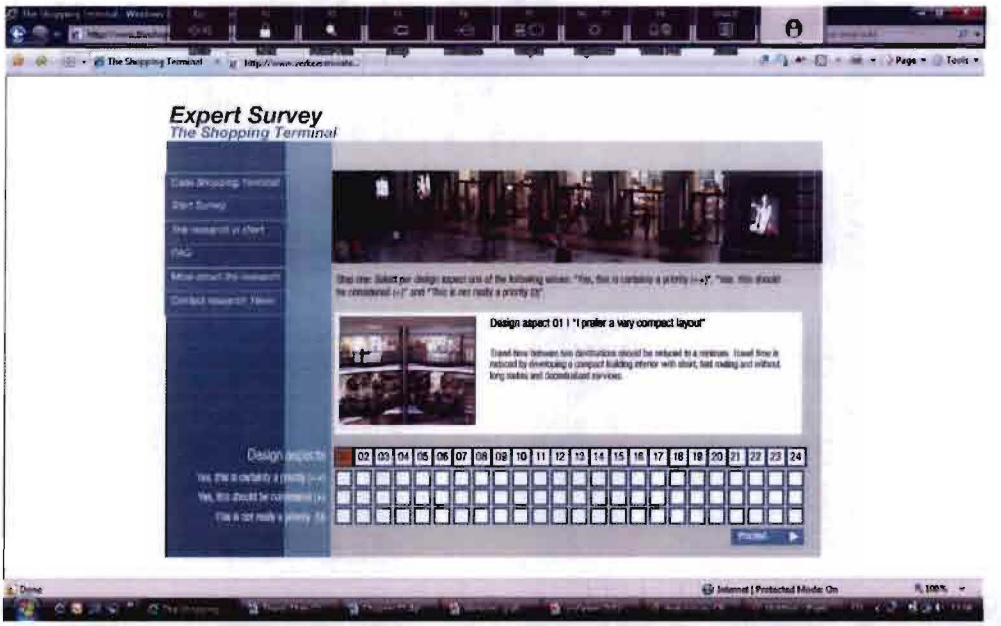


Figure 10 | Screenshot The Survey

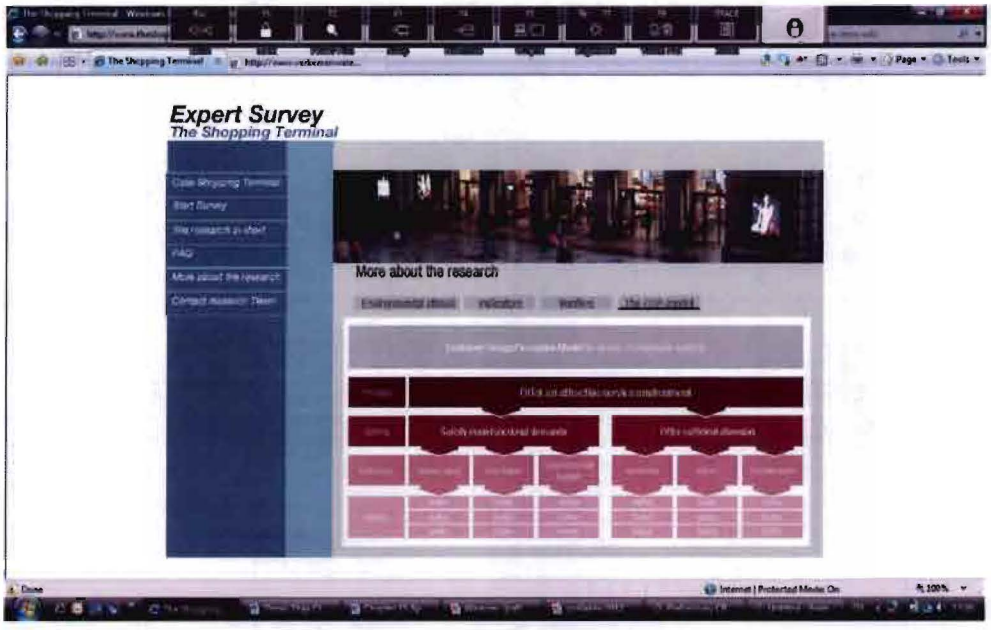


Figure 11 | Screenshot About the research: CP Model

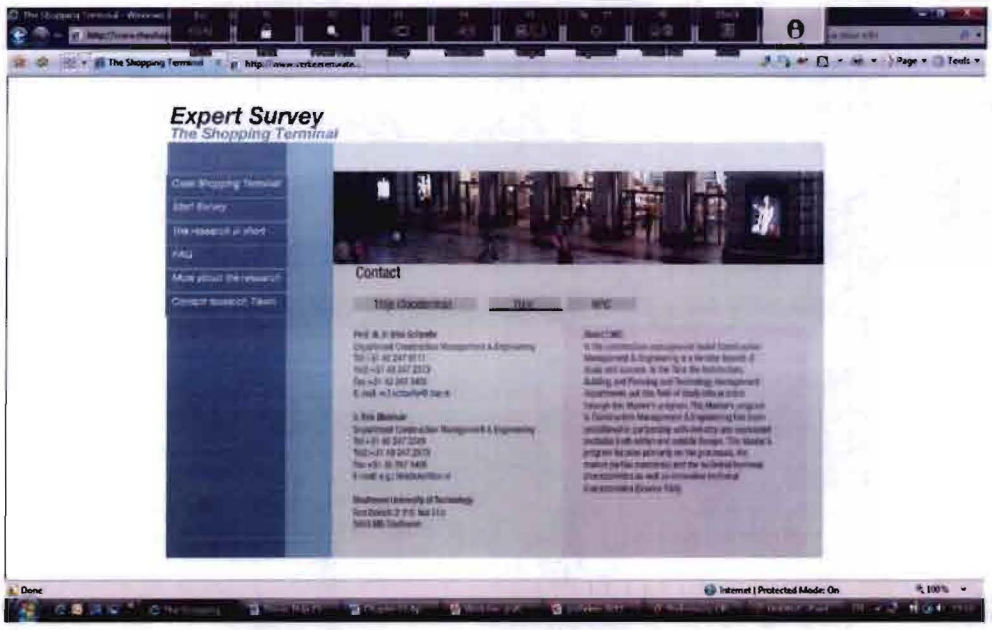


Figure 12 | Screenshot Contact research team: TU/e address and description of Construction Management & Engineering

Appendix 12 | Participants TCG Expert Survey

Company	Representation
Bureau Spoorbouwmeester	Ms. Nathalie de Vries
	Ms. Evelien de Munck Mortier
European Passengers Federation	Mr. Josef Schneider
NACO I Nethelands Airport Consultants	Mr. Piet Ringersma
	Mr. Rico Liebrechts
Schiphol I Aviation	Ms. Judy Berkhout
	Mr. Peter Posthumus
Prorail	Mr. Peter Krumm
	Mr. Michiel Duijker
	Mr. Hans van Gelderen
	Ms. Jorien Maltha
Ministerie van V & W	Mr. Henk Meeldijk
NSC	Mr. Gerd Korpershoek
PRC Bouwcentrum	Mr. Bert van Eekelen
NS Poort	Mr. Alex de Ruiter
Provincie Noord Brabant	Mr. Etiene Wieme
NPC	Mr. Michael Zaalberg
	Mr. Melchior Verboeket
	Mr. Wout Ritzema
	Mr. Wout van der Heijden
	Ms. Petra Grandiek
	Mr. Dirk Wijffels
	Mr. Marcel van Beveren
	Mr. Peter Korpershoek
	Mr. Jan Willem Bouwman
	Mr. Lee Verhoef

Table 2 | Transfer participants

Appendix 13 | Participants RetRail Expert Survey

Company	Representation
Redevco	Mr. Rowan Verwoerd
	Mr. Oedsen Boersma
ING Real Estate	Mr. Martijn Vlasveld
Fortis Vastgoed	Mr. Bram Loggers
Rodamco	Mr. Harry de Kroon
Corio	Mr. Lysander van der Sluis
	Mr. Bas Buvelot
Westfield London	Mr. Chris Savva
BRO	Mr. Felix Wigman
	Mr. Jan Carel Jansen Venneboer
	Mr. Tommy Walvius
NS Poort	Ms. Irma Luitse-Wunkenius
	Ms. Ellen Boersma
	Mr. Aerde Jepma
	Mr. Alex de Ruiter
	Mr. Mark van Hagen
	Ms. Martine van der Voort
	Mr. Peter van der Heijden
NPC	Mr. Arjan Hagedoorn
	Mr. Kaj Mook
	Mr. Henk Frankema
	Ms. Saskia Molhuizen
	Mr. Leo van Leeuwen
	Mr. Ralph Luijt
	Ms. Saskia Bosman
	Mr. Rogier Marien
DB Station & Service AG	Ms. Iris Ludwig
WH Smith	Mr. Fin Casey
Schiphol I Consumers	Ms. Maryan Brouwer
	Ms. Lot Frijling
Heijmans Commercieel Vastgoed	Mr. Laurens Maaijwee
	Mr. Renier Janssen
	Mr. Joost Augusson
HEMA	Mr. Bas van der Kwaak
LMBS	Ms. Esther Schmidt
Strabo	Mr. Jeroen van der Weerd
Tenstone	Mr. Jasper van der Weerd
Q-Park	
Intermarqeting	
NRW	

Table 3 | Retail participants

Appendix 14 | Survey results

Group A

Group A		ITEM																						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ID	1	9	21	22	24	19	23	13	14	15	4	7	5	16	10	6	8	1	18	17	3	20	12	11	2
	2	16	22	15	23	14	24	5	7	4	6	8	1	13	11	9	20	12	17	2	3	19	18	21	10
	3	21	22	23	24	12	17	3	20	9	13	14	4	19	18	15	16	1	11	10	2	8	5	7	6
	4	16	23	21	24	11	20	19	18	17	9	14	2	12	15	6	22	5	8	4	1	13	3	10	7
	5	23	24	16	21	11	22	19	12	17	9	15	3	18	20	8	4	1	14	2	5	13	7	10	6
	6	21	23	16	24	5	22	14	8	19	7	15	10	12	20	13	3	4	6	1	17	11	18	9	2
	7	3	15	24	20	12	21	22	18	19	10	13	11	17	16	1	2	4	9	8	14	7	23	6	5
	8	11	17	9	24	12	19	16	15	22	2	21	8	14	13	3	7	1	18	10	4	20	23	5	6
	9	17	24	22	23	15	21	16	8	9	1	10	11	20	14	13	18	6	7	3	12	4	19	5	2
	10	24	15	16	8	6	23	4	20	13	5	22	3	21	12	11	10	2	17	9	7	18	14	19	1
	11	8	5	16	17	15	14	18	11	19	2	10	9	24	20	1	4	3	13	23	21	12	6	7	22
	12	16	24	8	23	22	20	13	18	19	9	1	4	12	21	11	7	10	15	2	3	14	6	17	5
	13	24	13	16	20	6	18	15	17	21	14	23	1	11	22	9	2	3	10	4	5	19	7	12	8
	14	16	23	21	24	12	22	13	11	19	7	18	1	17	20	10	9	14	5	4	6	8	15	3	3
	15	19	23	15	16	4	24	20	22	21	2	14	8	12	18	13	9	1	3	6	7	17	10	11	5
	16	17	24	23	20	9	19	16	22	8	2	21	10	14	15	3	1	4	13	5	6	18	12	11	7
	17	22	23	21	24	8	20	16	15	14	3	19	1	13	17	12	5	10	7	11	9	18	6	4	2
	18	5	23	22	24	15	21	8	17	13	1	14	7	20	18	11	16	3	19	6	4	10	12	9	2
	19	14	24	22	21	16	23	20	2	19	7	12	6	8	17	5	13	4	3	1	15	18	10	11	9
	20	5	16	15	24	10	23	12	8	20	6	11	4	14	22	7	22	13	18	2	3	21	9	17	19
	21	23	21	20	24	2	16	15	4	22	1	13	5	7	17	6	10	9	11	3	19	14	18	8	12
	22	24	23	15	22	21	20	19	14	18	13	9	5	12	10	11	16	2	7	6	3	17	4	8	1
	23	24	23	21	14	11	22	12	20	8	9	10	1	16	18	15	13	2	7	6	4	17	3	19	5

Table 4 | results transfer participants

Group B

Group B		ITEM																						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ID	1	16	24	9	20	13	23	22	19	6	17	18	7	15	14	8	5	3	10	4	2	11	12	21	1
	2	9	20	11	19	17	1	4	5	6	8	12	18	22	13	10	21	7	2	3	14	15	23	16	24
	3	12	7	16	23	20	22	13	21	6	10	11	24	18	19	17	15	9	8	2	5	1	3	14	4
	4	21	24	23	22	6	16	18	12	20	7	14	13	9	10	8	5	4	3	2	17	15	19	11	1
	5	7	18	23	19	9	24	16	8	17	1	20	10	22	21	13	6	5	11	2	4	15	14	12	3
	6	16	5	15	23	21	10	9	4	11	17	18	24	3	19	12	8	6	2	1	20	13	22	14	7
	7	12	24	17	22	14	21	5	16	23	3	18	4	20	15	6	10	8	19	1	2	13	9	11	7
	8	3	16	18	23	1	24	7	8	17	9	21	6	11	22	13	10	4	20	14	12	15	19	5	2
	9	16	6	13	8	24	14	7	2	1	3	21	22	20	11	9	10	4	12	15	17	5	23	19	18
	10	1	10	9	18	17	16	2	3	4	22	23	24	11	21	15	20	13	14	12	8	7	19	5	6
	11	22	21	18	17	11	19	4	2	20	16	23	12	24	15	14	5	3	10	13	6	1	8	9	7
	12	14	6	12	24	21	13	20	10	18	1	11	19	9	3	4	5	16	17	15	22	2	7	8	23
	13	22	16	15	24	12	23	19	8	7	1	20	10	14	21	6	17	2	13	3	9	18	4	5	11
	14	23	16	7	12	5	15	22	6	8	2	24	21	11	20	10	3	9	13	17	19	14	18	4	1
	15	22	16	23	24	21	11	7	1	17	2	15	14	19	18	3	13	4	20	5	10	9	12	6	8
	16	21	22	23	24	20	12	11	4	13	5	2	16	6	14	3	17	1	10	7	18	8	19	9	15
	17	7	8	11	22	20	16	14	5	18	6	21	23	17	19	4	13	10	1	9	12	2	24	15	3
	18	11	9	18	19	12	17	1	6	10	4	21	2	23	13	15	8	7	14	16	20	5	3	22	24
	19	24	19	13	14	18	21	20	1	17	9	22	12	11	23	15	3	2	5	4	6	8	16	10	7
	20	20	21	19	17	11	24	15	8	23	12	13	10	18	7	14	3	2	4	5	9	16	6	22	1
	21	4	13	21	22	9	20	1	6	18	17	11	3	19	23	7	10	2	12	15	5	16	24	8	14
	22	17	20	22	18	11	24	16	9	10	12	13	19	14	15	23	7	3	8	4	2	5	21	6	1
	23	8	7	6	12	5	19	2	1	17	9	11	22	18	21	20	24	10	3	14	15	13	16	4	23

Table 5 | results retail participants

Appendix 15 | Discrepancies in scoring

Design Aspect	Mean A	Mean B	Difference
1	16,43	14,26	2,17
2	**20,48**	**15,13**	**5,35**
3	18,22	15,74	2,48
4	21,22	19,39	1,83
5	11,65	13,83	-2,18
6	20,61	17,61	3
7	14,26	11,09	3,17
8	**13,96**	**7,17**	**6,79**
9	15,87	13,35	2,52
10	6,17	8,39	-2,22
11	13,65	16,65	-3
12	**5,22**	**14,57**	**-9,35**
13	14,87	15,39	-0,52
14	16,7	16,39	0,31
15	8,65	10,83	-2,18
16	10,3	10,35	-0,05
17	5	5,83	-0,83
18	11,13	10,04	1,09
19	6,3	7,96	-1,66
20	**7,52**	**11,04**	**-3,52**
21	**14,61**	**9,87**	**4,74**
22	**11,3**	**14,83**	**-3,53**
23	10,43	11,13	-0,7
24	6,39	9,17	-2,78

Table 6 | Discrepancies in scoring

Appendix 16 | SPSS output of t-tests

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
kenm1	Equal variances assumed	,318	,575	1,069	44	,291	2,174	2,033
	Equal variances not assumed			1,069	43,914	,291	2,174	2,033
kenm2	Equal variances assumed	5,084	,029	3,157	44	,003	5,348	1,694
	Equal variances not assumed			3,157	40,288	,003	5,348	1,694
kenm3	Equal variances assumed	1,089	,302	1,706	44	,095	2,478	1,453
	Equal variances not assumed			1,706	42,264	,095	2,478	1,453
kenm4	Equal variances assumed	,487	,489	1,453	44	,153	1,826	1,257
	Equal variances not assumed			1,453	43,650	,153	1,826	1,257
kenm5	Equal variances assumed	2,059	,158	-1,280	44	,207	-2,174	1,699
	Equal variances not assumed			-1,280	42,461	,208	-2,174	1,699
kenm6	Equal variances assumed	11,131	,002	2,279	44	,028	3,000	1,316
	Equal variances not assumed			2,279	30,418	,030	3,000	1,316
kenm7	Equal variances assumed	6,448	,015	1,713	44	,094	3,174	1,852
	Equal variances not assumed			1,713	39,969	,094	3,174	1,852
kenm8	Equal variances assumed	,426	,517	4,089	44	,000	6,783	1,659
	Equal variances not assumed			4,089	43,914	,000	6,783	1,659
kenm9	Equal variances assumed	2,584	,115	1,467	44	,150	2,522	1,719
	Equal variances not assumed			1,467	42,136	,150	2,522	1,719
kenm10	Equal variances assumed	3,658	,062	-1,436	44	,158	-2,217	1,544
	Equal variances not assumed			-1,436	38,244	,159	-2,217	1,544
kenm11	Equal variances assumed	,488	,489	-1,877	44	,067	-3,000	1,598
	Equal variances not assumed			-1,877	43,954	,067	-3,000	1,598

kenm12	Equal variances assumed	17,424	,000	-5,589	44	,000	-9,348	1,673
	Equal variances not assumed			-5,589	31,419	,000	-9,348	1,673
kenm13	Equal variances assumed	3,249	,078	-,354	44	,725	-,522	1,476
	Equal variances not assumed			-,354	40,402	,726	-,522	1,476
kenm14	Equal variances assumed	3,646	,063	,226	44	,822	,304	1,344
	Equal variances not assumed			,226	39,183	,822	,304	1,344
kenm15	Equal variances assumed	1,722	,196	-1,515	44	,137	-2,174	1,435
	Equal variances not assumed			-1,515	41,422	,137	-2,174	1,435
kenm16	Equal variances assumed	,266	,608	-,023	44	,982	-,043	1,881
	Equal variances not assumed			-,023	43,804	,982	-,043	1,881
kenm17	Equal variances assumed	,088	,768	-,692	44	,493	-,826	1,194
	Equal variances not assumed			-,692	43,816	,493	-,826	1,194
kenm18	Equal variances assumed	,146	,704	,666	44	,509	1,087	1,632
	Equal variances not assumed			,666	43,209	,509	1,087	1,632
kenm19	Equal variances assumed	2,749	,104	-1,011	44	,318	-1,652	1,635
	Equal variances not assumed			-1,011	43,731	,318	-1,652	1,635
kenm20	Equal variances assumed	,894	,350	-1,932	44	,060	-3,522	1,823
	Equal variances not assumed			-1,932	43,538	,060	-3,522	1,823
kenm21	Equal variances assumed	1,195	,280	3,119	44	,003	4,739	1,519
	Equal variances not assumed			3,119	43,218	,003	4,739	1,519
kenm22	Equal variances assumed	,896	,349	-1,790	44	,080	-3,522	1,967
	Equal variances not assumed			-1,790	43,258	,080	-3,522	1,967
kenm23	Equal variances assumed	,894	,349	-,432	44	,668	-,696	1,610
	Equal variances not assumed			-,432	43,143	,668	-,696	1,610
kenm24	Equal variances assumed	6,821	,012	-1,362	44	,180	-2,783	2,042
	Equal variances not assumed			-1,362	37,887	,181	-2,783	2,042

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
kenm1	Equal variances assumed	-1,924	6,272
	Equal variances not assumed	-1,924	6,272
kenm2	Equal variances assumed	1,933	8,762
	Equal variances not assumed	1,925	8,771
kenm3	Equal variances assumed	-,450	5,407
	Equal variances not assumed	-,454	5,410
kenm4	Equal variances assumed	-,707	4,359
	Equal variances not assumed	-,708	4,360
kenm5	Equal variances assumed	-5,598	1,250
	Equal variances not assumed	-5,601	1,254
kenm6	Equal variances assumed	,347	5,653
	Equal variances not assumed	,313	5,687
kenm7	Equal variances assumed	-,559	6,907
	Equal variances not assumed	-,570	6,918
kenm8	Equal variances assumed	3,440	10,126
	Equal variances not assumed	3,439	10,126
kenm9	Equal variances assumed	-,943	5,987
	Equal variances not assumed	-,948	5,991
kenm10	Equal variances assumed	-5,330	,895
	Equal variances not assumed	-5,343	,908
kenm11	Equal variances assumed	-6,221	,221
	Equal variances not assumed	-6,221	,221
kenm12	Equal variances assumed	-12,719	-5,977
	Equal variances not assumed	-12,757	-5,938
kenm13	Equal variances assumed	-3,496	2,453
	Equal variances not assumed	-3,504	2,460
kenm14	Equal variances assumed	-2,405	3,014
	Equal variances not assumed	-2,414	3,023

kenm15	Equal variances assumed	-5,067	,719
	Equal variances not assumed	-5,072	,724
kenm16	Equal variances assumed	-3,834	3,747
	Equal variances not assumed	-3,835	3,748
kenm17	Equal variances assumed	-3,232	1,580
	Equal variances not assumed	-3,233	1,580
kenm18	Equal variances assumed	-2,202	4,376
	Equal variances not assumed	-2,204	4,378
kenm19	Equal variances assumed	-4,946	1,642
	Equal variances not assumed	-4,947	1,643
kenm20	Equal variances assumed	-7,195	,151
	Equal variances not assumed	-7,196	,152
kenm21	Equal variances assumed	1,677	7,801
	Equal variances not assumed	1,675	7,803
kenm22	Equal variances assumed	-7,486	,443
	Equal variances not assumed	-7,488	,445
kenm23	Equal variances assumed	-3,941	2,550
	Equal variances not assumed	-3,943	2,552
kenm24	Equal variances assumed	-6,899	1,334
	Equal variances not assumed	-6,918	1,352

Table 7 | Data results t-tests

Appendix 17 | 75 NPC Circle of Five© predictors.

		Kernbegrippen Nederlands		Kernbegrippen Engels
Vastgoed management			Asset Management	
A1	Omgevingsfactoren	Planologische mogelijkheden	Area	Spatial planning opportunities
A2	Omgevingsfactoren	Marktpotentie verzorgingsgebied	Area	Market potential service area
A3	Omgevingsfactoren	Vervoersmodaliteiten	Area	Modal split
A4	Omgevingsfactoren	Gezamenlijke visie	Area	Coherent vision
A5	Omgevingsfactoren	Ondersteunende voorzieningen	Area	Supportive facilities
A6	Omgevingsfactoren	Negatieve omgevingsfactoren	Area	Environmental dissatisfiers
A7	Marktfactoren	Passanten	Market	Passers-by
A8	Marktfactoren	Marktprijzen	Market	Market related-price
A9	Marktfactoren	Marketingpotentie	Market	Marketing opportunities
A10	Marktfactoren	Ruimtepotentie	Market	Spatial potential
A11	Marktfactoren	Eigendomssituatie	Market	Ownership
A12	Marktfactoren	Maatschappelijk Verantwoord Ondernemen	Market	Social Responsibility
A13	Veranderbaarheid	Robuustheid volumes	Changeability	Elasticity
A14	Veranderbaarheid	Genericiteit / Universaliteit ruimtes	Changeability	Generality
A15	Veranderbaarheid	Duurzaamheid	Changeability	Sustainability
Mobiliteit & Logistiek			Mobility & Logistics	
M1	Situatie in het gebied	Bereikbaarheid auto	Situated in the area	Traffic
M2	Situatie in het gebied	Bereikbaarheid OV	Situated in the area	Public transport
M3	Situatie in het gebied	OV Bediening	Situated in the area	Public transport schedule
M4	Situatie in het gebied	Bereikbaarheid voet / fiets	Situated in the area	Pedestrian & bike
M5	Situatie in het gebied	Capaciteit parkeren	Situated in the area	Parking Capacity
M6	Situatie in het gebied	Kwaliteit parkeren	Situated in the area	Parking quality
M7	Situatie in het gebied	Bewegwijzering	Situated in the area	Signing
M8	Loopstromen	Toegankelijkheid	People flow	Entrances
M9	Loopstromen	Mensenlogistiek – keten	People flow	People logistics – route
M10	Loopstromen	Mensenlogistiek – capaciteit	People flow	People logistics – capacity
M11	Loopstromen	Mensenlogistiek - kwaliteit	People flow	People logistics – flow
M12	Goederenlogistiek	Goederenlogistiek – keten	Goods logistics	Supply chain logistics – route
M13	Goederenlogistiek	Goederenlogistiek – capaciteit	Goods logistics	Supply chain logistics – capacity
M14	Goederenlogistiek	Goederenlogistiek - kwaliteit	Goods logistics	Supply chain logistics – quality
M15	Goederenlogistiek	Logistiek plan	Goods logistics	Logistics protocols
Veiligheid			Safety & Security	
V1	Organisatie	Organisatorische samenwerking	Organisation	Partnership
V2	Organisatie	Veiligheidsbeleid	Organisation	Safety & Security policy
V3	Organisatie	Maatregelenmix	Organisation	Safety & Security mix of measures
V4	Organisatie	Beinvloeding gewenst en ongewenst gedrag	Organisation	Influencing behaviour
V5	Security (sociale veiligheid)	Inzicht in objectieve veiligheid	Security	Insight in security levels
V6	Security (sociale veiligheid)	Inzicht in subjectieve veiligheid	Security	Insight in safety levels
V7	Security (sociale veiligheid)	Risicoplekken	Security	Hot spots
V8	Security (sociale veiligheid)	Feitelijke pakkans security	Security	Catch rate Security
V9	Security (sociale veiligheid)	Gepercipieerde pakkans security	Security	Perceived catch rate Security
V10	Security (sociale veiligheid)	Gevoel van ingrijpen bij nood	Security	Perceived support of bystanders
V11	Security (sociale veiligheid)	Aandacht risicogroepen	Security	Vulnerable groups
V12	Safety (brand, ongeval, ramp)	Inzicht in aard/omvang veiligheidsrisico's	Safety	Insight in safety risks
V13	Safety (brand, ongeval, ramp)	Feitelijke pakkans safety	Safety	Catch rate Safety
V14	Safety (brand, ongeval, ramp)	Gepercipieerde pakkans safety	Safety	Perceived catch rate Safety
V15	Safety (brand, ongeval, ramp)	Voorbereid zijn op branden, ongevallen, rampen	Safety	Preparedness
Ruimtelijke inrichting			**Design**	
R1	Uitstraling	Ruimtelijke inpassing	Ambiance	Spatial embedding
R2	Uitstraling	Herkenbaarheid	Ambiance	Recognizability
R3	Uitstraling	Representativiteit	Ambiance	Representativeness
R4	Uitstraling	Onderscheidende domeinen	Ambiance	Seperate domains
R5	Functioneel ontwerp	Overzicht	Functionality	Overview
R6	Functioneel ontwerp	Aanwezigheid functies	Functionality	Functions
R7	Functioneel ontwerp	Functionele relaties	Functionality	Functional relations
R8	Functioneel ontwerp	Constructie	Functionality	Building structure
R9	Functioneel ontwerp	Verblijfsfuncties	Functionality	Waiting zone
R10	Functioneel ontwerp	Daglicht	Functionality	Daylight
R11	Functioneel ontwerp	Klimaatbeheersing	Functionality	Fysics
R12	Beleving	Akoestiek	Perception	Accoustics
R13	Beleving	Kleur en verlichting	Perception	Illumination and colour
R14	Beleving	Sfeer	Perception	Atmosphere
R15	Beleving	Menselijke maat	Perception	Human dimensions
Exploitatie			Exploitation	
E1	Technisch onderhoud	Onderhoudsstaat	Technical maintenance	State of preservation
E2	Technisch onderhoud	Onderhoudbaarheid	Technical maintenance	Maintainability
E3	Technisch onderhoud	Onderhoudskosten	Technical maintenance	Maintenance costs
E4	Beheerorganisatie	Organisatievorm	Maintenance organisation	Organisation
E5	Beheerorganisatie	Sturingsmechanisme	Maintenance organisation	Output control mechanism
E6	Beheerorganisatie	Kwaliteitsnormering	Maintenance organisation	Quality level
E7	Kwantitatieve benutting	Benutting passantenstromen	Quantitative utilisation	Engagement of passenger flow
E8	Kwantitatieve benutting	Benutting winkels	Quantitative utilisation	Utilisation shops
E9	Kwantitatieve benutting	Benutting kantoren en woningen	Quantitative utilisation	Utilisation offices and housing
E10	Kwantitatieve benutting	Benutting parkeren	Quantitative utilisation	Utilisation of parking
E11	Kwantitatieve benutting	Huurprijzen	Quantitative utilisation	Rents
E12	Kwalitatieve benutting	Profilering	Qualitative utilisation	Profile
E13	Kwalitatieve benutting	Branchering	Qualitative utilisation	Branches
E14	Kwalitatieve benutting	Voorzieningenniveau	Qualitative utilisation	Facilities level
E15	Kwalitatieve benutting	Flexibiliteit	Qualitative utilisation	Flexibility

Table 8 | 75 predictors NPC's Circle of Five©

Appendix 17 | Validation of predictors

Design aspect	Predictors		Ranking					
			Not relevant	Relevant	Very important	Not relevant	Relevant	Very important
Design group 'Spatial Layout'	**Related Predictor**	**Construct**	**Transfer function**			**Commercial function**		
Compactness	Functional relations	Design			++		+	
Circulation	People logistics – flow	Mobility & Logistics			++		+	
Availability of space	People logistics – capacity	Mobility & Logistics			++		+	
Spatial logic	People logistics – route	Mobility & Logistics			++			++
	Overview	Design			++			++
Adaptability	Building structure	Design			++		+	
	Flexibility	Exploitation			++		+	
Design group 'Customer Information Supply'	**Related Predictor**	**Construct**	**Transfer function**			**Commercial function**		
Wayfinding	Signing	Mobility and logistics			++			++
	People logistics – flow	Mobility and logistics			++			++
	Separate domains	Design			++			++
[illegible]				+			+	
PA system and acoustics	Acoustics	Design		+		0		
Design group 'Core Functional support'	**Related Predictor**	**Construct**	**Transfer function**			**Commercial function**		
Ticketing systems	Facilities level	Exploitation		+			+	
Baggage facilities	Facilities level	Exploitation	0				+	
Store characteristics	Utilisation shops	Exploitation		+				++
	Branches	Exploitation		+				++
	Profile	Exploitation		+				++
Security Environment	Hot spots		0				+	
	Safety and security mix of measures		0				+	
Design group 'Ambience'	**Related Predictor**	**Construct**	**Transfer function**			**Commercial function**		
Quality of Light	Day light	Design		+			+	
	Colour and lighting	Design		+			+	
Maintenance	State of preservation	Exploitation			++			++
	Maintainability	Exploitation			++			++
Quality of air	Physics	Design		+			+	

Design group 'Amblence'	Related Predictor	Construct	Transfer function			Commercial function		
Architecture	Recognisability	Design		+			+	
	Representativeness	Design		+			+	
	Human dimension	Design		+			+	
[illegible]			0			0		
[illegible]				+			+	
[illegible]			0			0		
Design group 'Personal Care'	Predictor	Construct	Transfer function			Commercial function		
Productivity	Facilities level		0				+	
Seating	Waiting zone	Design		+			+	
Availability concessions	Facilities level			+			+	
Restrooms	Facilities level			+			+	
Social interaction opportunities	Waiting zone	Design	0				+	

Table 9 I Validation of predictors