Graduation Thesis

Overcoming the discrepancy in the office real estate market between the demand and supply side, through the intensification of emerging networks

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Preface

In your hand, you have the report that presents my research on *"Overcoming the discrepancy in the office real estate market between the demand and supply side, through the intensification of emerging networks"*. The aim of the research is to identify the most important building and location determinants for highly educated and creative workers and to compose a development strategy for new office development. This research is the final part of the Master Construction Management and Engineering (CME), faculty Architecture, Building and Planning (ABP), at Eindhoven University of Technology (TU/e). This research is conducted under the supervision of Joep van Eijkeren, SDK Vastgoed, Gamze Dane and Qi Han, TU/e.

The economic crisis, socio demographic changes and the emergence of new trends such as 'the new way of working' have contributed substantially to the stagnation between the supply and demand side in the office market. This is resulting in a discrepancy which is affecting the development of new development opportunities. Besides this, the economic crisis and individualization influenced the exponential growth of small and medium businesses. These businesses are forming so-called networks that represent the transition of the office market. Furthermore, for cities it is imperative to create an economical climate in which highly educated and creative workers are attracted, in order to strengthen their economic and financial position.

An example of an environment in which the aim is to attract highly educated and creative workers and to create a dynamic metropolitan area, is the former brownfield Strijp-S. The large amount of stakeholders from the supply side and the changing demand requirements of networks are directly influencing the location decision behavior of companies. This research is focused on investigating which building and location determinants have the most influence in determining the location decision behaviour for highly educated people and creative workers, who work in small and medium businesses. In order to develop a development strategy that will support a project developer (SDK) to get insights in the location decision behavior. Furthermore to identify new networks and to improve the collaboration between the most important stakeholders.

Through this way, I want to thank my supervisors Bauke de Vries, Gamze Dane and Qi Han for their input and guidance during my graduation period. I am also grateful to SDK Vastgoed, especially to Joep van Eijkeren and Erwin Westra, for their valuable guidance from the practical side of the research. I would like to thank all other persons who have contributed during this study.

Finally, of course I would like to thank my parents, my brother and my best friend because of their tremendous support and commitment throughout my academic career.

Tim Maier,

Eindhoven, July 2016

Content

List of Figures

List of Tables

Summary

The dynamics and forces of the real estate market, the continuously changing economy, the demographic changes and the expected exponential migration of both residents and highly educated and creative workers to urban city centres, are contributing to a comprehensive complexity to initiate or stimulate office new developments. Furthermore, as a result of the declining price pressure, the structural reduction in space requirements and the upcoming information technology, the existing office building stock has transformed in a negative feedback loop (so-called varkenscycles) (Rijksadviseurs, 2014). A break originated in the Dutch real estate market, between the demand and the supply side, the market transformed from a replacement market into a buyer's market in which there was a substantial oversupply (Zuidema & Van Elp, 2010a). More specifically, an imbalance with a gap between the qualitative demand and the quantitative demand. Subsequently, the vacancy rate in the office market increased, from 7 million m2 (15%) in 2013 (Remoy & van der Voordt, 2014) into 7,9 million m2 (16%) in 2014 (DTZ Zadelhoff, 2015). Besides this, as a result of the social-demographic changes, the economic crisis, the declining labour force, the increasing popularity of concepts such as the 'new way of working', the individualization and the decreasing surface area per employee and etc., the office market has also been influenced. This influence consisted of a decrease in the amount of corporates and an exponential growth of small and medium businesses (MKB, 2015). Through the adaptations in the labour market and a transition in a knowledge economy, a new type of urban geography emerged, that consists of highly educated and creative workers (Boterman & Sleutjes, 2014b). The businesses and individuals are clustering their activities and this contributed to the appearance of the so-called communities (networks) (Rocco, 2008a). As a result of the trade-offs between these aspects, the individuals and businesses are developing and applying new building and location determinants. This is resulting in a transition in the decision-making process for their location, such as facilities/services and more flexibility.

However, even though there is recognition of the supply side of the imbalance. Which at the same time is being influenced by a governmental shift that consists of policies and instruments that contribute and stimulate the withdrawal of vacant office buildings with restoration/transformation or demolition (Ministerie, 2013; Vastgoedjournaal, 2016b). Is the positioning of the most important stakeholders to initiate new office developments becoming more and more restrained. The market dynamics, the amount of oversupply, the multidisciplinary environment and the conflicting interests, contributed to a transition of the risk evaluation of the stakeholders. The increasing and highly complex imbalance between the demand and supply side, the changes in the labour market and the importance of emerging networks is contributing to the aspect of sustainable urbanization, to retain or shrink the business climate or to create a new and attractive business climate. Therefore, a discrepancy is occurring in the office market between the demand and supply side. The sustainable urbanization is resulting in an increasing market pressure to initiate and develop an attractive dynamic metropolitan area. As a result of this phenomenon and the changes that are occurring in the office market, there is the continuous search of cities, urban planners and policy makers to compose or define initiatives and strategies in which cities are trying to improve their competeveness, by attracting or retaining people who work in creative and knowledge-intensive sectors. To create a healthy dynamic economic

environment (Niedomysl & Hansen, 2010); (Akcomak, I.S.; Borghans, L.; ter Weel, 2011). Therefore, the following research question can be formulated:

"In which way can the imbalance in the office real estate market be overcome, between the demand and supply side, by investigating the building and location determinants for highly educated and creative workers, to reduce the discrepancy and initiate new office developments?"

By investigating the building and location determinants of both demand and supply side, it becomes clear that throughout the establishment of the companies at Strijp-S changes occurred in the preferences of the highly educated and creative workers. The determinants parking possibilities, network and services increased substantially. With the research method Discrete Choice Modeling (DCM) it has been determined that the determinants accessibility, amenities, type of building, rental price and flexibility have substantially influenced the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. DCM is suitable for determining choice behaviour of individuals between alternatives of products and services, By comparing the building and location determinants in future office developments, both sides categorize the determinant accessibility as the most important. The accessibility and the presence of amenities is also supported by literature, that these determinants are evident in the dynamics of an environment (Timmermans, 1986; Louw, 1996; Srour et al., 2002). This is resulting in the strengthening of the networks and is directly related to an increase in the business opportunities and therefore resulting in a stronger perception of the environment. Furthermore, both sides also categorize the following building and location determinants as important; dynamic environment, the image of the area, contract type vs. contract duration and the (flexibility) of the rental prices. An important distinction between both sides can be recognized in the influence of the building and interrelated characteristics and the amenities. Even though, as it is suggested by literature that employees/individuals are becoming less dependant on the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010), from the conducted DCM experiment it can be stated that the determinants Type of Building and the Office Space are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. Furthermore, there is a discrepancy noticeable between the demand and supply, as it becomes clear that from the derived results of the conducted interviews there is more emphasis on the flexibility and the multi-functionality. Besides this, although as it is suggested by literature, that the presence of amenities is interrelated with the dynamics of the environment (Timmermans, 1986), and that stakeholders (such as cities) are trying to implement development plans through a diversity of cultural amenities and high-standard public services in order to attract highly skilled labour that will eventually attract investments (Niedomysl & Hansen, 2010). From the findings of the conducted interviews, it can be stated that there is a discrepancy in the importance to facilitate amenities. The findings of both the demand and supply side in relation to the importance of networks that influence the location decision behaviour are also supported by literature. Rocco (2008b) states that companies still have a high willingness and commitment to accommodate themselves within clusters, which is contributing to the place identification and acting as a catalyst to attract more companies (Boterman & Sleutjes, 2014a). The derived results are supporting that the individualization, place identification and the emergence of networks are contributing substantially to the changes in the location decision behaviour. As a result

the networks are strengthening (Mak & Roodbol, 2014; DTZ, 2016a). This is then directly related to the positive evaluation of the place identification and placing more emphasizes on the sharing of knowledge and interaction through the presence of networks in a dynamic sustainable attractive metropolitan environment (Remøy, 2010; Vos, 2013; Boterman & Sleutjes, 2014b; DTZ, 2016a).

The imbalance can be overcome, to initiate sustainable urbanization, to reduce the discrepancy, on the one hand through the creation of awareness and commitment of the supply side that consist of the investor, project developer and the municipality. This is also supported by literature, as suggested by Pen (2014), that a shift is required and that this entails and requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties. Furthermore, by adjusting their risk evaluation on the changes in demand requirements, in addition by intensifying the collaboration, new opportunities and developed strategies can be initiated. As stated by Louw & Bontekoning (2007), by taken into account the changing demand requirements this could contribute to the collaboration of public and private development organizations. There is consensus among the stakeholders that it is evident to create more transparency among the conflict of interest of the stakeholders, which is also supported by literature (DNB, 2016). On the other hand, by the integration in both the building and location of the determinants such as; flexibility, services/facilities, hospitality, diversity of companies, (flexible) rental contracts and the emphasis on the collaboration and interaction of the highly educated and creative workers, the networks are strengthened. This contributes to the importance to steer creativity through the quantitative search for human interactions and how to connect this to defining workspaces with a flexible working environment (Ratti & Claudel, 2016). Subsequently, this contributes to the attraction of more individuals and businesses and acts as a catalyst, the so-called circular causation, for the concentration of activities and skilled labour within an area (micro level). In total this will contribute in the facilitation, stimulation and development of a dynamic environment (macro level).

Both the above-described approaches are combined in a development strategy that is shown in Figure 1. The development strategy further elaborates on the model of Gibson and Lizieri (1999), that combines a higher awareness and commitment of the stakeholders with the changes in the demand requirements. The aim of the development strategy is to take the first initiative, in the traditionally oriented multidisciplinary environment, in aligning the decision-making process in the collaboration of the different stakeholders. Furthermore, to contribute

Figure 1 The development strategy

to municipalities and policy makers in the steering, stimulation and initiation of new office developments, that attracts highly educated and creative workers. Therefore acting as a catalyst for other companies, which is evident in the knowledge economy, to create an attractive dynamic metropolitan environment (DTZ Zadelhoff, 2010; Niedomysl & Hansen, 2010; Akcomak, I.S.; Borghans, L.; ter Weel, 2011 Boterman & Sleutjes, 2014b; DTZ, 2016a).
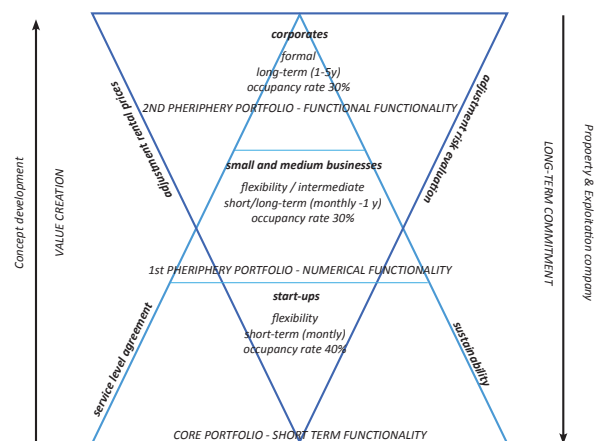
Samenvatting

De dynamiek en de krachten van de vastgoedmarkt, de continu aan veranderingen onderhevige economie, de demografische veranderingen en de verwachte exponentiële groei van de migratie van zowel bewoners als hoogopgeleide en creatieve werknemers naar stedelijke stadscentra, dragen bij aan de complexiteit tot het initiëren of stimuleren van nieuwe kantoorontwikkelingen. Daarnaast, als gevolg van de afnemende prijsdruk, de structurele vermindering van de benodigde kantoorruimte en de toenemende informatie technologie, is de bestaande kantoorgebouw voorraad getransformeerd in een negatieve feedback loop (de zogenaamde varkenscycles) (Rijksadviseurs, 2014). Er is een breuk ontstaan in de Nederlandse vastgoedmarkt, tussen de aanbod- en vraagzijde, de kantorenmarkt transformeerde van een vervangingsmarkt in een kopersmarkt, die gekenmerkt werd door een aanzienlijk overaanbod (Zuidema & Van Elp, 2010a). Specifiek is er sprake van het ontbreken van een evenwicht waarbij er een verschil waarneembaar is tussen de kwalitatieve en kwantitatieve vraag. Een direct gevolg van de deze aspecten is dat de leegstand in de kantorenmarkt is gestegen, van 7 miljoen m2 (15%) in 2013 (Remoy & van der Voordt, 2014) naar 7,9 miljoen m2 (16%) in 2014 (DTZ Zadelhoff, 2015). Daarnaast hebben de aspecten zoals de sociale-demografische veranderingen, de economische crisis, de dalende beroepsbevolking, de toenemende populariteit van concepten zoals het 'nieuwe werken', de individualisering en de afnemende vloer oppervlakte per werknemer en etc., tevens een aanzienlijke invloed gehad op de kantorenmarkt. De invloed bestond uit een afname van de hoeveelheid grote bedrijven en een exponentiële groei van de kleine en middelgrote bedrijven (MKB, 2015). Als gevolg van de aanpassingen op de arbeidsmarkt en een overgang die heeft plaatsgevonden in de kenniseconomie, is er een nieuw type van stedelijke geografie ontstaan, die bestaat uit hoog opgeleide en creatieve werknemers (Boterman & Sleutjes, 2014b). De bedrijven en individuen, zijn hun activiteiten gaan clusteren en dit heeft bijgedragen aan de totstandkoming van de zogenaamde communities (netwerken) (Rocco, 2008a). Als gevolg van de trade-offs tussen deze aspecten, zijn de individuen en bedrijven nieuwe gebouw en locatie determinanten gaan ontwikkelen en toepassen en dit heeft er vervolgens aan bijgedragen dat er een overgang heeft plaats gevonden in hun besluitvormingsproces omtrent het vestigen, zoals de faciliteiten / services en meer flexibiliteit.

Echter, hoewel er erkenning is vanuit het perspectief van de aanbodzijde over het ontbreken van een evenwicht. Dat tegelijkertijd wordt beïnvloedt door een herpositionering van de overheid die bestaat uit een beleid en instrumenten die bijdragen aan het stimuleren van het terugtrekken van leegstaande kantoorgebouwen door middel van restauratie / transformatie of sloop (Ministerie, 2013; Vastgoedjournaal, 2016b). Is de positionering van de belangrijkste participerende partijen tot het initiëren van nieuwbouw kantoor ontwikkelingen terughoudender geworden. De dynamiek van de markt, de hoeveelheid overaanbod, de multidisciplinaire omgeving en de tegenstrijdige belangen, hebben eraan bijgedragen dat er een transitie van de risicobeoordeling van de belangrijkste participerende partijen in de kantorenmarkt heeft plaatsgevonden. De toenemende en uiterst complexe situatie van het ontbreken van een evenwicht tussen de vraag- en aanbodzijde, de continu aan veranderingen onderhevige arbeidsmarkt en het belang van de sterk opkomende netwerken, dragen bij aan het proces van duurzame verstedelijking. Dit proces wordt specifiek gekenmerkt door het behouden of krimpen van

het ondernemingsklimaat of het creëren van een nieuw en aantrekkelijk vestigingsklimaat. Een direct gevolg hiervan is dat er een discrepantie is opgetreden tussen de vraag- en aanbodzijde in de kantorenmarkt. De duurzame verstedelijking leidt namelijk tot een toenemende druk van de markt tot het initiëren en ontwikkelen van een aantrekkelijk dynamisch grootstedelijk metropolitaans gebied. Als gevolg van de tegenstrijdigheid en de beschreven veranderingen die zich voordoen in de kantorenmarkt, is er een permanente zoektocht van steden, stedenbouwkundigen en beleidsmakers tot het vormgeven of definiëren van initiatieven of strategieën waarin steden trachten hun concurrentiepositie te verbeteren. De positie wordt versterkt door het aantrekken of behouden van individuen die werkzaam zijn in de creatieve en kennisintensieve sectoren. Met als voornaamste doel het creëren van een gezonde dynamische economische omgeving (Niedomysl & Hansen, 2010; Akcomak, I.S.; Borghans, L.; ter Weel, 2011). Hieruit is de volgende onderzoeksvraag geformuleerd:

"Op welke manier kan het ontbreken van een balans in het kantoren vastgoedmarkt worden overwonnen, tussen de vraag- en aanbodzijde, door het onderzoeken van het gebouw en de locatie determinanten voor hoog opgeleide en creatieve werknemers, om het verschil te verminderen en nieuwe kantoor ontwikkelingen te initiëren?"

Door het onderzoeken van de gebouw en locatie determinanten van zowel de vraag- als aanbodzijde, zijn er nieuwe inzichten verkregen in het veranderende besluitvormingsproces van hoog opgeleiden en creatieve werkers die werkzaam zijn op Strijp-S. De belangrijkste determinanten parkeermogelijkheden, toegankelijkheid, netwerk en diensten/faciliteiten zijn aanzienlijk toegenomen. Met de onderzoeksmethodiek Discrete Choice Modeling (DCM), is aangetoond dat de determinanten bereikbaarheid, voorzieningen, type gebouw, huurprijs en de flexibiliteit een substantiële invloed hebben op het besluitvormingsproces omtrent de locatie van hoogopgeleide en creatieve werknemers die werkzaam zijn in kleine en middelgrote bedrijven werken op Strijp-S. De DCM methodiek is geschikt voor het bepalen van het keuze gedrag van individuen tussen de alternatieven van de producten en diensten. Door het vergelijken van de bouw en de locatie determinanten in toekomstige kantoorontwikkelingen, categoriseren zowel de vraag als aanbodzijde, de determinant toegankelijkheid als de belangrijkste. De bereikbaarheid en de aanwezigheid van voorzieningen wordt tevens ook ondersteund door de literatuur, waarin benadruk wordt dat dat deze determinanten essentieel zijn in de dynamiek van een omgeving (Timmermans, 1986; Louw, 1996; Srour et al., 2002). Een direct gevolg hiervan is dat er een intensivering plaatsvindt van de netwerken en dit is direct gerelateerd aan een toename van business mogelijkheden. Dit resulteert vervolgens in een sterkere waarneming van de omgeving. Daarnaast categoriseren beide zijden ook de volgende gebouw en locatie determinanten als belangrijk; dynamische omgeving, het imago van het gebied, het type contract versus duur van het contract en de (flexibiliteit) van de huurprijzen. Een belangrijk onderscheid tussen beide kanten kan worden herkend in de invloed van het gebouw en de hieraan gekoppelde kenmerken en de voorzieningen. Echter, ook al wordt er door de literatuur gesuggereerd dat werknemers / individuen steeds minder afhankelijk worden van het kantoorgebouw / ruimte (Brounen & Eichholtz, 2004; Remøy, 2010). Vanuit de resultaten van de DCM methodiek kan worden gesteld dat de determinanten Type gebouw en de Kantoorruimte invloed hebben op het besluitvormingsproces omtrent het vestigen van hoogopgeleide en creatieve werknemers die werkzaam zijn in kleine en middelgrote bedrijven op Strijp-S. Daarnaast is er een

discrepantie zichtbaar tussen vraag en aanbod, waarin het duidelijk wordt dat er vanuit de verkregen resultaten van de interviews met de aanbodzijde de nadruk grotendeels ligt op de flexibiliteit en multifunctionaliteit. Vanuit de literatuur is tevens naar voren gekomen dat de aanwezigheid van voorzieningen verweven is met de dynamiek van de omgeving (Timmermans, 1986). Daarnaast trachten de belangrijkste participerende partijen (zoals steden) om ontwikkelplannen te implementeren die bestaan uit een diversiteit van culturele voorzieningen en hoogwaardige publieke diensten, met als doel het aantrekken van hoogopgeleide arbeidskrachten die zullen bijdragen aan het aantrekken van investeringen (Niedomysl & Hansen, 2010). Uit de bevindingen van de interviews kan worden gesteld dat er een discrepantie herkenbaar is in het belang van het toepassen van voorzieningen. De bevindingen van zowel de vraag- als aanbodzijde, met betrekking tot het belang van een netwerk in relatie tot het besluitvormingsproces omtrent het vestigen wordt tevens ondersteund door de literatuur. Rocco (2008b) benadrukt dat bedrijven nog steeds een grote bereidheid en inzet hebben om zich te vestigen binnen clusters. De clusters dragen vervolgens bij aan de identificering van de plek/plaats. Vervolgens heeft dit het effect van een katalysator voor het aantrekken van meer bedrijvigheid (Boterman & Sleutjes, 2014a). De verkregen resultaten vanuit het onderzoek ondersteunen dat de individualisering, de identificering van de plaats/plek en de opkomst van netwerken substantieel bijdragen aan de veranderingen die zijn opgetreden in het besluitvormingsproces omtrent het huisvesten. Hierdoor versterken netwerken zich (Mak & Roodbol, 2014);(DTZ, 2016a). Dit is vervolgens direct gerelateerd aan een positieve evaluatie van de identificering van de plek/plaats en ontstaat er een grotere nadruk op het delen van kennis en interactie door de aanwezigheid van netwerken in een dynamische duurzaam aantrekkelijke grootstedelijke omgeving (Remøy, 2010; Vos, 2013; Boterman & Sleutjes, 2014b; DTZ, 2016a).

Het ontbreken van de balans tussen vraag en aanbod, voor het initiëren van duurzame verstedelijking, moet voortkomen uit een parallel proces. Enerzijds door het creëren van bewustwording en betrokkenheid van de aanbodzijde die bestaan uit de investeerder, projectontwikkelaar en de gemeente. Dit wordt tevens ondersteund door de literatuur waarin Pen (2014) benadrukt dat er een verschuiving noodzakelijk is. Expliciet een verschuiving die nieuwe toetreders tot de markt met zich meebrengt en dit tevens ook vereist en er daarnaast aan bij draagt dat er een meer transparante samenwerking van de traditionele partijen tot stand komt. Daarnaast zal vanuit de aanbodzijde een aanpassing moeten plaatsvinden in de risico-evaluatie die specifieker aansluit op de veranderingen die ten grondslag liggen aan de vraagzijde. Er zal een intensivering moeten plaats vinden in de samenwerking die er toe zal leiden dat er nieuwe kansen en strategieën kunnen worden geïnitieerd. Louw & Bontekoning (2007) benadrukken dat door het in acht nemen van de veranderende eisen van de vraagzijde er een aanzienlijke bijdrage geleverd kan worden aan de samenwerking tussen de publieke en private organisaties. Er is een sterk draagvlak tussen de belanghebbenden over de relevantie tot het creëren van meer transparante tussen de tegenstrijdige belangen van de participerende partijen, wat tevens ondersteund wordt door de literatuur (DNB, 2016). Aan de andere kant, door het integreren van zowel de gebouw- als locatie determinanten; flexibiliteit, services / faciliteiten, gastvrijheid, de diversiteit aan bedrijven, (flexibele) huurcontracten en de nadruk op de samenwerking en interactie van de hoog opgeleide en creatieve werknemers, die tezamen zullen bijdragen aan het versterken van de netwerkvorming. In de transities die plaatsvinden in de kantorenmarkt en in de zoektocht naar het toekomstige kantoor, is het klaarblijkelijk van

belang om creativiteit te sturen door middel van de kwantitatieve zoektocht naar menselijke interacties en hoe deze verbonden kunnen worden tot het definiëren van werkplekken met een flexibele werkomgeving (Ratti & Claudel, 2016). Vervolgens zal dit bijdragen aan het aantrekken van meer individuen en bedrijven en fungeren als een katalysator, de zogenaamde circulaire causaliteit, waarbij er sprake is van een concentratie van activiteiten en hoogopgeleiden in een omgeving (microniveau). In totaliteit heeft dit een aanzienlijk aandeel in het faciliteren, stimuleren en ontwikkelen van een dynamische omgeving (macroniveau).

De hierboven beschreven benaderingen zijn vervolgens gecombineerd in een ontwikkelstrategie die is weergegeven in Figuur 2. De ontwikkelstrategie is een toevoeging op het model dat is ontwikkeld door van Gibson en Lizieri (1999). Het model van Gibson en Lizieri wordt gekenmerkt door een hoger bewustzijn en betrokkenheid van de belangrijkste participerende stakeholders met de veranderingen die ten grondslag liggen aan de vraagzijde. Het voornaamste doel van de ontwikkelstrategie is het nemen van het eerste initiatief, in de traditioneel georiënteerde multidisciplinaire omgeving,
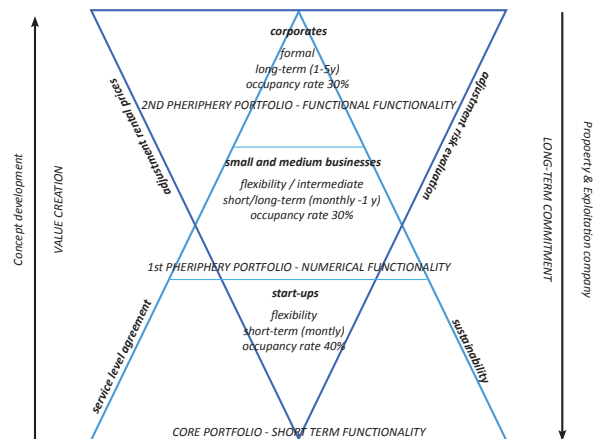
Figuur 2 De ontwikkelstrategie

in het op één lijn brengen van het besluitvormingsproces van de samenwerking tussen de belangrijkste stakeholders. Dit zal aanzienlijk bijdragen aan het proces van gemeenten en beleidsmakers in het sturen, stimuleren en initiëren van nieuwe kantoor ontwikkelingen. Waarbij hoogopgeleide en creatieve werknemers worden aangetrokken, dat zal dienen als katalysator voor andere bedrijven. Dit is essentieel in een kenniseconomie in het creëren van een aantrekkelijke dynamische grootstedelijke omgeving (DTZ Zadelhoff, 2010; Niedomysl & Hansen, 2010; Akcomak, I.S.; Borghans, L.; ter Weel, 2011 Boterman & Sleutjes, 2014b; DTZ, 2016a).

Abstract

An imbalance occurred within the Dutch office market between the demand and supply side. There is a gap between the qualitative demand and the quantitative demand. Besides this, the multidisciplinary environment and the conflicting interests are resulting in a transition of the risk evaluation of the stakeholders. Through adaptations in the labour market a new type of urban geography emerged, that consists of highly educated and creative workers that are clustering their activities in so-called communities (networks). The businesses and individuals are developing and applying new building and location determinants and these are affecting their location decision-making process. Parallel to this, there is the aspect of sustainable urbanization, in which there is a continuous search of cities, urban planners and policy makers to compose or define initiatives and strategies in which cities are trying to improve their competiveness, by attracting or retaining people who work in creative and knowledge-intensive sectors. This is resulting in a discrepancy.

From the investigation of the building and location determinants of both demand and supply side, changes occurred in the preferences of the highly educated and creative workers. The determinants accessibility, amenities, type of building, rental price and flexibility have substantially influenced the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. Both sides categorize the following building and location determinants as important; dynamic environment, the image of the area and the contract type vs. contract duration. An important distinction between both sides can be recognized in the influence of the building and interrelated characteristics and the amenities. The derived results are supporting that the individualization, place identification and the emergence of networks are contributing substantially to the changes in the location decision behaviour. The imbalance can be overcome by a development strategy that entails both demand and supply. An intensification in collaboration and commitment of the supply side. Furthermore, by the integration in both the building and location of the determinants such as; flexibility, services/facilities, hospitality and diversity of companies. This could contribute substantially to municipalities and policy makers in the steering, stimulation and initiation of new office developments, that attracts highly educated and creative workers. Therefore acting as a catalyst for other companies, which is evident in the knowledge economy, to create an attractive dynamic metropolitan environment.

Keywords; imbalance, office market, highly educated and creative workers, networks, discrepancy, building and location determinants,

Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning.

Albert Einstein

Part I Introduction

1. Introduction

1.1 Introduction

Global migration, economic shifts and demographic changes have considerably influenced the real estate market. As a result of the declining price pressure, the structural reduction in space requirements, the shift in disposable income and the upcoming information technology, the existing office building stock has transformed in a negative feedback loop (so-called varkenscycles) (Rijksadviseurs, 2014). Within the Dutch real estate market, a break originated in the balance between the supply and the demand side. The market transformed from a replacement market into a buyer's market in which there was a large oversupply. The vacancy rate of the office market increased substantially from 7 million m2 (15%) in 2013 (Remoy & van der Voordt, 2014) into 7,9 million m2 (16%) in 2014 (DTZ Zadelhoff, 2015).

Furthermore, according to the European Union (1996) in 2030 more than 80% of the global population will live in cities. Due to existing urban conglomerations and planning policies, new developments of greenfield sites are becoming more and more complex and restricted (Myers & Wyatt, 2004). This is creating a situation in which there is an increasing pressure on the urban land use. An example of this is an exponential increase in migration of both residents and companies to the (urban) centres. For example, of the 1.2 million m2 realized office buildings in 2015, 40% was realized within 750 meters of a railway station (DTZ Zadelhoff, 2016b). This is furthermore emphasized by a forecast by CBS (2015) of the population growth from 2015 - 2060 in the Netherlands towards 18 million. As a result of the increase of migration towards city centres and the exponential development of technologies, cities are trying to increase their competiveness by attracting or retaining people who work in creative and knowledge-intensive sectors (Boterman & Sleutjes, 2014a). Subsequently, there is a high expectation that inhabitants and companies, in their decision-making process to relocate, have a high interest and tendency to establish themselves at urban locations. More specifically, through the differentiation of retail, businesses, leisure, living and working there is a high need to develop multi global dynamic hubs at city centre locations.

The following aspects, the (negatively) increasing vacancy rate, the imbalance between the supply and demand side and the market forces have contributed to the increase of two important aspects. There is a recognition of the market, which is stimulated by a governmental shift (Ministerie, 2013), in which the abandoned buildings are withdrawn from the market through restoration/transformation or demolition (Vastgoedjournaal, 2016b). Furthermore, through a wide range of aspects, such as the social-demographic changes, the declining labour force, the increasing popularity of the 'new way of working' and the decreasing surface area per employee and etc., have contributed to a large extent that the evolving attributes of the demand side are changing substantially. The businesses are developing new location preferences and a transition is occurring in the importance of the factors that determine their decision-making process, such as facilities/services and the clustering of businesses. This is contributed to the substantial appearance of the so-called communities (networks).

The existing imbalance in the market is influenced by the changing location and building determinants of the demand side. Besides this, it is influenced by the supply side through

the multidisciplinary character of the built environment. There is a conflict of interest between the independent stakeholders that are involved in the development process. For example, by reviewing the involvement of the municipality in the period before the economic crisis that was characterized by an increasing demand it becomes clear that the municipality had a dual function that is contradictory. It consisted of a facilitating and stimulating policy for the development of new office buildings. It also consisted of the willingness (decentralized) to allocate land and to gain revenues. In contract, in a market that currently is characterized by an increasing vacancy this could have a negative influence on the imbalance. It is a continuously changing process that retains a high complexity (Zuidema & Van Elp, 2010b).

Through a substantial increase in the individualization of people, the influence of technological developments that become more and more integrated in the daily life and the increasing pressure on city centres, people have a strong need to work, live and recreate in a dynamic environment in which all facilities and transportation possibilities are intertwined. However, through the changing demand preferences in the location decision-process, the market pressure and dynamics, the scattered built environment and the interdependent interest of the most important stakeholders, a challenging situation is created to compose or determine new development strategies from both supply and demand side. Therefore, it is evident for cities to initiate or develop an attractive metropolitan environment that enables to retain or attract highly educated and creative workers, businesses and communities (DNB, 2016). The job value is primarily of high significance towards these highly educated workers, however they also have clear preferences towards other aspects of life. Aspects that influence the preferences do not only contain the quality of the house and the accessibility of employment from its location sectors (Akcomak, I.S.; Borghans, L.; ter Weel, 2011). Therefore, it is evident that in order to compose new development strategies the changing demand preferences are taken into account that could contribute to a large extent to the collaboration of public and private development organizations (Louw & Bontekoning, 2007).

Through the analysis of the existing gap between the qualitative demand and the quantitative demand and current developments, new insights will be gathered about the transition of the location preferences of the demand side and in correlation new development strategies. The gained insights that are obtained from the analysis could contribute to the main stakeholders that are involved in urban development policy, to identify a new policy mix to eventually contribute to the overall quality of life.

1.2   Problem definition

The market forces, the continuously changing economy and the increasing vacancy rate has created a situation in which there is a clear mismatch between the supply and the demand side. This resulted in a decreasing demand for the development for new real estate. This mismatch was further confirmed by several reports ((Bak, 2014); (Dynamis, 2015); (DTZ Zadelhoff, 2016a)). However, through the increasing migration of both residents and offices to the city centres, the shift in their location decision process and the conflict of interest among the most important stakeholders, it is challenging to develop new strategies or opportunities in the market. Therefore, the market pressure remains high and there is a high awareness and commitment for new developments. From a diversity of levels the dynamics are changing and a transition is occurring on the concentration of new

areas; the Randstad versus the rest, the city versus (new) suburban environments and etc. Within these new opportunities, the challenge consists of sustainable urbanization, to retain or shrink the business climate or to create a new and attractive business climate. This shift requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties (Pen, 2014).

From the investigated literature it can be stated that through the continuously shifting economy, the deindustrialisation, adaptations in the work force and the transition to a service-based economy, a new type of urban geography emerged. In addition to trade-offs between these aspects contributed to the appearance of new location attributes for the highly educated and creative workers (Boterman & Sleutjes, 2014b). Cities, urban planners and policy makers are continuously thriving to develop initiatives and strategies in which cities are trying to increase their competiveness by attracting or retaining people who work in creative and knowledge-intensive sectors (Akcomak, I.S.; Borghans, L.; ter Weel, 2011). Niedomsyl & Hansen (2010) state that cities implement development plans through a diversity of cultural amenities and high-standard public services in order to attract highly skilled labour that will eventually attract investments. Subsequently, this contributes to the creation of a healthy economic environment. Furthermore, by attracting highly educated/ creative workers, on a macro level the economic positioning of a city is strengthened and on a micro level this is contributing to a dynamic environment in which living, working and recreating are intertwined. Therefore, the importance of the correlation between the fulfilment of needs, demands and preferences (to create an attractive environment) will contribute substantially in decreasing the different aspects that affects the choice opportunities for location decision behaviour.

In literature, a suitable solution in the creation of a metropolitan environment that consists of a diversity of living, working and leisure, can be identified in the debate of the regeneration of brownfield sites (Glumac, Han, & Schaefer, 2013). Due to their high potential and location, these areas could have a major impact on the future development of the city. A wide range of benefits are imbedded in the restoration and redevelopment of a brownfield. These benefits consist of economical, social and environmental benefits, such as better environment quality, provision of land for housing or commercial purposes, creation of employment opportunities and especially the reduction in the pressure on urban centres. Besides these benefits an important aspect is the collaborative environment between the public and private sector that is categorized by the lack of consensus amongst key stakeholders (Glumac, Han, & Schaefer, 2013). An example of this is the area Strijp-S that is located in Eindhoven. Even though the city of Eindhoven has been ranked as one of the smartest regions of the world; it is missing a real urban surrounding area that is evident for the future to maintain its economic positioning and to attract certain knowledge workers and artists. The area of Strijp-S as an urban centre has this ability, this is further emphasized in the master plan (Van Winden, Van den Berg, Carvalho, & Van Tuijl, 2010 ; ED, 2011; Boterman & Sleutjes, 2014).

"The area Strijp-S has been considered as the location in which Eindhoven can fulfil its needs to create its missing metropolitan environment. Therefore, it is a key element in the Brainport strategy to make the city attractive for international oriented knowledge workers and artists. Strijp-S has to create the living, work and stay conditions to tie this target group to Eindhoven"(KuiperCompagnons, 2007, p. 25).

Furthermore, the economic crisis and the evolving location factors of the demand side contributed to a large extent to the appearance of so-called communities (networks). These networks consist of small- and medium companies that form new location preferences. Furthermore, within society new trends are gaining more importance that in the future will combine residential mobility with the continuously changing market forces of the office market. The first initiatives of this are located in Copenhagen (The Nest) and in London (The Collective), in which both living and working are combined in so-called co-working spaces or co-living spaces (Homes&Property, 2016). Even in Amsterdam the first concept of both living and working is initiated (Telegraaf, 2016).

Within literature a lot of research has been conducted in order to determine the residential preferences of highly educated people/ creative workers (Florida, 2005 ; Martin-Brelot, Grossetti, Eckert, Gritsai, & Kovács, 2010 ;(Boterman & Sleutjes, 2014a);(Boterman & Sleutjes, 2014b). However, in relation to their location decision evaluation, there is within literature a lack of knowledge in literature in determining the behavioural foundations of companies in relation to their location decision behaviour (Timmermans, 1986). Most research is conducted in determining the expansion possibilities for corporates or the relocation of a company (Yang & Lee, 1997; Cheng, Heng, & Yu, 2005; Mărgulescu & Mărgulescu, 2013). In line with this, the contribution and significance for design and planning professionals in implementing this research is constrained (Amole, 2009). Besides this, through the individualization of people and the place identification, the overall satisfaction of this target group is also highly influenced through their location decision process. Therefore, it is interesting to identify the most important building and location determinants of offices that are influenced by the location decision behaviour process of highly educated/creative people who work in small and medium businesses. This research will contribute in overcoming the imbalance between the supply and demand side and to develop the working building of tomorrow.

1.3 Research question(s)

By investigating the building and location determinants of highly educated and creative workers, who work in small and medium businesses in relation to their decision-making process, the most important attributes will be identified. This research will be conducted through both a literature review and a questionnaire and result in the identification of new development strategies for new office development. Furthermore, by investigating the supply side, through both a literature review and in-depth interviews with the most important stakeholders (municipality, investor/ project developer and etc.) more insights will be gathered in order to improve the decision-making process between the different stakeholders. This will also contribute to determination of the most important location factors from the supply side. In line with this, the following research question is defined:

In which way can the imbalance in the office real estate market be overcome, between the supply and demand side, by investigating the building and location determinants for highly educated and creative workers, to reduce the discrepancy and initiate new office developments?

Sub questions:

(1.0) Current situation

- *(1.1) What are the market dynamics and forces that contributed to the imbalance between the supply and demand side? What is the influence of the demand and supply perspective?*
- *(1.2) What are new opportunities and trends in developing office concepts?*
- *(1.3) What is the future in office development and should there be a redefinition of the concept of an office to identify new development strategies?*

(2.0) Demand perspective

- *(2.1) What are the most important attributes that determine the location decision behaviour for highly educated people / creative workers who work in small and medium businesses?*
- *(2.2) What is the significance of these attributes and what is their relation?*
- *(2.3) What is the importance of the emerging networks (communities) in relation to the emerging working concepts and how will this influence the new typology of the office?*

(3.0) Supply perspective

- *(3.1) What are the most important attributes/determinants that influence the location development process and their interrelated relation from the perspective of the supply side?*
- *(3.2) What current development strategies are implemented and what are the most important variables?*
- *(3.3) In which way can the conflict of interest between the independent stakeholders be overcome to create more transparency and to stimulate office developments?*

(4.0) Defining a development strategy

- *(4.1) From the derived results of the demand- and supply side is it possible to design a development strategy for the development of a (new) office?*
- *(4.2) How could this development strategy be implemented within the current market to overcome to complex processes that are involved between the demand and supply side?*
- *(4.3) In which way will the developed strategy create an added value to the processes that are involved in office development for networks?*

1.4 Research design

The research part is composed into three phases in order to understand the issues that are involved in the continuously changing real-estate market, the implementation of new development strategies, the interdependent interest of the stakeholders and the different aspects that influence the location factors of offices. First, a literature review is conducted in which the market dynamics and forces and the development of the office is described, the so-called theoretical framework. The second phase, the so-called research part, consists of an in-depth investigation of the most important building and location determinants of both the supply and demand side, the research approach, methodology

and the data which is derived through a questionnaire and interviews. The data is collected based on a discrete choice experiment and analyzed using a multinominal regression model. In the third part, the theoretical framework, the derived data and the in-depth interviews are compared and conclusions are drawn. Furthermore investigated whether it is possible to construct development strategy that implements both the demand- and the supply side in overcoming the existing challenges in the real-estate market. The research model is shown in Figure 3.
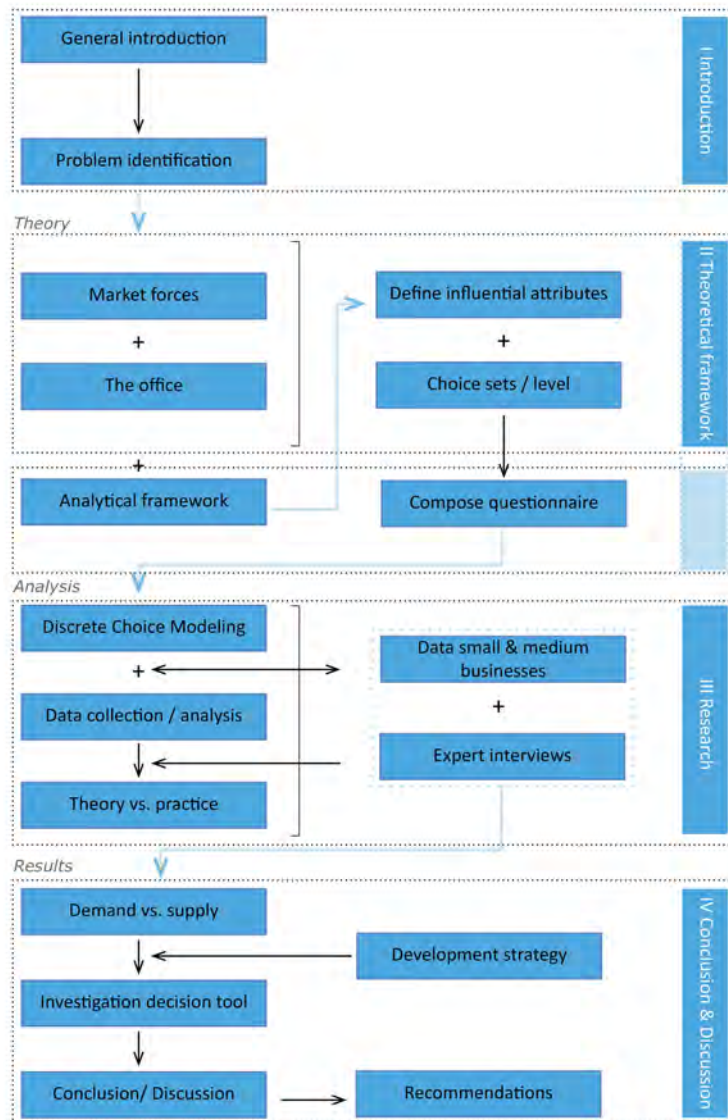
Figure 3 The research design

1.5   Expected results

Through an investigation and analysis the most evident office location factors for the location-decision process of highly educated/creative people will be determined. Besides this, through in-depth interviews with the most important stakeholders, new insights will be gathered in order to compose a development strategy that overcomes the imbalance between the supply and demand side.

This study will be valuable for the stakeholders that are involved in the real-estate market and their commitment and willingness to contribute to the urban development policy and

to create an attractive economic environment. New opportunities in the market can be formulated and in accordance with this new business strategies can be defined.

By investigating the supply side, the interdependent stakeholders that are involved in real-estate market, more transparency is created in overcoming the conflict of interest in office development. And investigation between the theoretical framework and the derived results will contribute to the identification of the importance of the different attributes. This will result in a development strategy. The aim of the development strategy is to implement the derived building and location determinants within the initiative phase and therefore provide insights in how to reconcile differences and reach consensus between the supply and demand side. Eventually resulting, from a bottom-up approach, in the development of a 'new' office building in which the emerging network and their building and location determinants are taken into account.

The relevance of this research to SDK Vastgoed is to investigate the current developments that occur in the continuously changing office stock market. From the top-down approach the most important building and location determinants that influence the office market, from the perspective of the stakeholders, will be determined. And from the bottom-op approach the most important building and location determinants, such as facilities/services or location, of the demand side will be determined. And the aim is to identify the building and location determinants of highly educated and creative workers, who cluster their activities and form networks, to develop a 'new' suitable development strategy, for a new office building. More specifically, to compose a development strategy that takes both the supply and demand side into account and identifies incentives to overcome the imbalance between the qualitative demand and the quantitative demand. The development strategy should overcome the existing gap between the involved stakeholders in order to compose new incentives that allow front-end approaches and flexibility and contribute to the built environment. And within the current market, new opportunities have to be identified to break through the stagnated and fragmented built environment.

1.6   Relevance and limitations
Societal relevance

In the process of creating a multi global dynamic environment in order to attract highly educated/creative workers a transition is necessary by the policy makers. Municipalities had a dual role in which they allocated the land in order to gain revenues and create an attractive environment. Currently, the government has more of a facilitating and stimulating policy for office development. The attitude of the government in collaboration with other important stakeholders has an enormous impact to compose development strategies and to define the office of tomorrow. Besides the composition of a development strategy, more insights will be gathered in the location decision process of highly educated and creative workers, that cluster their activities in networks, and the willingness and commitment of other stakeholders, will contribute to the decision-making process between the different stakeholders.

Scientific relevance

The real estate market and interrelated complexity of vacancy is gaining a lot of interest and awareness within the Netherlands. A possible solution is estimated through the transformation/ renovation of the oversupply. Within multiple research articles, promotional theses, and master theses a lot of research has been conducted within the process of transformation and the decision-making process between the independent stakeholders. However, due to the current imbalance between the supply and demand side and the emergence of the small and medium business and their location decision behavior, research on how to compose a development strategy for an 'new' office building for new type of urban geography, the highly educated and creative workers, that form networks is limited. This research will contribute in the identification of the building and location determinants for the highly educated / creative workers who work in small and medium businesses. Furthermore, through in-depth interviews with the supply side, the relevant building and locations determinants and development aspects will be defined. As a result of the composed development strategy, the potential, the amount of participating stakeholders and the location, the aim is to investigate, with the examined data and results, the case study Strijp-S. Therefore, this master thesis contributes scientifically in identifying the location decision behavior and to translate this into a development strategy that can be implemented in practice.

Research limitations

Due to the continuously changing office market and the interrelated complexity, it is not possible to implement and investigate the whole stock within this research. Therefore it is important to define the scope of this research. The scope of this research consists of two parts. First, through a literature review the market dynamics and forces and the development of an office will contribute in understanding the most relevant aspects. Furthermore, through an analytical framework the most important building and location determinants of highly educated/creative people who work in small and medium businesses will be determined. Parallel to this process, the most relevant aspects are determined from the supply side (project developer / municipality). Secondly, through a questionnaire and in-depth interviews the most important attributes of the supply- and demand side and their relation will be investigated. A development strategy, including the most important variables, will be defined and propositions will be determined. Therefore, the following boundaries are set to further define this research:

1. The focus of this research is the target group highly educated/creative workers who work in small and medium businesses.
2. The businesses are located at a Brownfield Strijp-S in Eindhoven.
3. From the supplier perspective (property investor/ municipality) the most important aspects will be identified. Through in-depth interviews the attributes and their interrelated relation will be identified.

1.7   Reading guide

This research is composed of four parts. The first part, the introduction, consists of two chapters. The first chapter (i) introduces the research framework and discusses the problem description that will be investigated within this research. The second chapter (ii), the glossary, clarifies and examines the most important definitions that are implemented

within this research. The second part provides a thorough and precisely examined framework that is composed of two chapters: (iii) Market forces (theoretical framework) and dynamics and (iv) research in the building and location determinants from both supply and demand side (analytical framework). The derived results of the chapters will contribute in the investigation and clarification of the sub questions. The third part, the research, consists of two chapters. The fifth chapter (v) clarifies the research method and the developed questionnaire. The sixth chapter (vi) examines the derived data. The fourth part consists of the conclusion (vii) and discussion (viii) in which the results in relation to the main research question and possibilities for future research are proposed.

2.   Glossary

Within this chapter the most important definitions and clarifications are defined that are implemented within this research in the investigation of the office real estate industry.

Defining vacancy

Within this research several types of vacancy will be addressed. In order to derive a further classification of the 'type' of vacancy it important to clarify the terminology of vacancy. In literature there is no consensus of what is meant with vacancy. Within literature there are several definitions of what is meant with vacancy. Alker et al. (2000) refers to vacant if it is *"not occupied or being put to use, meaning; land on which some previous productive use has ceased for a significant period of time".* (Alker et al., 2000, p. 64) Bak (2014) derives the definition of vacancy in relation to the size, namely if an office is bigger than 500 m2 (Bak, 2014). Furthermore, according to DTZ[1] (2015) the vacancy in the office market is referring to the available space in completed buildings that at the time of the inventory is not in use (anymore). Another definition is given by Dynamis (2015), *"it in general non-rented (or a part of) a real estate object".* (Dynamis, 2015, p. 156)

By examining the separate definitions it can be stated that there is a clearly defined overlap in the terminology. However, by investigating the market it can be stated that different types of vacancy can be distinguished. According to Hulsman & Knoop (1998) vacancy can be divided into four major types:

- (1)_Initial vacancy: vacancy just after an office building has been completed and is added to the market.
- (2)_Frictional vacancy: vacant office supply under normal market conditions, which is needed for the market to allow efficient movements; bandwidth 5-7%.
- (3)_Economical vacancy: vacant office supply due to economic conditions in the market. When the economic trend changes positively, this vacancy will be absorbed by an increasing demand.
- (4)_Structural vacancy: vacant office supply that has been vacant for over three years due to building and/or location characteristics.

Another categorization is defined by Keeris (2007) in which a distinction is made about the level of negative influence; accepted vacancy, problematic vacancy, dramatic vacancy and administrative vacancy. Keeris emphasizes, that within this typology, the structural vacancy can be found in the category dramatic vacancy. The category dramatic vacancy consists of three levels of gradation; future perspective for the tenant, real estate that has been structurally vacant for over two years and the third one is structurally vacant real estate. This structural real estate does not meet the current requirements from the demand side, due to a wide range of aspects. According to Van Gool et al. (2007) some of these aspects

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[1] In the publication 'The Netherlands complete" (Dutch: Nederland compleet; Kantoren- en bedrijfsruimte-markt) a definition is given for the vacancy in the office stock market. (Leegstand = betreft aangeboden ruimte in opgeleverde gebouwen die op het moment van inventarisatie niet (meer) in gebruik is). (DTZ Zadelhoff, 2015)

are the lack of qualitative location characteristics, the demographics (working population), business confidence, the quality of office space, locational aspects and the amount of required square meters per person and etc. A more distinctive classification is conducted by Van der Voordt et al. (2007). According to Van der Voordt et al. (2007) vacancy can be divided in four categories;

- (1)_Accepted vacancy;
- (2)_Problematic vacancy;
- (3)_Dramatic vacancy;
- (4)_Administrative vacancy.

An important aspect, as stated by Van der Voordt et al. (2007), is the duration of the vacancy. From the investigation of the available literature an object is categorized as structural vacant if it has been on occupied for more than 2 years and the expectation is that this situation will remain.

To summarize, the typology of vacancy can be divided in two main categories; cyclical vacancy and structural vacancy. The first type, the cyclical vacancy, is referring to the before described real estate cycle (dutch; varkencyclus). If the demand is increasing, this will eventually create an oversupply and in a normal market the tension between the demand and supply side is seeking an equilibrium. However, within the current market this is not the case and there is an imbalance market (Lamers, 2013).

Defining a Brownfield

A lot of literature has been written about what or how a Brownfield can or should be defined. Within literature there is no consensus about what is meant with a Brownfield. Alker et al. (2000) emphasizes the importance to compose a clear definition of a Brownfield, due to the multidisciplinary character of the different stakeholders that are involved in Brownfield redevelopment. A theoretical background is given, in order to define a Brownfield.

Throughout literature there is a wide range of definitions available. According to United States Environmental Protection Agency (US EPA) (1996) there is a relation between a Brownfield and contamination *"Abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination".* (EPA, 1996, p. 1) This is also addressed by McCarthy (2002), that states *"Brownfields are abandoned or under-utilised sites with known or suspected environmental contamination".* (McCarthy, 2002, p. 287) However, not all Brownfield are contaminated.

Taking into account the factors that are related to a Brownfield, the following definition, for universal usage, is proposed: *"A brownfield site is any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilised. It may also be vacant, derelict or contaminated. Therefore a brownfield site is not available for immediate use without intervention".* (Alker et al., 2000, p. 64)

This definition is extended by Glumac et al. (2013) that state the following: *"A brownfield site is any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized. It may also be vacant,*

derelict or contaminated. Therefore, a brownfield site is not available for immediate use without intervention." (Glumac et al., 2013, p. 794)

Throughout this report several terms are implemented. Therefore, below the most important definitions within the office real-estate industry will be defined. To create uniformity throughout the total report.

Absorption office stock: A transaction with a volume of at least 500 square meters of lettable floor area in the four major cities. In other cities transactions are recorded that consist of at least 250 square meters (LFA). The absorption must be rented or sold on the 'free' market. Investment transactions such as sale-and-leaseback, are disregarded when the actual absorption of the user has already been registered. The transactions are recorded in the year that consensus has been between the parties. (Dynamis, 2015)

Courant: An office is courant if it is technically up to the requirements of the demand side and it is possible to be put it on the market non-competitive for the right price. For this type of office, a user is found in theory quickly. (Stijnenbosch, 2015)

Development strategy: The criteria in determining the assessment for investment decisions in the development process and that are adopted in making the initial investment decision (Ruhl, 2015)**.**

Economical ageing: If the exploitation of an office is no longer profitable.

Free market: The rental and/or sale market in which property developers and investors, offer offices/companies and/or retail buildings for unknown users. (Dynamis, 2015)

Incentives: Incentives are discounts that are agreed between tenant and landlord to close or to extend an agreement. For high-quality real estate the incentives are limited and for real estate with a limited distinctive character the incentives increase. (DTZ Zadelhoff, 2016a)

Institutional/ public investors: Financial institutions which because of their function the position have to invest cash for a long period. Institutions which invest in real estate are: pension funds, insurance companies, and investment companies.

Institutional investor: A professional financial organization that manages capital of its participants in order to be able to do future payments to these participants (Keeris, 2007). For example: pension funds and insurance companies.

Location factors: The factors are related to the spatial situation of the office building (proximity to services, accessibility, parking facilities and etc.). (Louw, 1996)

Normative aging: If an office not meeting the actual quality standards of users, this could have a relation with technical aging, but also with the change demand of users.

Obsolete: An office is obsolete if it is technically aged and therefore is no longer measured in the supply. More specifically, the building is no longer suitable as an office and can no longer be used as an office building. (Stijnenbosch, 2015)

Office: A spatial independent unit which is largely used or to be used for office-related activities or supporting activities. The definition of office as a regional independent unit

means that offices in factories, commercial buildings, hospitals and universities are excluded from the statistics. (Stijnenbosch, 2015).

Office building: A real estate asset which is completely or at least for the majority, used for desk-related activities. (Keeris, 2007)

Office market ratio: The office market ratio is the ratio between the demand for office space in a given year and the supply at the end of that year. More specifically, this ratio is representing there is a balance between the supply and demand side. If the ratio increases, the imbalance between the supply and demand side decreases and there is a market that is more tight. And if the discrepancy between the supply and demand increases, the office market ratio decreases. (Dynamis, 2015)

Office organization: Companies that have a need for office space in order to be able to execute their business activities. (Keeris, 2007)

Office stock: The total amount of office spaces in the region, rented, in (private) use, empty or under construction. More specifically, the stock with a surface area higher than 500 sqm that is located in municipalities that consist of more than 10.000 sqm of offices spaces. ((Dynamis, 2015);(Stijnenbosch, 2015))

Prime real estate: Modern, current real estate that meets today's needs and requirements of businesses and is located at a good location. Offices and business that is less than five years old is generally considered as prime real-estate. (DTZ Zadelhoff, 2016a)

Private investor: A natural person or group of natural persons organized in a legal entity who invests private money in order to establish a certain return on their investment in the future. (Van Gool et al., 2007)

Professional/ private investors: This group exists out of the institutional investor and the listed real-estate funds.

Real-estate developer: The developer initiates and invest in the development and realization of real estate projects for the market. (Nozeman, Fokkema, & Scholten-Theessink, 2010)

Real-estate investor: A natural person, or legal entity who invests capital in real estate in order to generate a future return on investment. (Van Gool et al., 2007)

Reallocation/transformation: The extraction/withdrawal of a building of the market with an office function, with the purpose to transform this in a building with a non-office function. (Dynamis, 2015)

Rental prices: Rental rates are measured in euros per square meter per year leasable area, excluding VAT, service costs and any other fees, such as goodwill and / or acquisition costs. ((Dynamis, 2015);(Stijnenbosch, 2015))

Small floor areas: (dutch: kleine metrages) A transaction with a floor area between 250 and 500 sqm in the four major cities and in other cities less than 250 sqm. (Dynamis, 2015)

Stock in use: The part of the office stock that is not registered as supply at the time of assessment.

Stock office spaces; Existing or under construction office space with a surface area of 500 sqm rentable floor area or more. (Dynamis, 2015)

Structural office supply: The office spaces that are offered with the same quantity of square meters for three or more consecutive years. (Dynamis, 2015)

Supply: The supply is the total office supply including the vacant offices. Buildings in which at the end of each calendar year at least 500 sqm of office space is available for rent or sale. The supply is only referring to the already new constructed buildings or buildings that are under construction. ((Dynamis, 2015);(Stijnenbosch, 2015))

Technical aging: Technical aging means that the buildings are technically no longer adequate to be used as an office. Therefore the buildings are withdrawn/ fall out of the market. The buildings no longer meet the functional requirements of the demand side. (Dynamis, 2015)

The new way of working: The execution of work that is time and location-independent. A concept in which people share multiple workspaces. Offices become meeting places. (CPB, 2012)

Vacancy: In general, the non-rented (part of) a real estate object. (Dynamis, 2015)

Part II Theoretical framework

3. Theoretical framework: Market forces and dynamics

3.1 Introduction

The economic shifts, duration of the economic recession and important demographic changes has substantially influenced the real estate market. Through a declining price pressure, the structural reduction in space requirements, the shift in disposable income and the upcoming information technology, the existing building stock is transforming in a negative feedback loop (so-called varkenscycles) (Stroink, 2014). The above-mentioned aspects and through the changing demand preferences, the vacancy rate within the office market is increasing considerably.

In the Netherlands, according to Remoy & Van der Voordt (2014) the vacancy rate was about 7 million m2 (15%) in 2013. According to DTZ Zadelhoff (2015) the vacancy rate increased to 7,9 million m2 (16%) in 2014. This is in contrast with a normal standard of a vacancy rate of 3 – 8 %. Furthermore, of the total office stock 28% can be categorized as structural vacant (Stijnenbosch, 2015). Within the Dutch real estate market a break originated in the balance between the supply and the demand. Within the office real estate market this imbalance can be explained due the fact that the labour force stops growing, the "new way of working" is gaining popularity and the surface area per workplace per employee is decreasing (Besselaar, 2011). This is shown in Figure 4.
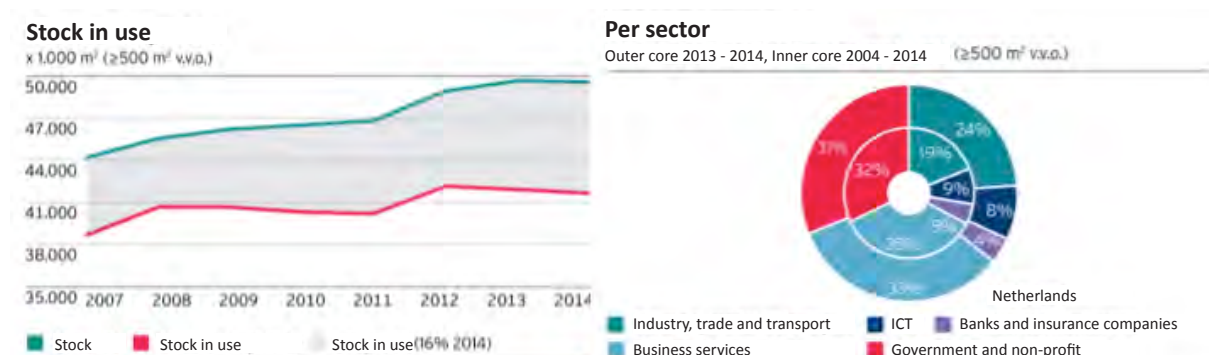
Figure 4 The difference between the existing building stock and the amount of vacancy regarding to the different sectors (derived from (DTZ Zadelhoff, 2015))

This chapter seeks to contribute to the topic of the office stock market in different ways. First, the dynamics and market forces that created the vacancy are described. Secondly the office market in het Netherlands and in Eindhoven will be examined in order to capture the emerging 'new' demand target group, the so-called occurring mismatch between the supply and demand side. Thirdly, the most important aspects that determined the imbalance between the demand and supply side will be investigated. To conclude, through a future perspective of the office and the emerging office concepts and trends, new opportunities are identified.

3.2 Market forces and the dynamics

The forces that characterize the market mechanism and the dynamics of the economy are always subject to fluctuations between supply and demand side and are always seeking an equilibrium. Just as in the economy, these forces are also applicable on the office stock market. In order to understand the office stock market, it is necessary to investigate the

market on multiple levels. A model that describes these forces is the so-called real estate cycle (Dutch; varkencyclus) (Van Gool et al., 2007).

The cycle is characterized by a shortage of office space, increasing prices, new built offices, an enlargement of the supply (oversupply), an increasing of the associated risks, a decrease of the production and eventually in a shortage of office spaces. It is a vicious circle. This is shown in Figure 5. The main reasons for the real estate cycle are the longer construction period and the macro-economic fluctuations. Therefore, as stated by Van Gool et al. (2007) and Stijnenbosch (2015), the supply of office spaces is relatively inelastic.
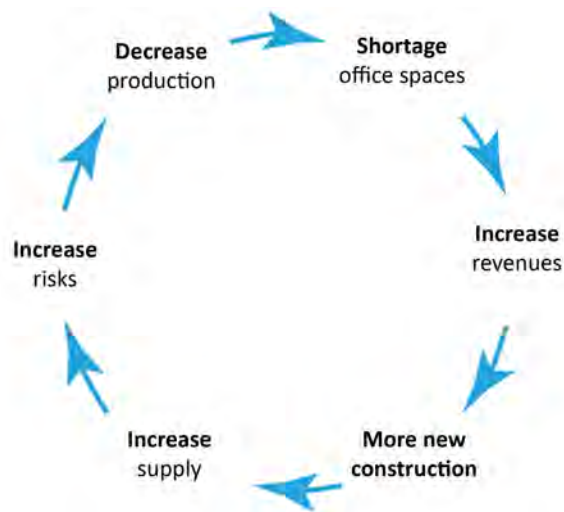
Figure 5 The real estate cycle ((derived from (Van Gool & Vos, 2002))

By examining the real estate cycle, the current oversupply in the office market can be explained. The current market in relation to the real estate cycle shows that the office market in the Netherlands is now in the phase of "increasing demand" (oversupply). According to the progress of the cycle, this phase is supposed to be followed by a phase that is characterized by a shortage of office spaces. However, as stated by Steinmaier (2011), the expectation exists that the current market does not absorb this short-term oversupply. Therefore, it seems that there is an imbalance and the real estate cycle is stagnating. Even though the real estate cycle is providing an explanation of the temporary oversupply, by examining the practice it becomes clear that there is a permanent situation of oversupply (Zuidema & Van Elp, 2010a).
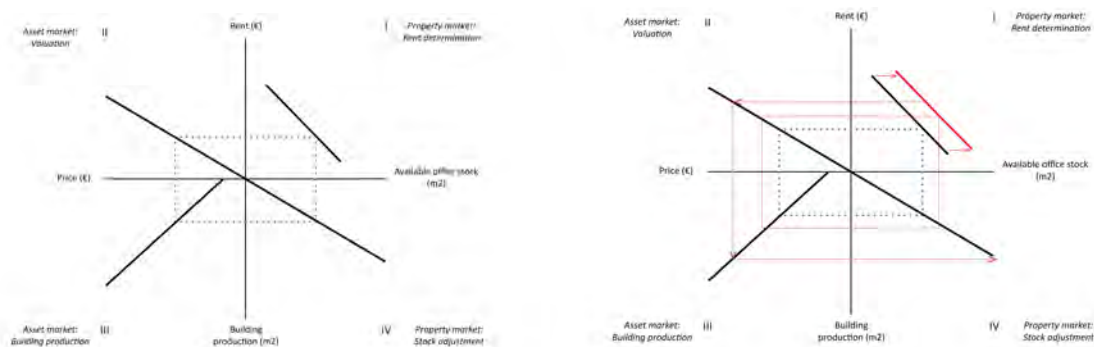
Figure 6 The market forces model by DiPasquale & Wheaton (derived from (DiPasquale & Wheaton, 1991))

Within literature there is a model that is often cited in order to describe the forces in the office stock more explicitly, the so-called four quadrants model and it has been developed by DiPasquale & Wheaton (1991). The model describes and clarifies the relationships between the real estate market and the asset market variables. Furthermore, it also examines adjustments within the real estate market that occur to find the equilibrium in the supply of and demand for real estate. The quadrants represent the occupier/user market, the investment market, the development market and the space market. The occupied/user market consists of the rental market and the adjustments to the stock. The

investment market consists of the investors market and the construction market. The model is shown in Figure 6.

In the first quadrant, top right, the demand for property is visualized. The amount of available stock determines and influences the rent, based on the principle of supply and demand. In the second quadrant, the relationship between the rent and the investment value of real estate is visualized/expressed. Within this quadrant, the slope of the line is equal to the capitalization rate. This relation is implying that there is a direct relation between the investment value and the amount of rent. The slope is equal to the quotient of rent and investment value (the so-called 'initial return'). The initial return has a positive relationship with interest rates. The third quadrant is representing the situation in which the building production is increasing according the increasing investment value. Due to the fact that a minimal value should be achieved for the compensation of the construction costs, the line is not starting in the origin. The fourth quadrant is representing the relation between the building production and the available inventory. If a situation occurs if there is a high building production this will result in an increase of the total building stock. In return this affects the rent level. The model is continuously searching for a balance. To summarize, the upper quadrants represent the short-term dynamics and the bottom quadrants represent the long-term dynamics.

By reviewing the current situation in the Netherlands it becomes clear that vacancy and transformation is a re-occurring process. However, the last few years the market transformed into a so-called 'replacement market' (dutch: vervangingsmarkt). The current office stock that is being used is somewhat stable. Due to aspects that the labour force has stopped growing, the increasing popularity of the 'new way of working' and the decreasing surface area per employee, the demand of expansion is decreasing. Therefore, the construction of new buildings only occurs to replace the old. This creates a situation in which there is an oversupply, the so-called 'buyer's market' (dutch: vragersmarkt). More specifically, the origin of this situation can be easily explained with the model of DiPasquale and Wheaton. By examining the situation of the Dutch office stock in 2000, in which there was a tremendous construction period as a result of the increasing demand, an economic recession occurred. This resulted in a decreasing demand or even a total absence of the demand. Therefore the demand curve is moving to the left. Parallel to this process, and as a reaction to the economical crisis, the interest rate was adjusted downwards. This resulted in a lowering of capital costs. Therefore, the funding of offices became more interesting for the investors. Finally, the market turned into a new equilibrium and contributed to the increase of the building production. As describe before, the demand was substantially decreasing, this eventually resulted in an oversupply. However, within the model of DiPasquale and Wheaton, the market should restore itself again (DiPasquale & Wheaton, 1991). This is shown in Figure 7 (Zuidema & Van Elp, 2010a).

Figure 7 The occurring process of vacancy shown through the model by DiPasquale & Wheaton (derived from (DiPasquale & Wheaton, 1991))

To summarize, at the turn of the century, the office market made the transition from an expanding market towards a replacement market (Brounen & Eichholtz, 2004). Since this period, the demand for office real estate is no longer increasing. However, the total volume of supply of office real estate did increase during this period. The model of DiPasquale & Wheaton does not take structural vacancy into account, due to the effect that the market should recover in the long term in equilibrium.

By examining the model of DiPasquale & Wheaton, in the phase of equilibrium between the supply and the demand, it is assumed that if deviations occur in the vacancy these are temporary. The balance should restore itself due to the assumption that if there is an increase in vacancy, the prices will decrease and the active forces of the market will absorb this temporary vacancy. However, within the current market there is a structural vacancy. Therefore, the model of DiPasquale & Wheaton was extended by Colwell in 2002 with the factor vacancy (Colwell, 2002). The variable vacancy was added to the fourth quadrant. As stated by Colwell, the occurring vacancy should be able to compete as an office. More specifically, Colwell assumes that obsolete empty offices are not competitive and can be removed from the market. These offices are characterized as obsolete (Colwell, 2002). This suggests a shift in a part of the office stock market from courant to obsolete offices. This is closely related to the tension between supply and demand.

The combination of the model of DiPasquale & Wheaton and the extension of Colwell give a theoretical clarification of occurrence of structural vacancy. By implementing the model of Colwell, all the offices that can be categorized as non-competitive and that exceed the natural vacancy, are no longer qualified as an active element in the model and therefore left out of the model. The existing oversupply in the Dutch office stock could be categorized as obsolete and be priced of the market. However, the office stock market is more complex and more heterogeneous than the theoretical model. In the following paragraph the office market of the Netherlands will be examined.

3.3   Office market in Netherlands

The market forces, the continuously changing economy and the increasing vacancy rate created a situation in which there is a clear mismatch between the supply and demand side. There is less demand for the development for new real estate. This mismatch was further confirmed by several reports (Bak, 2014; Dynamis, 2015; DTZ Zadelhoff, 2016a). This is shown in Figure 8. Currently, the total stock consist of 54 million m2 office space of which 16% is vacant (Rooijers, 2015). This paragraph examines the development of the Dutch office stock

Figure 8 Supply and demand absorption offices (derived from (Remøy H. , 2010))

market in relation to the vacancy.

Through the exponential economic growth in the sixties and the parallel increasing emerge and demand of rental offices, companies were resilient to lay down their funds in the ownership of a building. A higher priority was given for flexibility in financial and spatial quality. This increasing demand resulted in the creation of an investment market for office buildings. The investment market correlated with the investment pressure from social pension insurance companies, which needed products. Throughout the seventies the Dutch office market increased through the increase of investments of British investors. This resulted in large amount of quality office space on the market. However, the oil crisis that occurred in 1973 caused a stagnation (Van Gool et al., 2007; Besselaar, 2011). Throughout the eighties the Dutch economy recovered slowly. The recovery was followed by a enormous boost to the economy during the second half of the eighties. This resulted in an increase of the rent and subsequently an increase in the investment opportunities for the supply side. Through the economical crisis that occurred in the United States and that transferred to the Netherlands this ended abruptly in the 1900's. This resulted in a strong declination of the demand for offices and eventually in an oversupply in the Dutch office market and therefore in a high vacancy rate. From the beginning of 1994 the Dutch economy started to recover slowly. Even though, an economic recovery was visible, due to the reluctance of the developers who suffered substantial losses, a high shortage in the supply of new developments was noticeable. Eventually, this tension resulted in a substantial increase of the office rents and therefore a large amount of new office stock was added to the market and the vacancy rate dropped from 10% in the early nineties to around 2% in 2000 (Van Gool et al., 2007; Besselaar, 2011). The before described market forces can be described as a healthy balance that reflects the model that is proposed by DiPasquale & Wheaton.

The total office stock of the Netherlands consists of a range of different categories. By examining the different categories, in order to determine where this mismatch is occurring, it becomes clear that within the Dutch office stock the amount of vacancy is somewhat parallel increasing with the amount of m2. Furthermore, by examining the size in relation to the supply side, the demand side and the absorption of the office stock, it becomes clear that there is a large difference between the demand (48%) and the supply side (39%) of the offices with a size of 500 – 1000 m2. The absorption of the market is 23% and the demand of this category is intrinsically increasing. This is shown in Figure 9.
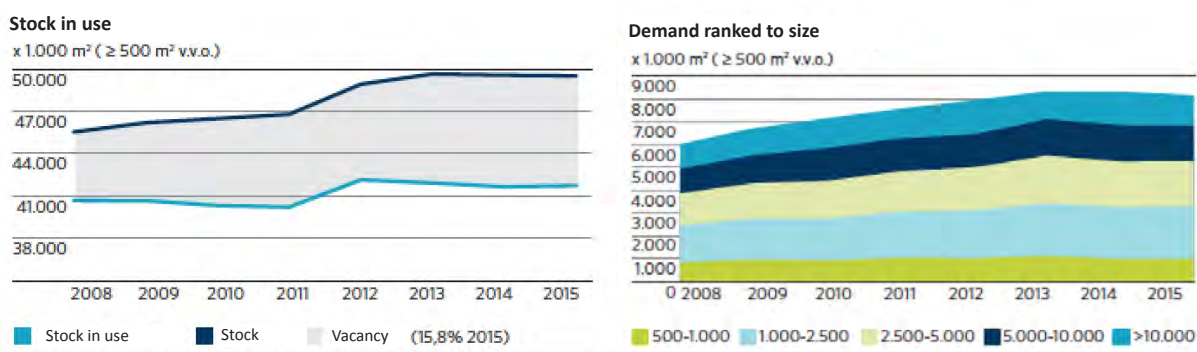
Figure 9 The stock in use and the supply in relation to the size (derived from (DTZ Zadelhoff, 2016a))

By further examining the changes that occurred in the demand size, which is shown in Figure 10, that a large amount of the demand side of the office stock consist of 500 – 2500

m2 (48% in 2014). However, this does not correlate with the supply side, in which there is less amount of m2 available (39% in 2014).
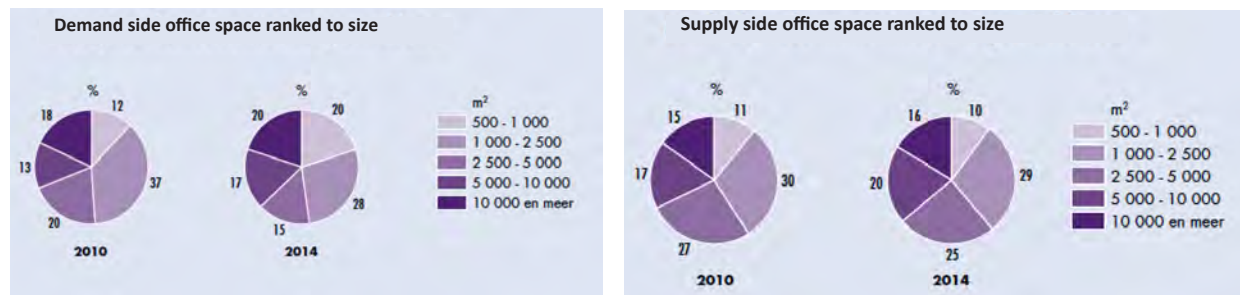
Figure 10 The differences in the demand vs. supply side according to the size (derived from (Bak, 2014))

By examining the office stock market through a comparison of the supply side and the demand side regarding the aspects of the location of the building, the accessibility and the type of the building, which is shown Appendix A in Figure 11 and 12, it can be stated that the amount of office stock from the supply side is substantially increasing, and especially the larger the amount of m2. However, the amount of new constructed buildings that consist of a larger amount of m2 is decreasing. Furthermore, the amount of new constructed office stock that consists of a smaller amount of m2 is stable. There is a decrease in the interest in districts of offices that are located at C-locations. This is implying the importance of networks and a noticeable decrease in the importance of locations. Through an investigation that was conducted by DTZ (DTZ, 2016a; 2016b), there is a considerable increase in the construction of new offices that are located at railway station, of the in 2015 1.2 million m2 constructed new offices, approximately 40% was realised within 750 m of a railway station. Furthermore, a shift is occurring in the demand preferences, an increased migration to office location with a high degree of dynamism, flexibility and sustainability.

Even though the current market can be categorized as a mismatch between the supply and demand side, it can be stated that the market pressure remains high and therefore there is an increase for new developments. From a diversity of levels the dynamics are changing and concentration on new areas; the Randstad versus the rest, the city versus (new) environments and etc. Through the individualization of people, the emerge of new working concepts, the economic crisis and a higher need for connection, interaction and collaboration, the amount of small and medium businesses has intrinsically increasing to the total amount of 1.351.981 companies (MKB, 2015). This is shown in Appendix A in Table 1. Within these new opportunities, the challenge consists of sustainable urbanization, to retain or shrink the business climate or to create a new and attractive business climate. This shift requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties (Pen, 2014).

3.4   Office market in Eindhoven

For the scope of the research and in addition to understand the Dutch office market, the Eindhoven office market has been investigated. The office market of Eindhoven can be characterized as a replacement market. The vacancy is currently 13% and the amount of office jobs is decreasing (3,6%) (DTZ Zadelhoff, 2016a). By investigating the mismatch between the supply and the demand side, which is shown in Appendix A in Figure 13 and 14, it becomes clear that on the level of Province of Brabant the demand side is increasing

and that within the city of Eindhoven the amount of demand is decreasing in 2014 (Bak, 2014). In contrast, by examining the situation in 2015 it becomes clear that there was an increase in demand side, and especially in the service sector (DTZ Zadelhoff, 2016a). However, it is evident to mention that within literature there is a strong emphasis on the larger scaled properties. In contrast, the most interesting mismatch can be noticed in the classification of the offices with a size of >1.000 m2 until 2.500 m2 office space. More specifically, 85% of the transactions take place in the size class > 1.000 m2 office space (StecGroep, 2011). Furthermore, by examining the most substantial transactions in office space, it becomes clear that in the area of Strijp-S, that consists of a large number of small and medium businesses, 16% of the total transactions are occurring (DTZ Zadelhoff, 2016a). This is shown in Appendix A in Table 2. Eindhoven has a strong demand on small-scaled office space by small-scaled entrepreneurs and their middle and small sized companies. A possible effect could be explained for example in the differences in rent. This is shown in Appendix A in Table 3. This will be further investigated in the investigation in determining the location preferences (Chapter 4 Analytical Framework).

To conclude, both from a national scale and that of the city of Eindhoven, the development and stimulation of the small-scaled office spaces can contribute substantially in identifying new development strategies. Therefore, it is upon the most interest to determine the building/location factors for attracting or retaining highly educated and creative workers. In the following paragraph, the different aspects of the supply and demand side will be examined in order to identify the most relevant criteria.

3.5   Demand perspective vs. supply perspective

As described with the theoretical model by DiPasquale & Wheaton is the office market composed of both supply and demand and an imbalance occurred. Interdependent aspects influence both supply and demand. Therefore, within this paragraph the most important aspects that influence both sides are clarified.

The demand perspective

As stated by Gijsbers (2011), the primary function of a building is to provide a technical achievement in order to operate for the functionality for a specific period and an agreed price. This definition is indicating a relation between the performance of a building with the demand requirements, the quality of the building components, the willingness to pay of the demand side and the desired rental period. The suitability or the service life of a building is a derivative of the interaction between these forces.

1.Economic fluctuations

The market mechanism and the dynamics of the economy are constantly subject to fluctuations between the demand and supply side. A negative economic development has an indirect influence on the demand for offices. Due to the economical recession there was a discernible decrease in the demand for offices.

2. Labour force

The size and the development of the labor force is an indicator to determine the demand side (Steinmaier, 2011). An important aspect that has influenced the labor force is the aging population and the amount of population in the Netherlands. It is expected that the

number of aging population will increase in the future and that this results in a decrease of the labor force and this has a negative influence on the demand for offices. This is shown in Figure 15. According to the data derived from CBS (2009) the Dutch population will grow from 16,5 million people to 17,5 million people in 2038. This will have major influences on the further growth of the labor force and employment (Stijnenbosch, 2015). By reviewing

Index office jobs
2007=100

Figure 15 The index of office jobs (derived from (DTZ Zadelhoff, 2015))

the declining labor force and the relation to the geographical aspects, it is important to mention that the vacancy and the demand for offices is highly depending on the city and the region (DTZ Zadelhoff, 2015).

3. Employment

The structural change of economy of the recent decades has contributed to a substantial increase of the amount of office workers (Stijnenbosch, 2015). According to Van Gool et al. (2007) there is a direct relation between the employment and the demand for office space. In the period 1995 – 2002, as a result of the economical growth, there was an increase in the number of office jobs. This period was followed by a recession, in the period 2005 – 2008. And in the period 2008 – 2013, the number of jobs has increased to 2.3 million. In 2014 there is a decline in the number of offices is. This is shown in Table 4. However, due to the recent economical crisis there is a decrease in office employment that is expected to grow in the coming years (Steinmaier, 2011). This decline has a negative impact on the demand.

Amount of office jobs			
Year	*Netherlands*	Growth	*%*
2008	2.300.862		
2009	2.268.650	-32.212	-1.4
2010	2.265.500	-3.150	-0.1
2011	2.274.000	8.500	0.4
2012	2.274.400	400	0.2
2013	2.280.800	6.400	0.3
2014	2.271.000	-9.800	-0.4

Table 4 The amount of office jobs 2008 – 2014 (derived from (Stijnenbosch, 2015))

4. The required floor space

The average use of space for employees and the number of office jobs determine the required floor space. The space per employee is expressed in the m2 of floor area per person that is employed (Stijnenbosch, 2015). By reviewing the situation in the Netherlands, in a research that was conducted by the CPB (2012), it becomes clear that there is a large decline of the amount of square meters per workspace and that is closely related to the demand for offices. This is shown in Table 5 and Figure 16.

Average use of space per employee				
Sector/Year	1996	1999	2001	2004
Banking and insurance	25,7	21,6	20,1	29,2
Business services	26,7	26,4	23,7	28,9
Non-profit sector	34,3	29,9	27,4	22,4
Built, industry	24	22,5	22,8	
Total	27,9	25,5	23,6	26,8

Table 5 Average use of space per employee, 1996 – 2004 (derived from (Stijnenbosch, 2015))

By reviewing Figure 16 it becomes clear the trend of the increasing office space from the past has stopped. A new trend is that office users are becoming more efficient with their office space. It is also further emphasized by Steinmaier (2011) that the number of square meters per workspace has decreased from approximately 22 sqm in 2003 to about 18 sqm in 2010. Furthermore, a proposition is given about the future composition of the number of sqm per workstation in 2040, which will decline to 16-10 sqm. This is

Figure 16 The decrease of square meters per workspace in the Netherlands (derived from (CPB, 2012))

shown in Appendix A in Table 6. Many companies are trying to reduce the number of square meters of office space by dealing efficiently with the space (JLL, 2015). An example of this is that if companies choose to move, work places are created for only 80% of the office employees'. Another example is the new housing strategies of companies; companies are increasingly opting for new office concepts with a higher occupancy rate (DTZ Zadelhoff, 2010). And a higher occupancy rate of an office space is reflected in the decreasing number of sqm per workstation. Another important aspect that is affecting the required floor space is the gaining popularity of 'the new way of working' (dutch; het nieuwe werken). Traditionally, each employee had his own workspace (regardless of the presence in the office). Due to the increasing digital way of working, the number of required floor space and the location are becoming less evident. Therefore, the number of workstations is decreasing.

5.Quality of the building

The functionality of an office space and that of a building has undergone several changes. An aspect that is highly correlated with the building characteristics is that of the flexibility and efficiency of the layout. More specifically, the appearance and quality of the interior finish, flexibility and efficiency, and comfort are all characteristics that are related to the year of construction of the building. This is emphasized by DTZ, that the amount of supply is more than sufficient to meet the quantitative demand for office space. However, it is evident that the quality of the available office spaces can meet the demand. Within the current market, despite the large amount of office stock the quality of these offices is insufficient (DTZ Zadelhoff, 2010). Therefore, a classification was composed by DTZ. This is shown in Appendix A in Table 7.

In a research that was conducted by Remøy (2010), a relation was established between the year of construction and the structural vacancy. Therefore, it can be concluded that the year of construction, the flexibility and efficiency, is highly determining the suitability for transformation and the future functionality of the building. Within the period before the economic crisis, a large amount of office building was added to the market for which there was no demand and therefore a large amount of redundant offices were added to the market.

6. Location

According to Van der Voordt et al. (2007) locational aspects are referring to the location of an object, the accessibility and the image. Due to the interdependence of each object and its unique location, the causes of the structural vacancy can vary per location. There is a strong relation between the development of the mobility and the uniqueness of the location. The range of mobility from walking, going by car and the associated traffic problems, contributed to a large extent to the development of offices in the city centres, areas on the outer edge of the city and eventually to peripheral locations such as near highways or in office parks. The advantages of these locations consisted of good accessibility, availability of parking spaces, expansion options and affordable land that could be developed. Locational aspects should therefore be approached collectively (or from the municipal government).

If locational vacancy occurs due the locational aspects, the object does not meet the requirements regarding the location factors. Locational aspects are difficult to change or to adapt to the specific demand requirements. Therefore, it is interesting to intervene/adapt in order to change the locational requirements on a morphological scale or to group objects. A recent development, that was derived from a research by the CPB (2012), is that the demand side has a higher moving behaviour towards city centres.

7. Changing requirements

As a result of the increase in the interdependence of people, the development of new technologies and the emerging of phenomena such as the new way of working and shared workspaces, have distinguishably influenced the changing requirements of the demand side. Employees are becoming less dependant of the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010). Besides this, as stated by Remøy (2010), in the decision process of office organizations, the accommodation decision is based in the quantitative and qualitative demands and preferences. Through the decision process, that is illustrated in Appendix A in Figure 17, office organizations evaluate their accommodation strategies on the expected future demand of office space compared to their current supply. The current mismatch is illustrated in a research that was conducted in the small and medium businesses (De Vries & Van den Besselaar, 2013). This is shown in Figure 18.
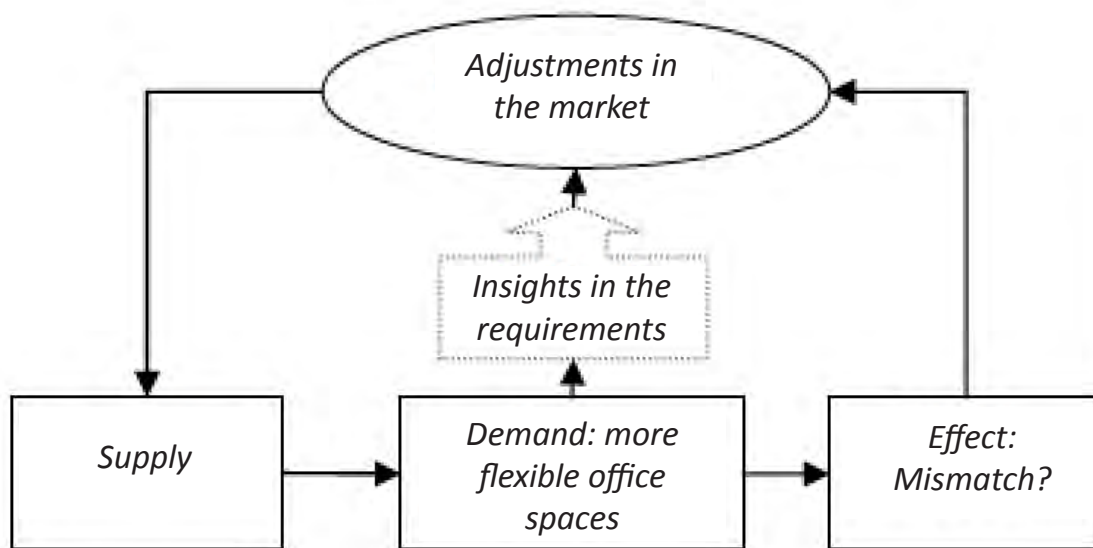
Figure 18 A model representing the changing demand requirements (derived from (De Vries & Van den Besselaar, 2013))

By determining the changed requirements from the demand side, policy makers are better able to formulate policies about the spatial economic environment. Subsequently, the supply side can get more specific insights in the changing demand preferences and therefore adapt or align their portfolios.

The supply perspective

1. Fluctuation on the market

The office market is cyclical that was described with the real estate cyclus (dutch; varkenscyclys) and the model of DiPasquale & Wheaton with the extension of Colwell. Even through both models describe the market dynamics and forces and moves in the phase of an equilibrium, it is assumed that if deviations occur in the vacancy these are temporary. The balance would restore itself due to the fact that if there is an increase in vacancy, the prices would decrease and the active forces of the market would absorb this temporary vacancy. Due to the long construction and developing period of new office buildings there is a delayed response from the supply side to the demand side. An example is the increasing demand for office spaces in around 2002. This was followed by a large amount of new constructed office buildings and as a result of the economic crisis; there was a large oversupply.

2. New construction

The market dynamics and forces, the changing requirements and the pressure of the market contribute substantially to the construction of new office buildings. If the market is in balance there is direct relation between the withdrawal of the office stock and the construction of new office buildings. Furthermore, as stated by NVB (2011), due to the changing requirements of the demand side the construction of new office buildings is influencing directly the moving behaviour. The demand requirements consist of the limited possibilities for adapting existing buildings, the connection to the continuously changing demand preferences (less costs and/or space) and the qualitative aspects (that include

installations and appearance / architecture). However, as emphasized by Steinmaier (2011), the current market is more characterized as a replacement market and less as an extension market.

3. Withdrawal

In overcoming the imbalance of the office stock market and in order to reduce the oversupply, one method is the extended theoretical model of DiPasquale & Wheaton by Colwell. More specifically, by removing the obsolete (and redundant) offices from the market. This is also addressed by Van der Voordt et al. (2007), that a large amount of the out dated stock on the office market has to be removed in order to prevent extended vacancy. To withdraw (or to price out) the obsolete offices from the market, the following strategies can be identified, namely; renovation, transformation and demolition (Korteweg, 2002a; Remøy, 2010; Gijsbers, 201); Bak, 2014). A more comprehensive description of the strategies is shown in Appendix A in Table 8.

4. Multidisciplinary environment

An important aspect of the supply side is the multidisciplinary character of the built environment. For example, the withdrawal of the office buildings is highly correlated with the depreciation of the building. On the other hand, the depreciation of the building is directly related to the competitive positioning or financial feasibility of the investor. This process is therefore highly depending on sense of urgency for the investor. If a building is depreciated the interest rate will decrease, the rent will also go down and this influences the marketability positively. As a result, the building derives a stronger economic competitive position and is more suitable for renovation or transformation. Or even suitable for demolition. However, the existing oversupply and the speed in which this is extracted from the market is influenced by the market dynamics and forces. The rigidity of the market is affected by the financial situation, the large amount of the office stock that is financed with debt capital and the willingness and commitment of the involved market parties in preventing the reduce of the supply through transformation or preventing or down warding the price or by depreciation of the building (Zuidema & Van Elp, 2010b ; van Swam, 2014). By reviewing this situation it becomes clear that investors are not always directly faced with the problems of vacancy. Next to the commitment or willingness of the investor, the process is also influenced with the decisiveness and flexibility of the investor to respond on the market dynamics and forces. More specifically, to be able to reduce the vacancy. The decisiveness of an investor is influencing decision-making process in taking the necessary steps to overcome the imbalance between supply and demand (Zuidema & Van Elp, 2010b; van Swam, 2014).

Within the construction of new offices there is a contradiction in the spatial ordening and the role of another important stakeholder, the municipality. As stated by Zuidema & Van Elp (2010b), during the period that was characterized by an increasing demand, the municipality had a highly facilitating and sometimes even stimulating policy for the development of new office buildings. Besides that there was a lack of regional coordination. The reasoning for this can be found in the fact that municipalities were willing (decentralized) to allocate the land and therefore to take advantage of the realized land revenues and to remain attractive as a location for businesses. Furthermore, there is a conflicting interest between the municipalities. On the one hand municipalities have

nothing to gain if oversupply or vacancy occurs and at the same time the competitive position it relation to the other municipalities should be ensured.

From the above-described examples it becomes clear that each of the stakeholders that are active within the office real estate market have interdependent and conflicting interests. Therefore, it is interesting to investigate which location factors influence the facilitating location decision process from the supply side, because it is a continuously changing process that retains a high complexity. A more comprehensive description of the different roles and interest of the independent actors are given in chapter 4 (Analytical Framework). A total overview of the described aspects is illustrated in Appendix A in Table 9.

3.6   Current (new) developments & trends

As a result of the aspects such as the individualization of people, the exponential growth of technological innovations that are become more and more incorporated within the building and work environment, the decreasing required office floor space, the increasing importance of sustainability, the higher need for connection, interaction and collaboration, the demand requirements are changing substantially. Furthermore, the emerging phenomena such as the new way of working and shared workspaces, have contributed considerably to situation in which the employees have become less dependant of the office building/space and have a higher preference for flexibility (Brounen & Eichholtz, 2004; Remøy, 2010). The phenomena 'work' is rapidly changing and new typologies are emerging that consists of a diversity and variation of both location and function, in which people want to work in more flexible environments an the office will become a meeting place in which people want to connect and interact (Ross, 2012 ;DTZ, 2016a). People are able to work in more efficient way due to the technological incorporated innovations.

There is an increasing demand for a new type of typology that will create a future workspace that consists of diversity and a variation between both location and function. This is in line with the changing demand, with the prediction that there is an *"ever increasing cohort of 'contingent workers', the freelancers and independents that are vocal about the 'new world of work'"*(Ross, 2012). Subsequently, it is evident to define a new typology for the future office, as stated by by Ross (2012), it *"will represent a more fluid and dynamic organisation, accommodating a business as it constantly changes through inherent flexibility and the ability to load-balance space"* (Ross, 2012). An example of this is examples Niels Torp's Scandinavian Air Services (SAS) building in Stockholm, to show an indication of the rethinking of an office space. This is shown in Appendix A in Figure 19. To conclude, work as from the origin being characterized as a repetitive process, is transforming into a process that is referring to connection, interaction and collaboration. Ratti & Claudel (2016) further state that within the search for the future office it is evident to steer creativity through the quantitative search for human interactions and how to connect this to defining workspaces with a flexible working environment. The office will become a meeting place in which people will connect and interact. And it maybe even possible that it is necessary to move back into the origin of the office in which people counteracted from different groups or confraternities that were the historic precursors of today's modern corporation. However, in which way the 'future' office will evolve is found in the latter, but it will have a major influence on architects, developers, corporations, and society as the work environment will transform.

However, it is important to mention that the described aspects are influencing the work pressure also negatively. Through the innovations and changing labour market, people are less dependent on the traditionally 9 – 5 working hours and therefore increasing the communication possibilities and work pressure. Because of aspects such the optimization of communication networks and the measuring of productivity, deadlines are becoming shorter and competition is increasing. In which way this will evolve in the nearby future is found in the latter. It is therefore interesting that the continuously changing office market is rapidly influenced through the introduction of new working and/or living concepts, the office of the 21th century or the development of so-called communities. An example of this is the emergence of flexible offices spaces. Within the office market the long-term lease is coming under pressure, even with large companies. By examining the transition of the office (and the residential) market, several initiatives are arising. An example is the initiative to combine and integrate both working and living, in the so-called co-working spaces or co-living spaces in Copenhagen (The Nest) and in London (The Collective) (Homes&Property, 2016). Furthermore, multiple flexible office concepts are emerging both internationally and in the Dutch office market. To understand the changing demand requirements in the labour market, this paragraph consists of an overview of the most common trends and opportunities in the office market. A comparison of the most important aspects is shown in Appendix A Table 10. This will contribute to a large extent in the identification of the building/location determinants that influence the location decision process of highly educated and creative people. This is shown in the next chapter.

We Work

Within the international office market, one of the first concepts that identified the importance of sharing knowledge through facilitation and the possibility of a community is WeWork, that was developed by Adam Neumann and his partner, Miguel McKelvey. The concept consists of the co-working space movement that gathers people with different expertises. The strength of the business model is that WeWork takes out a cut-rate lease on a floor or two of an office building, this is then subsequently divided into smaller areas and these are rented to smaller businesses and start-ups with monthly memberships (Konrad, 2014).

The WeWork concept is on of the first concepts that was able to create a financial solid argument (WSJ, 2015). Emphasized by their multibillion-dollar valuation, in which they maximized the profit by the optimization per m2. And this is an analogy with the banking sector, they rent long and lease short (Ratti & Claudel, 2016). The success of WeWork contributed substantially to the emergence of similar concepts. For example, the start-up Breather that created flexible spaces that can be rented by the hour. Another example, is the development of WeWork Labs in which the concept consists of the collaboration of 50 entrepreneurial types. Moreover, to create a building that has a strong community with a diversity of talent and that will eventually contribute to New York's entrepreneurial community (Jeffries, 2011).

Spaces

Another example that is gathering more international recognition and is one of the first office concepts that aimed to combine collaboration, inspiration and the facilities to contribute to the conditions of working and being successful. The concept of Spaces is

innovative and distinctive due to the diversity of supporting services and facilities that are provided. This contributes consequently to the flexibility of tenants to arrange their "Pay-what-you-use" principle. Only the services are charged which are actually being used by the tenant and therefore it is possible to create an optimization of facility costs. Furthermore, the diversity also contributes to the presence of creativity through a diverse mix of professional companies. The concept was originated in Amsterdam in 2007 and has grown into an international appreciated concept and a community internationally. However, it is important to mention that spaces is not the owner of the buildings that are transformed (Inside, 2007; Spaces, n.d.).

Tribes

A more recent example is the office concept Tribes, a counterpart of Spaces, developed by Eduard Schaepman and in collaboration with the investors Marcel Boekhoorn and Lost Boys-founder Michiel Mol. The concept is defined by solidarity and as stated by Schaepman the current office market is more oriented from the perspective of organization in comparison of that of people. Therefore, Tribes is creating inspiring workspaces that starts with virtual offices, Network Access memberships, flexible workplaces and meeting rooms throughout a local, national and global network. The determinants are efficiency and comfort. Next to this, through a diversity of functions in combination with high performance IT facilities it is creating a new type of business climate. The rental price consists of €150 p/month per location and if occupants want to use multiple locations the price increases up to €250 p/month. The concept is currently located in Brussels, Eindhoven, Utrecht, Rotterdam and The Hague (Keswiel, 2015);(Tribes, n.d.).

Het Nieuwe Kantoor (HNK)

Through the changes in the Dutch office market, the increasing vacancy rate and the changes in the demand preferences, the listed real estate company NSI NV (investor) has developed the innovative full service and flexible housing concept HNK (dutch; Het Nieuwe Kantoor). The concept consists of a variety of workplaces, offices and many services for any type of user, from self-employed to multi-national corporations, in an inspiring contemporary setting. NSI can distinguish itself with this concept in comparison with other emerging concepts, because NSI is the owner of the building. Moreover, NSI is able to implement substantial investments and therefore better able to steer to the changes of the demand side (NSI, 2015).

SX Building Eindhoven

By reviewing the situation in Eindhoven, there is a concept that stands out, namely the thematized development of the SX building. At the area Strijp-S, in the historical building SX Building (1914), in which previously the glass manufacturing company of Philips was located, has been transformed in 2014 to a centre that consists of a diversity of sports, marketing and media. The success of the concept consists of the community of companies and facilitating sports as a meeting place. The concept has been developed in a collaboration between Volkerwessels and the municipality of Eindhoven ("SX-Eindhoven," n.d.). Through a small market research the most important co-working spaces were identified. This is shown in Appendix A in Table 11 and 12.

3.7 Conclusion & Discussion

By reviewing the market dynamics and forces, through the theoretical model by DiPasquale & Wheaton and the extension by Colwell, in comparison to the perspective of the supply and demand side, it can be stated that the office market traditionally has a cyclical dynamic movement. It a vicious cycle, more specifically a situation in which a certain phenomenon indirectly holds itself in place. Traditionally, the existing imbalance between the supply and demand side would restore itself. However, offices are heterogeneous products, the price development is limited transparent, the market is characterized by a slow response to economic fluctuations and a slow response to the demand for office spaces. Besides this, the current market can be characterized as a replacement market instead of an expansion market. Furthermore, a break originated in the office market that mainly manifested itself clearly after 2000. Through the individualization of people, the changing demand location requirements, the more efficient use of offices and the exponential increase of the construction of new offices, this eventually resulted in an increasing vacancy rate. The imbalance between the supply and demand side and the real estate cycle is stagnating and it becomes clear that there is a permanent situation of oversupply (Zuidema & Van Elp, 2010a). Even though both theoretical models clarify the different forces of the real estate market and therefore the origin of the imbalance and there is emphasis on the extraction of the obsolete buildings, the continuously changing office market is much more dynamic and complex to be clarified from the perspective of these theoretical models.

An important aspect that contributed considerably to the imbalance in the office market is that a large amount of the current office stock does not meet the changing demand location preferences. The vacancy rate among the buildings that were constructed before 1970 is 8% of the total vacancy rate. Therefore, it can be stated that the buildings that were constructed in the period 1970 – 1995 have the highest vacancy rate. These buildings were abandoned due to the large amount of office buildings, with a higher quality and were more in line with the demand requirements, which were added to the market, which was reinforced by the declining office demand. Moreover, in retrospect one could argue whether it was wise to increase the amount of office stock in such a rate. Unfortunately, the market forces embrace the opportunity for new developments. Besides this, in a research that was conducted by CBS (2015), the number of households and the Dutch population will grow in the next 2 a 3 decades with 1 million. This is shown in Appendix A in Figure 20. Therefore, it is a logic assumption that the existing oversupply in the office market will be implemented to overcome the shortages in the overall real estate market. An example is the amount of offices that is withdrawn from the market. In 2015 approximately 2 million floor office space was extracted (Vastgoedjournaal, 2016b). Currently, there is much attention form the government, researchers and the construction sector to transform the existing structural vacant offices into for example a residential function. However, the re-allocation of these buildings is often a time consuming and difficult process and it is found in the latter if this is the solution between the imbalance of the supply and demand side (Remøy, 2010);(Stijnenbosch, 2015).

From the perspective of the supply side it is argued that the obsolete offices are not competitive and should be removed from the market. By examining the current office stock market it can be stated that it is rather challenging to extract obsolete offices from the market. Each of the different strategies consists of multiple actors, which have conflicting interests, investments and involvement and therefore different challenges. This

multidisciplinary environment results in a complicated process in overcoming the existing imbalance between supply and demand. For example, within the transformation strategy, due to the governmental policy and guidance for the fear of nuisance in the reuse of vacant offices, it is not allowed to transform vacant offices into other functions that are located in office parks. Furthermore, due to the high transformation costs it is often not financially feasible to transform an office into a new function (Centraal Plan Bureau (CPB), 2012). This is further emphasized by Bak (2014), that states the amount of office stock that is extracted from the market is less than the amount of new office buildings that is being added. The multidisciplinary character is furthermore increasing the complexity to overcome the imbalance, through the contradicting differences of interest. Besides this, there is the expectation that within the future construction sector, the building stock will stabilize in 2040. If this moment is reached, there is the expectation that the office market will not grow and subsequently is not able to absorb the oversupply. It could be stated that it is unavoidable that qualitative changes in demand are necessary to absorb this difference within the existing building stock. Therefore, there is an increasing need to create a higher transparency in the real-estate market (DNB, 2016). The willingness and commitment of the supply side is substantial in overcoming the imbalance. Therefore, it is evident to investigate the perspective of the supply side, through in-depth interviews, to have more insights in which way the existing challenges could be overcome and will contribute to the identification of new opportunities in the office market. A suitable solution could be to take the continuously changing demand requirements into account and to develop buildings that are multifunctional and flexible and therefore preventing the future vacancy.

As a result of the changes in the labour market, the economic crisis and a mismatch between the supply and demand side, a transition occurred in the demand requirements. There is a higher need for flexibility and collaboration and interaction. Subsequently, through the exponential growth of technological innovations that are become more and more incorporated within the building and work environment and the parallel increasing work pressure, the origin of the office spaces is changing rapidly (DTZ, 2016a). There is an increasing interest from the demand side for a new type of typology that will create a future workspace that consists of a synergy between connection, interaction and collaboration. Employees are becoming less dependant of the office building/space (Brounen & Eichholtz, 2004); (Remøy, 2010). This is emphasized by Ratti & Claudel (2016), that state that within the search for the future office, it is evident to steer creativity through the quantitative search for human interactions and how to connect this to defining workspaces with a flexible working environment. The continuously changing and evolving market dynamics and forces of the office market and the shifting demand preferences are contributing to the emergence of new working concepts and the considerable increase of small and medium businesses. Examples are arising exponentially, such as flexible work concepts, such as HNK or WeWork, or co-living and co-working concepts. However, in which way the 'future' office will evolve is found in the latter. One could argue that throughout the changes in office market the importance of individualization, corporate identity, collaboration and flexibility will increase in the future. Furthermore, if the working concepts are an answer to the changing demand requirements or have a temporary nature is highly depending on commitment and willingness of both the supply and demand side to overcome the existing imbalance in the office market. Therefore, it is evident for cities, urban planners and policy makers to take the changing demand requirements into account, in order to create a dynamic and attractive area and moreover to attract or retain people

who work in creative and knowledge-intensive sectors (Akcomak, I.S.; Borghans, L.; ter Weel, 2011).

To conclude, by investigating the building and location determinants that influence the location decision-making process of both the supply and demand side, specific insights will be gathered that could contribute substantially to municipalities and policy makers in developing a dynamic metropolitan area that attracts highly educated and creative workers (DTZ Zadelhoff, 2010; Boterman & Sleutjes, 2014b; DTZ, 2016a).

4. Analytical framework: Determinants demand and supply side

4.1 Introduction

Through a wide range of aspects, such as the continuously changing market dynamics, the individualization of people, the changes in the labour market and the economic crisis, the imbalance between the supply and demand in the office market is increasing intrinsically. However, the combination of the exponential growth of technological developments, the emergence of new working concepts and the migration to city centres is creating a new market pressure in which cities, urban planners and policy makers are thriving to create a dynamic environment. An environment in which the functions living, working and retail are intertwined (DTZ, 2016a). In a knowledge economy it is evident to attract or retain people who work in creative and knowledge-intensive sectors. In order to determine location factors of highly educated/creative workers who work in small and medium businesses and how these are enacted, it is important to identify which aspects influence the location decision behaviour and how these are interrelated with a higher place identification. Furthermore, with this theoretical framework more in-depth insights in location preferences will be determined.

This chapter seeks to contribute to the identification of the most important building and location determinants that influence the decision-making process in the office market in different ways. First, a brief context is explored about the underlying forces that contribute to the decision-making process of the relocation of companies. Secondly, the most important building and location determinants will be determined from the demand side. Thirdly, the barriers in the decision-making process and the most evident location decision models will be clarified. Fourth, from the perspective of the supply side the most relevant aspects that influence development aspects are investigated. To conclude, an overall conclusion is composed that contributes to the clarification of the most important building and location determinants from both demand and supply side.

4.2 Decision process companies

4.2.1 Urban economics

To understand the decision process of companies to relocate it is important to understand the processes, more specifically the continuously evaluation of their internal demands and parallel to this the demands that are originating form the external context, that influence and contribute to the decision-making process of relocation. As literature suggests, it can be stated that there are two aspects that are closely interrelated in the location decision process, namely urban economics and corporate real estate management (Clapp, 1993; Louw, 1996).

Urban economics can best be defined as the study of the location choices of firms and households, and the consequences of these choices (Quigley, 2008). More specifically, it is directly related to defining a view on the composition of urban areas and furthermore an explanation of the individual location choices of firms in an urban area. The theory of urban economics can be mostly traced back to the manufacturing sector. The current economy can be characterized as service sector economy and therefore a transition should be

constructed that is suitable for this research in the most important building and location determinants that influence the decision making process.

Within literature a lot of research has been conducted about the wide range of urban and regional economics. In understanding what theories are the most suitable for this research a selection was derived that consists of the main topics that are relevant for this research. First, one of the main reasons for first to cluster together at different levels (international, regional and etc.) is that of agglomeration economies, the so-called concentration of activities within an urban area. Secondly, the forces that shape the spatial composition of an area, the so-called opposing forces – centripetal and centrifugal – are examined.

4.2.2 Agglomeration economies

In understanding the different types of agglomeration economies, Parr (2002) states that agglomeration economies are *"regarded here as cost savings to the firm which result from the concentration of production at a given location, either on the part of the individual firm or by firms in general"* (Parr, 2002, p. 718). Within literature one of the first that referred to agglomeration economies was made by Marshall in 'Principles of economics' ((1890); (1920)). Marshall clarified that through geographical alignment of companies, they were to benefit from labour and infrastructure pooling. In order to derive a classification of agglomeration economies, MacDonald & McMillan (2007) derive the following classification; (1) economies of scale within the firms; (2) localisation economies, which are external to the individual firm and arise from the size of the local industry and (3) urbanisation economies, which are external to the local industry and arise from the size of the local economy.

Within literature a lot of research has been conducted in order to investigate the underlying sources of agglomeration economies. As stated by Rosenthal & Strange (2002), which is an extension of the research of Marshall, a range of seven categories were formulated, the so-called micro-foundations or sources of agglomeration economies. These consist of; (i) knowledge spillovers, (ii) infrastructure sharing, (iii) rent seeking, (iv) labour market pooling, and (v) input sharing. Within the first aspect, as stated by Capello (2008), the exchange of knowledge between individuals that work in within different companies or industries is evident for generating or stimulating the agglomeration economy. This exchange of knowlegde, more referred as knowlegde spillovers, is created through the interacton and face-to-face contact by individuals. Furthermore, if an area consists of a certain diversity of skilled labour, this creates an amplification of firms who are active within the same industries. The so-called labour market pooling. And internally, the specific differentiation of labour can create an agglomeration force within the company. Within the service economy, that is mostly based on knowledge, this is a important aspect.

In order to determine the approach to what extent an agglomeration economy should be measured, is referring to the different dimensions against which they have to be measured. Capello (2008), has defined an approach in order to develop an understanding of the existence of agglomeration economies. Capello refers to the so-called scope, that is referring to the dimensions; (1) geographic dimension, (2) industrial dimension and (3) cognitive dimension. The dimensions are representing the micro-foundations of agglomeration economies – synergy, indivisibilities and proximity.

The first micro-foundation, synergy, is referring to the presence of a certain network among economic agents. This network is allowing the possibilities of flexibility and outsourcing. This aspect is closely related to the socio-cultural dimension that is characterized with features such as; a sense of belonging, cultural and religious homogeneity and trust. Synergies are important for internal as well as external economies (Capello, 2008). The second micro-foundation, indivisibilities, take the industrial perspective into consideration and occur when the scale of an agglomeration activities contributes to the productivity of a company and results in a shift in the production or cost curve of the company (Rosenthal & Strange, 2002; Capello, 2009). This is more referring to the external economies. For internal economies an example could be the optimization of the usage of space. To conclude, the third micro-foundation, proximity, results from both indivisibilities and synergies and is directly linked to the geographic dimension of agglomeration economies. For example, in the case of internal economies companies cluster their own portfolio. The different dimensions are shown in Appendix B in Figure 21.

4.2.3 Centripetal and centrifugal forces

Through the concentration of a diversity of companies within a particular area, influenced by location factors such as input sharing or a decrease in transportation costs, a wide range of products and services are created/produced. Moreover, these products and services create an added value for the workers and consumers in the area and therefore resulting in higher incomes and more satisfaction. An environment is created that on the one hand attracts more people and other hand influences the location decision behaviour of other companies due to the better existing market. Subsequently, this results in an exponentially growth of the economic activity. The above-described situation is, the phenomenon of circular causation, is referred as the active centripetal force. And will eventually result in the concentration of activities within an area. The opposing force, the so-called centrifugal force, contributes to a diffusion of activities, due to high rents, transportation costs and etc. The external factors, as stated by Marshall (1890 ;1920), were composed by Krugman (1998) into the centripetal forces that act within an area and the opposing centrifugal forces. This is shown in Table 13.

Forces affecting geographic concentration	
Centripetal forces	**Centrifugal forces**
Market-size effects (linkages)	Immobile factors
Thick labour markets	Land rents
External economies	Pure external diseconomise

Table 13 Forces affecting geographic concentration (derived from (Krugman, 1998))

It is evident to understand that within the location decision behaviour of companies, that it is highly influenced by the externalities that stimulate the concentration of companies (Krugman, 1998), and is always seeking a balance with the opposing forces. And the opposing forces that counteract the concentration of companies and eventually could lead to a dispersal of activities. Within the service economy, that is characterized as a knowledge economy, between the two opposing forces, there is the continuously tension between dispersal and agglomeration (or to centralize or decentralize) of activities (Sassen, 2001, p. 192). Within this process, the characteristics that shape this have been changing and therefore there is and increasing need for new economic requirements. Through the exponential growth of technological developments, on a global level, transnational companies are become more and more decentralized. On the contrary, on a more local

level (for example an metropolitan area) companies are concentrating their activities in clusters in different parts of the urban area. More specifically, the increasing importance of social interaction is acting as a catalyst agglomeration force at a more local level.

To conclude, the evaluation of a company to relocate is affected through a wide range of aspects. Next to agglomeration economies, the centrifugal and centriputal forces as the accessibility and communities play a distinguishable role in the location decision-making process. After the clarification of the external forces that affect the decision process of companies and the highly educated and creative people who work there, in relation with the correlated variables, the next paragraph consists of the identification of the most important building and location determinants.

4.3 Identification of the building and location determinants

4.3.1 Introduction

Throughout literature a lot of research has been conducted in order to determine the significance of location satisfaction, the relation with the correlated variables, and in which way it influences the balance between the continuously location evaluation and the actual intention to move. However, through the market dynamics, the individualization of people and changes in the workforce there a shift noticeable in the location decision behaviour. As stated by Timmermans (1986), there is still a lack of knowledge about the behavioural foundations of location choices. Furthermore, Priemus (1986) states that people have the tendency to merge (coincide) their preferences with their actual situation. Therefore, it is challenging to separate practises and preferences. For example, in comparison with the residential market, there is a clear relationship with education and the intention the move. This is emphasized by Boterman & Sleutjes (2014), that state that higher educated groups, have access to relatively higher volumes of economic and other resources, and therefore is a strong overlap between the preference and the practice, due to the fact that the constrains in the housing market are more easily to overcome.

Within literature several attempts were conducted to determine or categorize the most important variables that influence the location decision behaviour of companies. Most of this research was focused on the expansion of their departments with a certain expertise. For example, through an increase of the accessibility or the concentration of R&D departments. However, with the current office market there is a noticeable change in the requirements from the demand side. In an interview that was conducted with Tom van Putten of DTZ (2016), there is a emphasizes on a transition in the building and location determinants of the demand side. Aspects such as location, services, network and hospitality are gaining more awareness. Subsequently, this in combination with a substantial increase in the amount of small and medium businesses is affecting the location decision behaviour. And, especially within their location decision behaviour there is still lacking knowledge.

Furthermore, through the growing importance and significance of creative and knowledge-intensive sectors within the current economy, the academic interest of the people who work in these environments and their increasing interest in place identification, there is a discernible interest to work, live and to recreate nearby or close to city centres. Within this knowledge economy, these highly educated workers, are expected to be more mobile than others (Martin-Brelot et al., 2010). According to Boterman & Sleutjes (2014) the nearness

of urban amenities and a lively residential environment are essential factors in their location decision behaviour. This is further emphasized by Ter Weel et al. (2011), that in order for cities to increase their competitiveness it is very important to attract or retain this target group. For the scope of this research and the relation towards the target groups (highly educated/creative workers) who work in small and medium businesses and the willingness and adaptability to relocate, their choice preference towards amenities, a distinction is proposed that explores the following components; socio-demographic, building and location (Louw, 1996). A more specific overview is shown in Appendix B in Table 14. Besides this, as stated by Remøy (2010), in the decision process of office organizations, the accommodation decision, is based on balance between the quantitative and qualitative demands and preferences. The outcome of this research will be implemented in the data analysis of this research.

Socio-demographic

1) Education/work

As literature suggests, in the current knowledge economy, highly educated workers, are expected to be more mobile than others (Martin-Brelot et al., 2010). As literature suggests, is this aspect recognizable in determining the satisfaction in housing market. For example, as stated by Dane et al. (2014a), the housing satisfaction is directly related in the evaluation of the travel distance, the availability of a network or changes in the life course. Moreover, throughout the life cycle of people, the residential mobility is affected by the life course. Besides this, Employment opportunities are becoming more evident throughout the life course. As stated by Niedomsyl & Hansen (2010), people have a higher tendency to move if this contributes to their career.

Aksoy & Marshall (1991) propose that the location decision behaviour of companies is highly influenced by the labour intensity, financial business scope and qualified and specialized employees. Furthermore, within the location decision behaviour Van Oort et al. (2007) has contributed to a large extent in identifying the importance of employment in the Netherlands through migration research in the location decision behaviour of companies. First of all, from the perspective of policies and management from both national and municipal level employment is a corner milestone. The establishment of new companies contributes to the creation of new employment. And municipalities compete with each other in order to attract high educated and creative people (Van Oort et al., 2007, p. 10). Furthermore, Van Oort et al. (2007) state that companies that relocate themselves grow considerably faster than companies that do not move. At the time of moving, there is a sharp increase in personnel (1.5 - 2 times). And as stated by Niedomsyl & Hansen (2010), people have a higher tendency to move if this contributes to their career. The presence of highly educated and creative workers is directly related to the presence of business climate and networks. However, this aspect is highly correlated with the residential evaluation of residents. Therefore, personal trajectories in combination with the availability of networks determine in a substantial way the balance between the location decision behaviour and the residential satisfaction, due to the fact that jobs do not follow people but people move were jobs are available (Boterman & Sleutjes, 2014; Niedomysl & Hansen, 2010) .

2) Availability

Within the location decision process companies have a continuously evaluation of their current location and that of another location. A wide range of aspects influences this evaluation. From a literature review, conducted by Louw (1996), multiple empirical studies were compared in order to derive the most recognizable motives for companies to relocate. From the comparison an important aspect that directly influences the decision behaviour of companies is the direct availability of a new location/building (Louw, 1996, p. 59). However. From the comparison it can be concluded that the evaluation process is correlated with a wide range of aspects and that the manner in which companies conduct the comparison between the current and future location differ.

3) Place identification

Throughout a wide range of inhabitants that differ in age, the before mentioned place identification is also related to the life cycle op people. For example, students who have a strong local identity perceive their environment in a positive way. This is also emphasized by Amole (2009), in which the place identification of students and their residential situation was investigated, and the longer students felt identified with their environment the longer they stayed. This was perceived as the relationship between the morphological configuration and the predicted satisfaction. Along the life cycle of people, the morphological configuration is continuously changing and therefore affecting the residential satisfaction. Furthermore, if an inhabitant perceives a strong place identification and a feeling that the neighbourhood is contributing to the definition of oneself it will parallel contribute in a positive evaluation of the environment and eventually create a positive housing satisfaction (Fleury-bahi, Félonneau, & Marchand, 2008). Subsequently, this aspect also applies within the location decision behaviour op companies or highly educated/creative workers. If there is a strong perception of an environment, such as at the people who want to work in a creative environment, for example Strijp-S. This has a positive effect on the duration of the residency (Boterman & Sleutjes, 2014a).

4) Corporate identity

Within the location decision process of companies there is an aspect that is becoming more and more important, namely the manner in which the company feels identified with their environment. Or if the environment is representing the company sufficiently (Louw, 1996). The accessibility, strengthened by the appearance, visibility and representativeness of the building, is creating a so-called corporate identity. A location must ensure the appearance or the image of the company. Besides, through the individualization of highly educated/creative workers, people have a higher awareness to be part of a corporate identity that meets their place identification (Korteweg, 2002a; Boterman & Sleutjes, 2014a). Through the individualization of employees, people are creating a higher awareness and perception in which way the corporate identity reflects their values and standards. And furthermore, the culture of the company also affects the level of participation of the employees.

5) Sustainability

A determinant that is directly linked to the place identification and the corporate identity is the sustainability. Companies and individuals have a considerable interest in sustainability.

Remøy (2010) states that the urban sustainability and future value of the location are also important triggers. As literature suggests, an environment that consists of a synergy of living, working and recreation and that are in equilibrium with each other, is contributing to a higher utilization of the area. It is ensuring the emotional and cultural context and identity of the city. And in total this is providing a sustainable environment in which people want to live, work or recreate (Vos, 2013). Next to this, from the perspective of the government there is a strong focus and emphasis on the urban fabric and urban sustainability. Furthermore, an active attitude of governmental parties regarding the sharing of knowledge about sustainability provides an incentive to implement this in the built environment. An example is the redevelopment of the head office of the Rabobank in Eindhoven. The former Rabobank building will be demolished and 95% of the materials of the demolition will be implemented in the new building. Furthermore, the concept of the building consists of a design that meets the requirements of the new way of working, in which employees no longer have a fixed workplace and the building is designed multifunctional for multiple users (OVG, 2016).

Building

7) Type of building

An important determinant that influences the location decision behaviour is the type of building, which is facilitating the company. The type of building is highly correlating with a wide range of characteristics that influence the decision making process. As stated within literature, there is a discrepancy between the rigid character of the building and the dynamic development of an organization (Louw, 1996). Buildings have limited modification possibilities during their existence and therefore it is difficult to adjust the buildings according to the changing demands. To summarize, Louw (1996) states that the life cycle in relation the changing demand preference is considerably influencing the location decision behaviour of companies. The changing demand preferences are influenced by performance capacity, the so-called performance criteria; flexibility, efficiency, effectiveness and creativity. For the life cycle of buildings three types are distinguished; functional, technical and economic. And the functional life cycle is decreasing substantially. Furthermore, Korteweg (2002a) states that the decision to relocate is highly depending on the re-evaluation of the location factors accommodation and location. And these factors are amplified by the appearance, visibility and representativeness of the building is creating the so-called corporate identity. Furthermore, in a research that was conducted by Remøy (2010), a relation was established between the year of construction and the structural vacancy. Therefore, it can be concluded that the year of construction, the flexibility and efficiency, is determining the suitability for transformation and the future functionality of the building. Other aspects that are closely related to the type of the building are for example the aesthetics, flexibility, grid and etc.

8) Flexibility

Through the increasing globalization, technological developments and that products and services have a decreasing life cycle, companies are becoming more competitive in a more uncertain business environment. Through the increasing and complexity of the environment companies have a high need for flexibility (Lizieri, 2009). As literature suggests, the concept of flexibility can be defined as the degree in which an organization is able to adapt or respond on changes (Mooij, 2002). And the flexibility of the real estate

portfolio enables organizations to be able to respond better on cyclical economic conditions. By implementing flexible office concepts, organizations are able to create a more applicable and suitable adaptation strategy for growth and shrinkage movements of the organization. By renting flexible office spaces, organizations are able to minimize their costs and to optimize the work environment and their revenues (Lizieri, 2009; DTZ, 2016a).

9) Accessibility

The accessibility is seen as one of the most evident pull factors in the evaluation of a company to relocate. Timmermans (1986), refers to the so-called economic factors (accessibility / size / competitiveness) as the most important factors in the location decision behaviour. Furthermore, Louw (1996) proposes that the accessibility and proximity emphasize the importance of the contact of an office with its functional environment. This perspective is also reinforced as stated by Srour et al. (2002) a distinguishable location factor is the accessibility. More specifically, the *"accessibility of a location is a measure of how well transportation networks interact with land use attributes to satisfy household, business, or others' preferences"* (Srour et al., 2002, p. 2). This is also emphasized by Cheng et al. (2005), in which a tool was proposed to investigate the decision behaviour in the retail industry, and refers to the geographic limits, location type and etc. to determine the suitability for assessing the physical conditions of potential sites. However, another perspective is introduced by Louw (1996), that relates accommodation as a subordinate to the location.

Through several studies it was determined that, the location decision behaviour is relation to the accessibility is interrelated with a number of aspects. For example, another important relation is the accessibility by public transport or by car. This was emphasized by Korteweg (2002a), in which a relation was established with the location decision behaviour and the location factors accommodation and location. Other examples are sufficient parking places or the proximity of the city centre in relation to the business climate.

The importance of accessibility is also emphasized by McDonald & McMillan (2010), through a distinction of the market that consists of three sectors. The first, the commercial and financial, requires closely interaction though face-to-face contacts with suppliers, customers or governmental agencies. Therefore, a location is preferred in a downtown area. The second is the manufacturing sector that is located in the near vicinity of highways, rail lines and airports carries. The third, the residential sector, is highly depending on job opportunities, place identification, amenities and etc. (Fleury-bahi et al., 2008; Niedomysl & Hansen, 2010; Boterman & Sleutjes, 2014b). From the above described sectors it can be stated that the distance to downtown is an apparent factor. Even though distances have become much smaller in the digital era, connectivity remains crucial. More specifically, the connectivity and accessibility (local, national and international) is one of the most evident factors that influence the location decision-making process of companies. This is further emphasized by Rocco (2008), that refers to connectivity as the 'transferability' between different urban networks. Rocco furthermore states that *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134).

10) Facilities/services

Within the transition in the demand preferences for the location decision behaviour an important factor that is gaining more and more interest, is the importance of facilities/services within the building. This is emphasized by an interview that was conducted with Tom van Putten (DTZ, 2016a), is that companies attach more importance to the so-called hospitality. This factor is referring to the presence of facilities/services; friendly reception, spacious lobby, high quality coffee and various meeting places. In comparison with the traditional office market, there is now more importance to *"to create an atmosphere of hospitality"* (DTZ, 2016a).

11) Costs

In the evaluation between the current location and the future location there is a dependant factor, namely the costs of a company. The costs consist of the labour costs, the rent and the costs that are related to the location. Some locations, depending on conditions such as the availability of specialized personnel or the accessibility, the quality of the location, are interrelated with definite higher costs. An example is the Zuid-as in Amsterdam. For small companies, such as start-ups, to rent a space high costs are involved, due to the installations costs that are involved before the actual usage the office. Besides this, in the traditional office market companies enter into a rental contract that consists of the duration of 5 years in which the market dynamics can change rapidly. Therefore, there is a high need of flexibility. Within the location decision process of a company there is the continuously comparison between the costs and the return.

12) Rental contract vs. rental price (length of lease contract)

In the Netherlands the duration of the rental contracts are relatively short. The duration is mostly 5 years with the possibility of another 5 years. This duration is influencing the decision behaviour of owners, for example in a short-term rental contract the owner is less persistent in implementing changes from the demand side (Louw, 1996). However, through a change in the labour force, a higher demand for flexibility and an increase of the amount of small and medium businesses there is a higher awareness for the importance of the ratio between the rental contract – rental price – length of the rental contract. Through the implementation of flexibility companies are better able to can grow or shrink in a flexible manner within a short period of time. This saves organizations a substantial amount of time and money (de Baaij, 2003; Gibson, 2003). Therefore there is strong preference from the demand side for flexible rental contracts. In contrast, the more flexible the ratio, the higher the risk for the owner. This ratio is on the one side influenced by the market dynamics and the cyclical demand for office spaces and on the other hand by an increasing importance of energy and service costs. Tenants are more willing to pay a higher rental price if this price is facilitating a higher attractive work environment (DTZ, 2016a).

13) Ownership

As stated by literature, an important factor that influences the location decision process of a company is the type of ownership (Louw, 1996). A company has the decision to rent, buy or to lease. It is also possible that at the level of portfolio (dutch; portfolioniveau) different combinations can be constructed. Furthermore, it is also possible that a company decides to implement a shift in the type of ownership, for example in a sale/leaseback transaction.

Depending if a company decides to develop a new building, it is evident that there is precise match between supply and demand.

The differences in the location decision process between buy rental or lease consists of an evaluation of financial, legal and tax problems. An important issue that is related with the decision to buy is that it imposes a considerable burden on available funds (equity or debt) and therefore the economic risk lies with the owner. For a company to decide to acquire ownership means that there is a considerable decrease in the ratio between equity and total capital. And this eventually comes at the expense of the financial flexibility. In the rental construction there are less disadvantages. Possible disadvantages will be adjusted in the rent. In addition, it is upon the owner's benefit to maintain a good and rentable building. The durability of a rental contract influences the implementation of specific user requirements (Louw, 1996). The differences between the different types of ownership are shown in Appendix B in Table 15.

Location

14) Environment

Another determinant that is referring to the place identification is the environment. In the locational evaluation of the demand side (DTZ, 2016a) there is a higher interest to relocate in an environment in which there is a high degree of dynamism. This dynamism is the highest at city centres that consist of a high concentration of companies, retail and leisure and are characterized by a high accessibility. From a research that was conducted by Rocco (2008b), companies have a higher tendency to relocate themselves in urban centres because these centres are characterized by richer economies. For example, Amsterdam in which there is a strong emphasis on creativity and innovation. In addition, the city has an image of non-compliance, which also ensures a great attraction. Subsequently, as stated by Tom van Putten (DTZ, 2016a), the experience is becoming more and more evident, created by a dynamic environment in which there is a diversity of working, leisure and retail and preferably in a green environment with spectacular architecture.

15) Amenities

A determinant that is closely interrelated with the environment is the presence of amenities within this environment. Boterman & Sleutjes (2014) make a distinction in the type of amenities, namely climatological amenities (cities with a more comfortable climate attract more people) and the amenities that are related to consumption. The last category can be seen an economical driver for growth and consists of a diversity of functions that revolves around the consumption of cultural amenities such as concerts, theatre and restaurants. In a more broad perspective it can be seen as a diversity of functions that create an environment in which an inhabitant can identify them selves and that can boost the urban region. However, it should be stated that the attractiveness of an area is highly depending on the correlation of the presence of specific populations and the merge of specific amenities. As literature suggests, the presence of amenities or agglomeration effects are evident for the dynamics of an environment (Timmermans, 1986). This is also emphasized by Sleutjes (2013), that states that there is a strong relation to highly educated inhabitants and the presence of urban amenities, such as a diversified supply of restaurants, theatres and concert halls. The presence of amenities also facilitate to the importance of social networks. The interaction between people is contributing in a major way to the

economic growth and the dynamic society. Sleutjes (2013) also refers to a research that was conducted by the Nederlands Bureau for Economic Policy, in which the housing market in the neighbourhood of these amenities was investigated. From the research it can be stated that the residential market near these amenities is much smaller and this explains the higher housing prices. Due to a variety of characteristics it is not that straightforward to directly relate the presence of amenities to the residential satisfaction. This is emphasized by Niedomysl & Hansen (2010), that indicate that a variety of factors influence or even repel the residential satisfaction. Furthermore, people have a higher preference for work opportunities that are relative to amenities. And that by clustering (type of) people and economic activities this could contribute to the attractiveness of a region. However, from the investigated literature it is assumed that residential mobility is more affected by the classical factors. Therefore, the presence of amenities should be considered as preferences not as demands, and have a less substantial influence (Niedomysl & Hansen, 2010).

16) (Social) networks

Through changes in the labour market, the individualization of people, the emergence of new trends such as 'the new way of working' and the place identification of people with their environment, there is a high need to interact and form so-called networks (Louw, 1996). In a research that was conducted by Boterman & Sleutjes (2014) the importance of a social network was investigated. This is shown in Appendix B in Figure 22. From the research it can be concluded that the presence of social networks is an important indicator for the determination of place identification and therefore influencing the location decision behaviour. The importance and strength of a network, that consists of a diversity of communities, was emphasized in an interview with important stakeholders at Strijp-S ("Members-S magazine," 2014). Through the diversity of people who work in a community they are able to share risks, resources and to combine their expertise.

17) Business climate (clustering companies)

As described in the place identification individuals and companies have a high feeling to intertwine with their environment. As stated by literature, a strong migration towards urban centres is recognizable (StecGroep, 2011; Eindhoven, 2014). Even through globalization and the continuously evolving technological innovations companies have become more and more unattached with their environment. However, as literature suggests, companies still have a high willingness and commitment to accommodate themselves within clusters (Rocco, 2008b). Therefore, there is a high need for a dynamic metropolitan area. Within this area companies are forming clusters.

A metropolitan area creates a strong pull factor for other companies for a number of reasons. On the one side, as stated by Klier & Testa (2001), *"They employ a sizable and highly white-collar work force, and they generate demand for numerous specialized business services… Headquarters of large corporations have historically gathered in the largest metropolitan areas."* And on the other side, *"headquarters require ready access to state-of-the-art communication infrastructure i.e., air transportation and connections".* (Klier & Testa, 2001, p. 1) From the perspective of the government, they have a high interest in encouraging and facilitating clusters. From a research that was conducted by Van der Werff (2010), is indicating that governments develop policies for business climate in order to stimulate and create jobs. Furthermore, the policy makers have a noticeable focus on local areas. There is a strong emphasizes on 'sectors with growth; which can

provide jobs. Thereby the focus is primarily on knowledge-intensive sectors because there is the belief that by developing this sector, more employment opportunities for highly skilled knowledge workers can be created. This is also directly related to the economic problems of cities; such as unemployment, limited growth of local companies and etc. (Van der Werff, 2010). This is furthermore emphasized by Florida (2005), that identifies the highly educated workers, the so-called creative class, as the most important actors in the economic development of a city. As stated by literature, the presence of the creative class is seen as the predominant condition for the emerge of clusters (Florida, 2005 ;Van der Werff, 2010; Boterman & Sleutjes, 2014b). To conclude, an overview of the investigated literature is shown in Table 16 in relation to the different aspects that both influence and contribute to the decision-making process of highly educated and creative workers.

Identifying building and location determinants														
	Determinants / Literature	(Timmermans, 1986)	(Louw, 1996)	(Korteweg, 2002b)	(Srour et al., 2002)	(Van Oort et al., 2007)	(Fleury-bahi et al., 2008)	(Rocco, 2008b)	(Eindhoven, 2014)	(Niedomysl & Hansen, 2010)	(Remøy, 2010)	(Van der Werff, 2010)	(Boterman & Sleutjes, 2014b)	(DTZ, 2016a)
Socio-demographic	Education/work					X				X				
	Availability		X											
	Place identification						X						X	
	Corporate identity			X									X	X
	Sustainability										X			
Building	Type of building		X	X							X			
	Flexibility													
	Accessibility	X	X		X									
	Facilities/services		X					X						X
	Costs		X										X	X
	Rental contract vs. price		X										X	X
	Ownership		X	X				X						X
Environment	Environment							X						X
	Amenities	X											X	X
	Network		X										X	X
	Business climate							X	X			X	X	X

Table 16 An overview of the investigated literature and the derived attributes that influence the location decision behaviour

4.3.2 Barriers in the decision-making process

Within the location decision process of companies there is the continuously evaluation with their current situation and the possibility to relocate. Even though it can be stated that a lot of advantages can be identified for a company to relocate, it is evident to investigate the factors that are the constraints in the decision-making process.

As literature suggests, there are a number of factors that create a discrepancy in the evaluation of the current location and the actual moving behaviour of companies. An important factor is the costs that are involved in the decision to relocate. Depending on the financial situation of the company it is not always possible to relocate. This factor is directly related to the rental contract. A lot of companies are not able to relocate due to their current rental contract. Moreover, the type of ownership influences the decision-making

process substantially. If a company is owner of the building, due to the current market dynamics there is less financial flexibility to relocate. Another aspect, that is emphasized by Louw (1996), the present supply creates a constrain on the realization of the continuously changing preferences of the demand side. Furthermore, Louw (1996) states that the location decision is highly affected by the search process and the amount of time that is invested within this search process.

The environment, and the correlated factors; amenities, social network and etc., also have influence on the decision-making process. If a company has a certain place identification with their environment and a network of customers or suppliers, there is less incentive to relocate. This is directly related to the accessibility. As suggested in literature, individuals have a higher value what they already have. More specifically, as stated by Gourville (2006) individuals *"value what they own, but may have to give up, much more than they value what they don't own but could obtain"* (Gourville, 2006, p. 101). This is the so-called endowment effect.

4.3.3 Location decision models

Within literature a lot of research has been conducted about the location decision process of companies. From a wide range of studies that consisted of empirical research on the location decision process of companies several models have been developed. Before clarifying the different models it is important to give a definition was it meant with location theory. Within literature there is no consensus what is meant with location theory. Louw (1996) cites the definition of Lambooy, in which the location theory is defined as *"that part of the regional economy that deals with the general forces that determine the location of businesses"* (Louw, 1996, p. 17). Through the research that has been conducted by Louw (1996), several theories about location theory have been compared. From this research it can be concluded that even though al lot of research has been conducted about the geographical migration of companies there lacking knowledge and insights to define a comprehensive location theory. And therefore it is important to investigate the building and location determinants that determine the location decision process of companies. Atzema et al. (2012) refer to the so-called behavioural location theory in which two phases can be recognized, the decision to relocate or not, the search for alternative locations, the evaluation of the alternative locations and the definitive choice for the new location. A more distinctive definition is composed by Pors, that states *"The acting, organization and performance of a company, in response to internal and external conditions and changes, visible in the physical shape of the company (real estate / the housing)"*(Pors, 2013, p. 42).

One of the models that is investigated by Louw, is that of Edwards (1983) consists of geographical elements of the organization and behavioural theory. This is shown in Appendix C in Figure 23. Furthermore, the model shows in which way the size and type of organization influences the decision-making process. A distinction of the three most important characteristics in order to categorize the companies is proposed; the size and complexity of the organization, the way in which management and ownership are separated in the organization and status of the organization within the company. This is further composed in a model that is shown in Figure 24, in which range of five companies is introduced. In this range there is an increasing tendency *"in the direction of informal and incremental decision-making for a solution of the direct problem (the stimulus)"* (Louw, 1996, p. 42).

By reviewing the model it becomes clear that an important aspect, as emphasized by Edwards, is that the model is highly influenced by the behaviour of individuals and that the model is illustration the search for the most optimal solution.

Another model, that is investigated by Louw (1996), is constructed by Van Dinteren. This model consists of two phases, namely the phase in which a company decides to relocate to another location and the phase in which multiple alternatives are investigated and analysed. In the location decision process, as stated by Van Dinteren, the decision to relocate is depending on the evaluation if the threshold of the current housing has been exceeded or through external circumstances. And this is influenced by factors, such as the termination of lease.
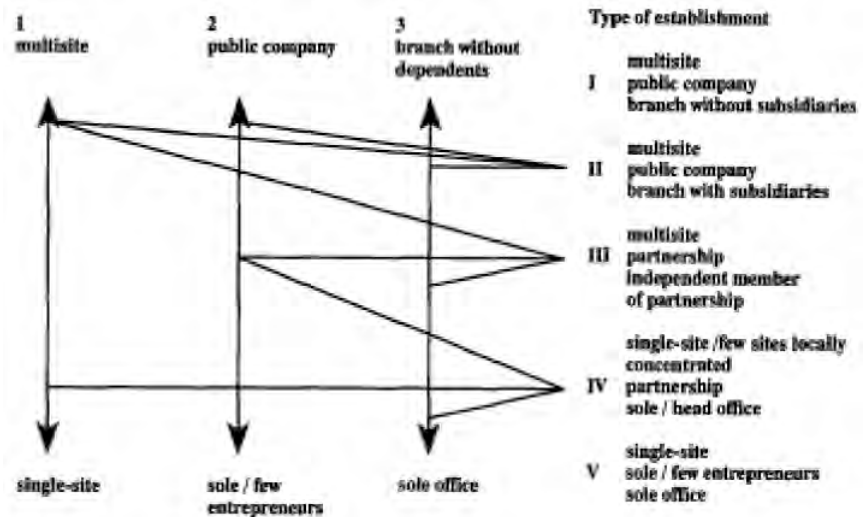
Figure 24 The location decision model (derived from (Louw, 1996) cited from (Edwards, 1983))

As stated before, the factor flexibility is discernable in the location decision process. Gibson & Lizieri (1999) propose a model, the so-called periphery property portfolio model, that implements the factor flexibility in the location decision process of organizations. The model is shown in Figure 25. The core of the model consists of the accommodation that an organization uses over a longer period of time, for example the headquarters of an organization. The peripherals portfolio consists of two "layers". The first layer consists of an office space that is rented for a short-term period (several years). This layer is used by the organization to accommodate specialized project teams. The second layer consists of offices spaces that is used based on the demand of that moment. This can vary from several hours to several months or years. An important aspect is that the required facilities and services should already be available so that these functions can be put in use directly. By applying this model it is important to decide if the accommodation strategy is an extension on the current situation or one that is definitive. This is closely related by the size of the company (Gibson & Lizieri, 1999).
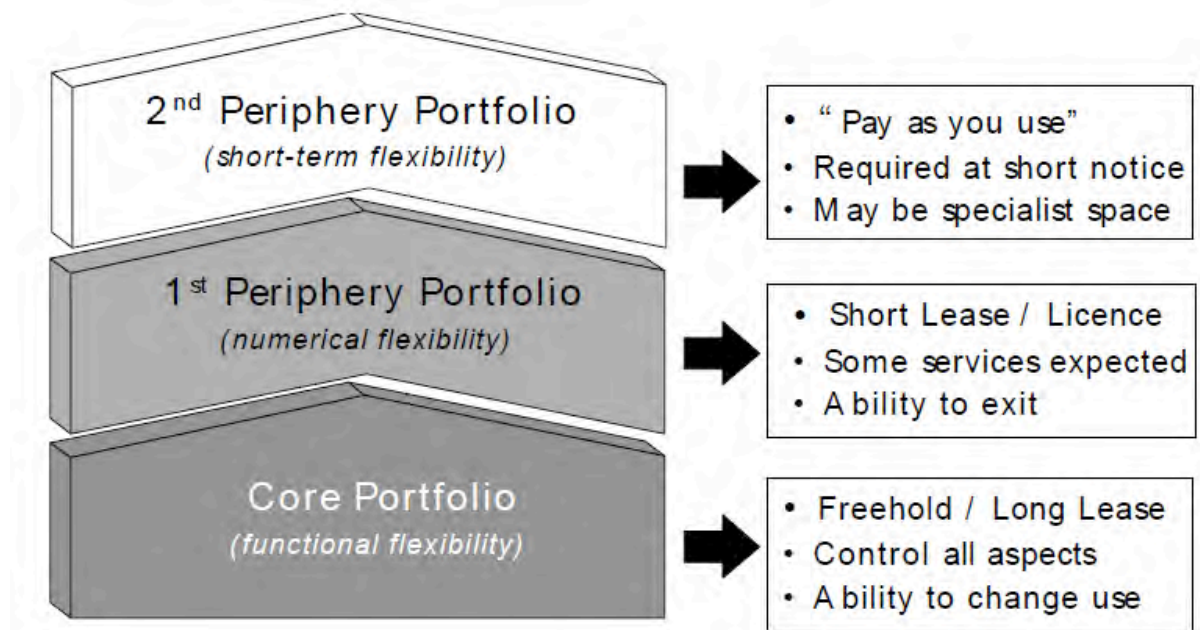
Figure 25 The core periphery property portfolio model (derived from (Gibson & Lizieri, 1999))

To conclude, from the investigated literature, it can be stated that even though a lot of research has been conducted in the location decision process of companies it remains a process that consists of a high level of complexity and is influenced by a wide range of factors. Factors such as the flexibility, size, current supply, corporate identity and place identification contribute independently to the evaluation to relocate. Furthermore, the various developed models show a lot of similarities; the amount of research about the influence of the independent factors and their relationship is limited.

4.4 The supply side

4.4.1 Introduction

After the clarification of the most important building and location determinants that influence the location decision process of the demand side, it is important to distinguish the most important aspects from the supply side. Through the continuously changing market dynamics, the changes in the labour market, the exponential growth of technological innovations, the emergence of networks and the increase of small and medium businesses, the importance of the commitment and willingness of the supply side to develop new strategies is evident to overcome the imbalance in the office market. By investigating the perspectives of the most important stakeholders, the most important building and location determinants and interrelated aspects and 'new' develop opportunities will be identified. This will contribute in the complexity of decision-making process in order to initiate or stimulate the office development. More specifically, to compose a development strategy that consists of the demand side and the supply side.

In order to determine the building and location determinants, this paragraph is structured in the following way. First the complexity of the stakeholder's perspective will be investigated. Secondly, the importance of the development process is clarified. This is further elaborated through the development strategies. To conclude, the importance of risk management is discussed.

4.4.2 Multidisciplinary environment

Within the multidisciplinary environment that is active in the office market, a decisive rol is filled in by the municipality. Prior to the economic crisis, municipalities were pro-active in the development of offices. Municipalities were willing in a decentralized structured way to allocate areas and by doing so, to take advantages of the realized revenues. Besides this, through a stimulating and facilitating positioning in the office market, the municipalities were able to remain attractive as a location for businesses. However, through the market dynamics, the decrease of the number of square meters per workspace and etc. the vacancy rate and the office supply increased substantially (DTZ Zadelhoff, 2010; Steinmaier, 2011). And as proposed by Zuidema & Van Elp (2010b), the municipalities had a highly facilitating and stimulating policy regarding the construction of new office buildings. If the government would have adopted a central policy on the allocation of land, this eventually could have had a negative impact on the development of the office stock. Furthermore, parallel to this, municipalities also have conflicting interests. On the one hand municipalities have nothing to gain if oversupply or vacancy occurs and at the same time the competitive position, in relation to other municipalities should be ensured. It is a continuously changing process that retains a high complexity (Besselaar, 2011; Lamers, 2013).

As a result of the market dynamics, the increasing vacancy rate and the office (over)supply, the government has adopted a more restrained positioning regarding the allocation of land and the construction of new office buildings. Through a number of aspects that are interrelated with the continuously evolving office market, the government has introduced policies such as the "Ladder sustainable urbanization" (dutch: Ladder Duurzame Verstedelijking). Regarding the content of a zoning plan the municipal council has a (very) high degree of policy freedom, with the assessment of the Spatial Planning Act. Through the implementation of the ladder, there is more precise emphasizes on the decisive spatial planning through the optimal use of space in urban areas. The ladder facilitates an assessment framework in which a precise and transparent decision-making process is composed, regarding spatial and infrastructural projects (StecGroep, 2011; Ministerie, 2013). On a more local level, the municipality of Eindhoven has developed the "Eindhoven Offices Strategy 2012-2020". This strategy consists on the one hand to accommodate the exponential growth of the small and medium businesses in existing buildings and on the other hand for the construction of new office buildings at priority locations, the so-called "Priority Nota 2011 - 2014" (dutch: Prioriteitennota 2011 – 2014). Furthermore, the principle applies that before realizing the new constructed buildings at least 70% of the building must by rented or sold and that there is no suitable alternative accommodation available (Eindhoven, n.d.; Eindhoven, 2014). On top of this, involvement of the municipality consists of a dual function in comparison to other stakeholders. First, through the provision of land and the issuing of building permits (public function). Moreover, from the supply side the municipality has the role of setting conditions, for example the spatial ordering (environmental regulations / zoning), and the role of creating (value) conditions for investments in infrastructure. Therefore, it can be stated that risk evaluation and the positioning of government and the municipality has changed considerably and is decisive in overcoming the mismatch between the supply and demand side (Vastgoedjournaal, 2016b).

In overcoming the imbalance between the supply and demand side, a suitable solution could be the withdrawal of the oversupply of the market. An aspect that is correlated with

this withdrawal is the depreciation of the building. In the process of the depreciation there is a discrepancy through the dynamics of the market and the type of collaboration between the investor and the bank. From the perspective of the investor the following aspects are important; the portfolio, the risk evaluation, the type of financing and the competitive positioning or financial feasibility of the investor. As suggested by literature, even though the investor has good constructed portfolio, the financial structure has the ability to limit the possibilities of the investor to handle in different market situations (Lamers, 2013). Besides this, there is the urgency and willingness of the investor. This is directly influenced by the continuously evolving dynamics of the market, the changing requirements of the demand side and the large amount of the office stock that is financed with debt capital. If a building is depreciated, the interest rate will decrease, the rent will also go down and this influences the marketability positively. As a result, the building derives a stronger economic competitive position and is more suitable for renovation, transformation or for demolition. Therefore, it can be stated that investors are facing a high complexity. In this complexity two relevant aspects can be distinguished. On the one side, investors are not able to meet, due to their financial situation, to the demand requirements, and as a result buildings are becoming obsolete. And on the other side, investors are not always directly faced with the problems of vacancy. For example, if the building is not completely vacant an acceptable return remains. If this process continues from the perspective of the investor there is no urgency for intervention (Zuidema & Van Elp, 2010b; van Swam, 2014). As a result of the risk evaluation of the investor a discrepancy occurred in the type of investments. By reviewing the market of investments, there is a differentiation recognizable. This is shown in Figure 26. This emphasized by an interview that was conducted with Michel Wilhelm, national director DTZ Zadelhoff (department Capital Markets) that states the following;

"In the past, the volume was more depending on investments in office space. In 2007, this segment resulted in 65% of the total investment volume. In 2015 this proportion was "only" 36%. Retail space accounts for 24% of the total volume, 22% for residential complexes and business - particularly logistics real-estate account for 14%." (DTZ, 2016b)

Figure 26 The Dutch real-estate investment market (derived from (DTZ, 2016b))

The most of the increasing investment volume is derived from foreign investors, especially from Anglo-Saxon parties, who have the perspective that the Dutch investment market is interesting (NVM, 2016a). The decisiveness of an investor is substantially influencing the decision making process in taking the necessary steps to overcome the imbalance between supply and demand (Zuidema & Van Elp, 2010b; van Swam, 2014).

By reviewing the office market, a large amount of the oversupply and the imbalance between the supply and demand side is created through the development of office buildings before the final user was identified. As literature suggest, in 2001 approximately 1.9 million square meters of new offices were added to the market, in 2009 approximately 600,000 square meter and in 2015 approximately 190,000 square meter. Within this decrease of new office buildings, the project developer is faced with the so-called prisoner's dilemma. On the one side, in times that are characterized as good economically positive there is much to gain with office development. The value of an office building is highly depending on the rent. By developing with risk and through the provision of 'wrong incentives', the risks for office development decreased. Through the provision of incentives, property owners are trying to create interest for the office space. The translation of an incentive is a stimulus. An example of an incentive is a rental-free period. An temporary incentive period is provided with the anticipation that better times will come (Van Gool et al., 2007). This had created a market that can be characterized as non-transparent (DTZ Zadelhoff, 2013). The potential profit is overcoming the risk evaluation and therefore project developers, even though they could have had the anticipation that the market is evolving, have prevailed the expected profits above the risk of oversupply (Besselaar, 2011). The transition from the supply perspective is illustrated with a power/interest grid. This is shown in Figure 27.
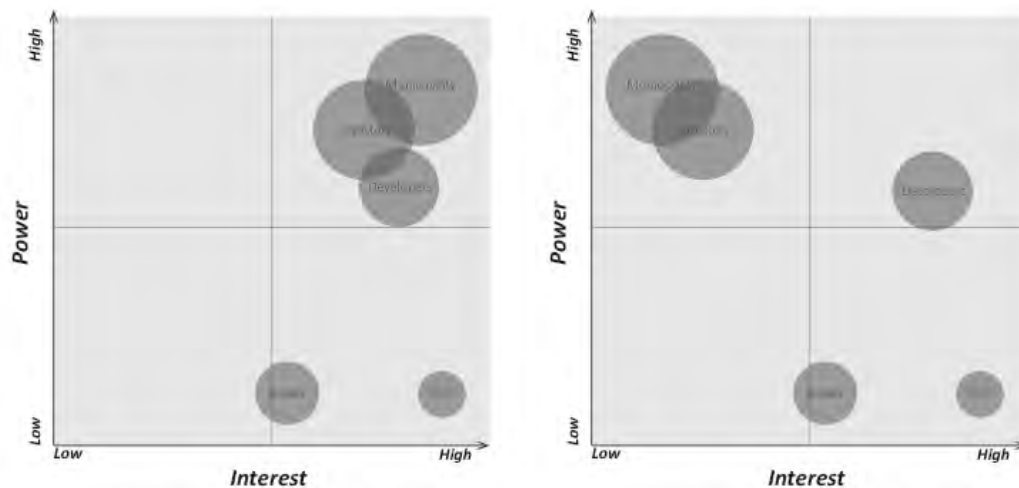
Figure 27 The transition in the office market (left; before and right; now)

4.4.3 Development process

As literature suggests, the uniqueness of a project, the multidisciplinary environment of the supply side, the fluctuation of the market dynamics are influencing the development process. From a research that was conducted by Gehner (2011), a traditional development process was investigated. This is shown in Figure 28.
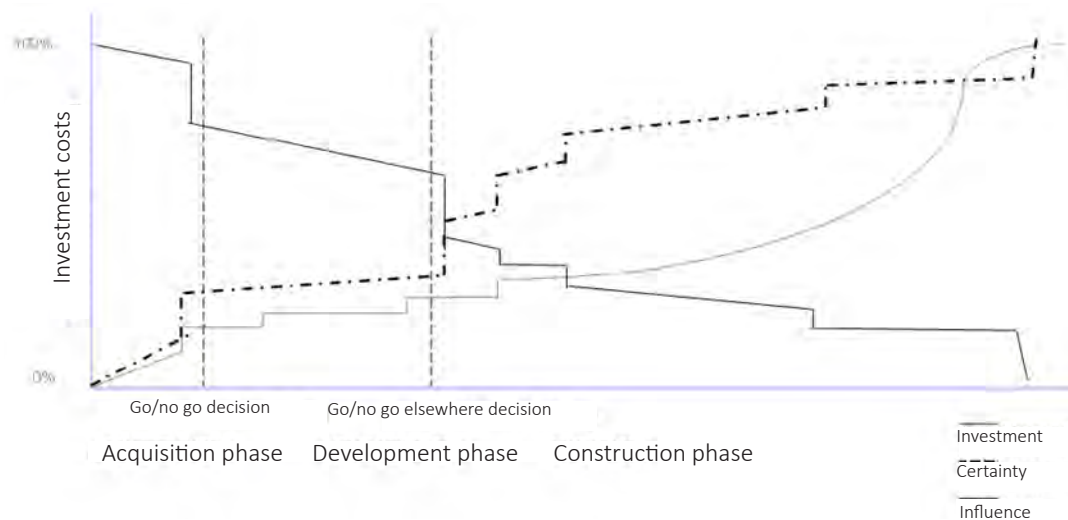
Figure 28 Traditional development process (derived from (Ruhl, 2015) cited from (Gehner, 2011))

By reviewing the model, it becomes clear that during the preliminary phase substantiated estimations, regarding the associated risks, have to be constructed in order to determine the profitability of the project. If there is an acceptable chance that if the desired return can be realized, there is a higher justification for certainties and therefore for the necessary and required investment. This is also shown in Appendix B in Figure 29. There is a large gap between the development in time and the operation costs in the initiative phase and the expected revenues. Throughout the development process of a project, between several transition phases, there is the recurrent principle where the decision is made whether to invest or not to invest further in the project (go. vs. no-go decision). Parallel to this process, if more certainties are gathered throughout the different phases of a project, in return more obligations and investments are committed. An important aspect of this is the collaboration between the independent stakeholders and their conflicting interests (Gehner, 2011; Lamers, 2013; Ruhl, 2015). The complexity of the development process makes it a process that can hardly be described as linear and iterative. The development process is closely related to the development strategy and the different phases of a project (Gehner, 2011; Ruhl, 2015). Throughout the different phases of the project, the most important investment decisions are made if a phase transition occurs. From the moment than an investment decision is taken within the development process there is still the risk that the expected return is not achieved. More specifically, the process of decision-making can be characterized as uncertain, or with a degree of risk. This is emphasized by Ruhl (2015), that states the decision-making process is primarily based on intuition and that the decisions in the development process related to expectations in the future and therefore will always consist of uncertainty. This uncertainty is highly influenced by the development strategy and the correlating risk management. For example, the uncertainty can be reduced by gaining more specific information or to obtain certainties from other parties.

As stated before from the perspective of the investor or project developer, an important aspect is the risk evaluation. The uniqueness and the characteristics of each project differ and therefore also the correlating risks. The assessment of the risks varies within the project. From the moment the initial investment decision process is outlined the risk evaluation is highly depending on the development strategy. Therefore, the development strategy influences the risk evaluation of a real-estate development (Gehner, 2011). By

investigating the differences of the development strategies more insights will be gathered in order to compose a development strategy from the supply side (Ruhl, 2015).

4.4.4 Development strategies

Before elaborating on the existing development strategies, it is important to define what is meant with a development strategy. Within literature, the strategy of an organization is referring to the process or steps in which an organization is trying to accomplish its goals (Van Gool et al., 2007). Therefore, a development strategy is referring to the methodology in which a project developer is trying to achieve his return objectives with the development of the real estate. Within the initial decision process, the project developer composes a risk evaluation which development strategy is the most suitable. As stated by Ruhl (2015), a development strategy should be defined as *"The criteria for making the investment decisions in the development process that will be adopted in making the initial investment decision."* (Ruhl, 2015, p. 11)

As suggested by literature, a distinction consists between the supply and demand driven strategies. From the supply side the strategies consists of; strategic land acquisition, concept development and the development competition. From the demand side, the strategies consists of; the tenant-driven development and investment-driven development (Gehner, Halman, & De Jonge, 2006; Ruhl, 2015). Through a research that has been conducted by Ruhl (2015), the different strategies are defined and clarified and shown in Table 17. The table is constructed with the assumption of an ideal market with a balance between the supply and demand side.

Development strategies		
Market	Development strategy	Explanation
Supply side	Strategic land acquisition	This strategy starts with the acquisition of a land or real estate position.
	Concept development	This strategy is initiated with the development of an idea or a concept that meets the demand of the market.
	Development competition	This strategy is initiated by the municipality or another building/land owner. The allocation of building/land for the (re)development is mostly done by tendering procedures.
Demand side	Tenant driven	This strategy is initiated with a exploration of the market to find a potential tenant and/ or buyer. Based on the requirements of the demand side the most suitable location is defined.
	Investment driven	This development strategy starts with the process of having capital return on investments in real estate. The investments are made by investors who want to attract development capacity or want to engage in collaboration with other parties.

Table 17 The Development strategies (derived by (Ruhl, 2015))

Through the continuously changing market dynamics some changes have occurred in the popularity of the development strategies. For example, the strategic land development strategy, more specific, the acquiring of land with the intention to realize a change in zoning and therefore to capitalize on the value development performance of this land, has been the recent decades a strong policy of municipalities. However, the economic changes contributed negatively, through the decreasing land prices, from the perspective of municipality in a policy that can be characterized as reserved. Furthermore, through a

detectable increase of foreign capital a shift occurred in the real estate, namely from the focus on the acquisition of land towards the market of the transformation of existing buildings and this resulted in an increase of the popularity of this development strategy. Another development strategy that is influenced by the market dynamics is the tenant-driven strategy. In a period that is characterized by economic downturn, the demand side can choose from a large amount of supply. By reviewing the current office market and in order to overcome the imbalance between the supply and demand side, the investment-driven strategy could be implemented. However, this strategy is highly depending on the commitment and willingness of the involved stakeholders to develop with risks (dutch; op risico ontwikkelen).

To conclude, the development process, the development strategy and relation with the risk management is in overall highly depending on the risk attitude of the stakeholders that are involved in the development process. The risk attitude, from for example a project developer, is highly influencing the willingness and commitment of the project developer in the invested in the initiating and bearing of the risks. Subsequently, a project can be assessed and monitored with the correlating risk profile. And this eventually determines the successful completion of the project ((Ruhl, 2015) cited from Raftery, 2003)).

4.5   Conclusion & Discussion

The location decision-making process of companies, and specifically that of highly educated and creative people, is a comprehensive complex process that is interrelated with a large number of aspects. The external forces, the so-called agglomeration economies and the continuously tension between the centripetal force and centrifugal force, are evidently contributing in the evaluation of the relocation. Through the changes in the importance of the geographical alignment of companies, the concentration of activities within an area, knowledge spillovers, labour market pooling, companies and individuals are seeking to create a synergy. More specifically, within the location decision behaviour, individuals are seeking a balance with the opposing forces. Another important aspect is the circular causation, in which the above-described aspects stimulate and facilitate an environment that attracts more people and businesses and acts as a catalyst for the concentration of activities and skilled labour with an area. Furthermore is this contributing to the exponential growth of the economic activities. Subsequently, this concentration, and therefore the importance of the exchange of knowledge and the face-to-face contact are becoming more and more evident within the knowledge economy. Even though the exponential growth of technological developments, on a global level, is contributing to the fact that transnational companies are becoming decentralized; on a local level there is a much higher awareness and commitment for interaction and collaboration. Therefore, companies are concentrating their activities in clusters, the so-called networks. This is further emphasized by Rocco (2008), that refers to connectivity as the 'transferability' between different urban networks. Rocco furthermore states that *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). From the investigated literature, it can be stated that the location and more specifically, the connectivity and accessibility (local, national and international) is one of the most evident determinants that influence the location decision-making process of companies. Moreover, within the evaluation process of individuals to relocate, the characteristics that shape this process have been changing substantially.

Through the assessment of the most important building and location determinants it can be stated that the most important determinants that are contributing to the changes or the transition of location decision behaviour of highly educated/creative workers (DTZ, 2016a) consist of; (i) place identification, (ii) corporate identity, (iii) costs, (iv) flexibility, (v) facilities/services, (vi) environment/amenities, (vii) (social) network and (viii) the clustering of companies (business climate). As literature suggests, through the increasing importance of place identification, specifically the perception of the environment, individuals and companies have a high willingness and commitment to accommodate themselves within clusters (Rocco, 2008b). If individuals or companies have a strong perception of the environment, influenced by the amenities/facilities and services, for example that of creative people who work at Strijp-S, this is influencing the location decision behaviour in a positive way through a longer residency and furthermore as a catalyst to attract more companies (Boterman & Sleutjes, 2014a). Subsequently, this is contributing to the concentration and sharing of knowledge and the strengthening of the network. Another determinant that is influencing the location decision behaviour of highly educated and creative people and that is directly linked to the place identification, that is more referring to the characteristics of the building, is that of sustainability. As suggested by literature, an environment that consists of the equilibrium of synergy between living, working and recreation, is ensuring the emotional and cultural context and identity of the city. Therefore, it is providing a sustainable environment in who people want to life, work or recreate (Remøy, 2010; Vos, 2013). From the perspective of the supply side, there is still lacking knowledge within literature about the building and location determinants have that influence on the development on the location decision behaviour of highly educated and creative workers. Therefore, the contribution and significance for design and planning professionals in implementing this research is constrained (Amole, 2009). By examining the processes that are interrelated in the development of new office buildings it becomes clear that the following aspects are contributing to the development of new office buildings: (i) risk evaluation, (ii) multidisciplinary environment, (iii) development process and (iv) development strategies. Therefore, it is evident to investigate the importance of the building and location determinants from the perspective of the supply side through interviews with the most important stakeholders that are actively involved in the office real estate market.

Even though a large number of determinants are identified that contribute positively to the location decision process it is evident to understand that there is a discrepancy in the location evaluation. Through several constrains, individuals and companies are not always able to relocate. For example, due to the financial situation or the present supply, the flexibility of the individuals or the companies is highly affected and therefore they are not able to relocate. Furthermore, the place identification could also affect the location decision process in the opposite way, because if a company has a strong place identification with their environment and a network of customers or suppliers, there is less incentive to relocate. This is directly related to the accessibility. In overall, it can be stated that the location decision process to relocate, from the perspective of the demand side, is highly complex and affected by both internal aspects and external aspects that could become thresholds in the current housing situation. Therefore, the proposed decision location model by Gibson & Lizieri (1999), that consist of high degree of flexibility, is a very suitable solution in overcoming the discrepancy.

The location decision process of the demand side is also highly affected by the willingness and commitment of the supply side to facilitate or stimulate the accommodation. Especially, within the initiative phase the multidisciplinary environment of the supply side has a decisive role in contributing in overcoming the existing imbalance between the supply and demand side. Through the increase in the interdependence of people, the development of new technologies and the emerging of phenomena such as the new way of working and shared workspaces, have distinguishably influenced the changing requirements of the demand side (Brounen & Eichholtz, 2004; Remøy, 2010). Therefore, stakeholders such as municipalities and investor have a more reluctant role through the transition of their risk evaluation concerning new office developments. An example, is the shift of the municipality from a highly facilitating and stimulating policy, regarding the construction of new office buildings, into a more precise policy in which there is emphasis on the decisive spatial planning through the optimal use of space in urban areas (Zuidema & Van Elp, 2010b). Furthermore, because of the changes in the building and location determinants from the demand side, there is a stronger focus on the accommodation of the small and medium business in the existing office oversupply through transformation.

By examining the traditional development strategies it can be stated that a suitable strategy consists of a combination of the concept development and the tenant driven development. However, the implementation of this strategy and in order to overcome the existing imbalance, this is highly interrelated through the 'traditional' risk evaluations of the most important stakeholders. Therefore, it is evident that the changing market dynamics are translated in more flexible risk evaluation that takes into account the uniqueness and characteristics of a project. Even though the risk evaluation is mostly based on uncertainties that are primarily based on intuition, the changing demand preferences ask for new develop opportunities and therefore a transition in the determinants that influence the initial investment decision. To conclude, within literature there is still an information gap about the building and location determinants that influence the location decision process from both supply and demand. By investigating the quantitative building and location determinants of the demand side in comparison with the qualitative building and location determinants of the supply side, new insights will be gathered in order to compose a new development strategy and overcome the existing imbalance.

Part III   Research

5. Research approach

5.1 Introduction

The derived attributes from the literature study have their independent relation and influence on the location decision behaviour and the evaluation of the current location of the highly educated and creative workers. Moreover, contribute to the evaluation process for the decision maker. However, not all the investigated attributes have the same significance in relation to the actors that are involved in the decision process for relocation. For example, for the demand perspective, small and medium businesses, the location and the business climate are important. From the perspective of the supply side, the rental period and the location are important.

This chapter seeks to investigate the most important attributes and their relations from the demand side. First, through the introduction of the research method Discrete Choice Modeling. Secondly, by clarifying the application within this research is determined. Thirdly, the Discrete Choice Modeling experiment that is containing the different steps is designed. To conclude, the DCM experiment is composed within a questionnaire.

5.2 Discrete choice modeling (DCM)

The economic crisis, socio demographic changes and the market forces contributed substantially to the emergence of small and medium businesses, that clustered and formed so-called communities (networks of highly educated and creative people). In order to determine the determinants and their relations that contributed to the office location preference of the highly educated and creative workers and therefore the individual choice behaviour of these target groups, the research method Discrete Choice Modeling will be implemented.

The aim of the DCM experiment is to understand the preferences of highly educated and creative workers regarding their location decision behaviour in future office developments. By having insights in the importance of the attributes, that were derived from the literature study, cities, urban planners and policy makers are better able to attract or retain individuals who work in creative and knowledge-intensive sectors (Akcomak, I.S.; Borghans, L.; ter Weel, 2011). Furthermore, new information is gathered about the building and location determinants that could contribute in the relocation of the emerging networks in new office developments. To conclude, the DCM technique is highly applicable for the investigation of the preferences for both individuals and groups (Henser et al., 2005). The attributes and their relation will contribute substantially in the creation of a development strategy in order to overcome the imbalance between the demand and supply side.

Background Discrete Choice Modeling

The research method Discrete Choice Modelling is relatively new technique, that originated from economics and psychology, that is suitable for determining the choice behaviour of individuals between alternatives of products and services (Glumac, 2012). According to Van Swam (2014), Discrete Choice Models are implemented with the assumption that the decision maker undergoes utility-maximizing behaviour and the models are based on the theoretic assumption by Lancaster (cited by (Kemperman, 2000)) that each product is described as a bundle of product characteristics or attributes (Kemperman, 2000). In

gaining more insights in the decision-making process of the demand side to locate or relocate themselves on the Brownfield site Strijp-S, the DCM technique seems very useful. By applying the DCM technique the researcher is able to determine the impact of product and/or service composition on different target groups of individuals (van Swam, 2014). Furthermore, with the DCM experiment, insights are established about the likelihood or the probability of a particular choice of a consumer for a number of alternatives. According to Hensher et al. (2005) it is assumed that an individual has certain preferences that are defined over a number of alternatives, treatment combination, based on *utility maximization*. The treatment combinations indicate the specific profile of the alternatives in the choice set (Henser et al., 2005).

Before elaborating of the DCM experiment it is important to make a distinction what data is used within the experiment. By examining Figure 30, it becomes clear that there are two distinctive approaches to measure the preference and choice, namely the stated and revealed. The differences between the modelling approaches are depending on the used data. Stated models are based on observations or responses from respondents in controlled hypothetical situations. And revealed models are based on observations from respondents in real market situations. The specification of the choice model is identical (Kemperman, 2000).
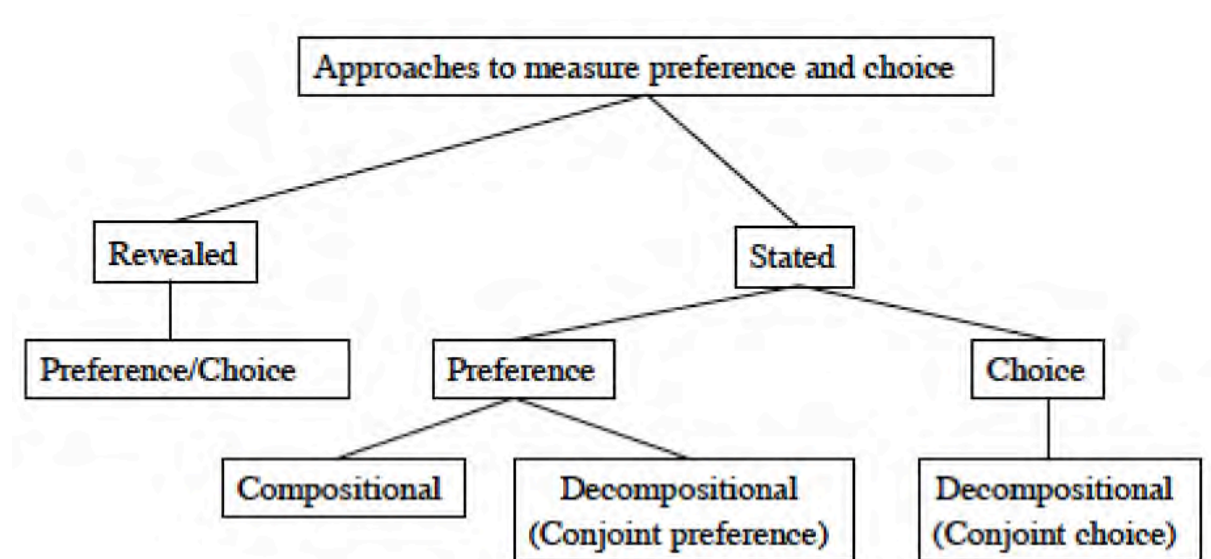
Figure 30 An overview of preference and choice measurement approaches (derived from (Kemperman, 2000))

Within this part of the research the focus will be on the investigation of the individual choice behaviour of the location preference (highly educated and creative workers) and the interrelated variables of small and medium businesses that are already located on Strijp-S. Therefore, the revealed modelling approach will be implemented. This is further emphasized by Kemperman (2000), that *"revealed choices based on past behavior form the basis for modeling choice behavior"* (Kemperman, 2000, p. 83). The revealed choice modelling approach has a high level of representation of the actual choice behaviour of the investigated target group. Subsequently, this is indicating the expectation that a high external validity may be obtained and that therefore this is indicating a high predictive power. Beside this clear advantage it is important to mention that there are a number of disadvantages related to this modelling approach. First, within real markets it is often

possible that there is a correlation between the attributes and the alternatives. This could create biased parameter estimations. Secondly, it is only possible to obtain the estimates for existing attributes levels and alternatives. For completely new products or services the information is not available and therefore it is not possible to predict the specific impact. And finally, if the collection of the revealed preference or choice that is conducted it is only possible to make one observation per respondent. This is strongly implying the necessity of large samples and highly interrelated costs. To summarize, the revealed choice modelling approach is highly suitable is the data regarding the investigated effects of new explanatory variables on existing markets is limited (Kemperman, 2000).

For developing a DCM experiment, Kemperman (2000) defined a model in order to determine the revealed preferences. This model is shown in Figure 31. The model consist of the following methodological steps:

Phase 1	Problem refinement
Phase 2	Elicitation of influential attributes
Phase 3	Specification of relevant attribute levels
Phase 4	Choice of Measurement Task
Phase 5	Experimental design condsideration
Phase 6	Construction of the questionnaire
Phase 7	Analyzing the results
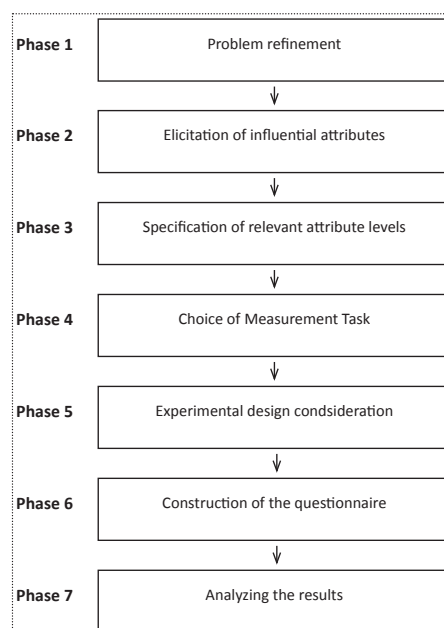
Figure 31 The experimental design process of a DCE experiment (derived from(Kemperman, 2000))

1) Problem refinement

The first phase consists of a clarification of the problem identification. Within this research the problem that is addressed with this research method consists of the determination of the locational preferences of the target group small and medium businesses original location choice on Strijp-S. This is addressed in chapter 1.

2) Elicitation of influential attributes

In this phase the influential attributes that are relevant in the choice process have to be identified. Through a conducted literature review that is shown in the previous chapter the influential attributes are defined. After the influential attributes have been elicited it is important to determine the number of attributes that will be included within the experiment. The specific amount of attributes that are imbedded in the experiment is imperative for the complexity or reliability of the experiment. This should be taken into consideration.

Within this experiment, as stated by Kemperman (2000), the decision nets method will be implemented. Through the experiment the respondents are given the most important attributes for a certain alternative. And then the critical levels will be identified in order to investigate their decision behaviour.

3) Specification of relevant attribute levels

The next phase consists of the determination of the appropriate amount of levels of each attribute. The attribute levels, as stated by Henser et al. (2005), are defined as "the levels assigned to an attribute as part of the experimental design process" (Henser et al., 2005, p. 107). The number of attribute-level labels should be identical in relation to the number of alternative levels for a given attribute. The attribute levels can be expressed as numbers (for example quantitative attributes such as travel time may have attribute-level labels of "10 minutes," "20 minutes," etc) or as words (i.e. qualitative attributes such as colour may have attribute level labels of "green" and "black"). And according to Henser et al. (2005) "each "possible" attribute level may be mapped to a point in utility space" (Henser et al., 2005, p. 107). This is shown in Figure 32. In general there is less complexity to construct the experimental design by using two or four levels of each attribute. And besides this, the attribute levels should "cover the range of trade-off held by each individual and competitive trade-offs should be ensured" (Kemperman, 2000, p. 93).
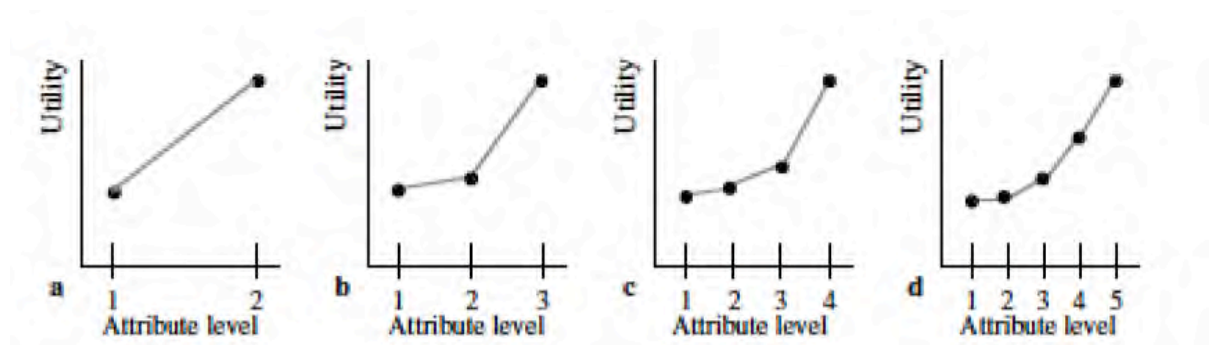
Figure 32 The attribute level mapped to a point in utility space (derived from (Henser et al., 2005))

A higher accuracy is obtained by measuring more levels and in accordance retrieving more information that is captured in utility space (Henser et al., 2005). If more levels are added more complex utility relationships can be identified.

Within the identification of the attributes that will be implemented in the experiment an important aspect, as stated by Henser et al. (2005), is the concept of *"interattribute correlation"* (Henser et al., 2005, p. 106). The concept is referring to the cognitive perceptions that decision makers associate (or directly link) to the attribute descriptions that are provided. For example, the relation of price and the (perceived) correlation with a higher quality. And by investigating the importance weights for price and quality the situation could occur that decision makers do treat these attributes as being independent.

4) Choice of measurement task

The fourth phase consist of the choice of the measurement task. There is a difference between the conjoint preference and choice approach. In the conjoint preference approach the respondents are asked to rate or rank hypothetical alternatives. The profiles are ranked form the most to the least preferred. Within the consideration of the ranking of alternatives the advantages consists of the ordering the profiles instead of their preference

and a carefully consideration of trade-offs between the profiles and their alternatives. However, the information that is gathered to the degree of preference is limited and the data that is collected from the different ranking depths differs in reliability. In the conjoint choice approach the respondents are asked to decide between two or more hypothetical alternatives. The respondent is asked to select a profile from a choice set that is representing his or her preferences. An example is shown in Figure 33.

Figure 33 Example of a conjoint choice set (derived from (Kemperman, 2000))

5) Experimental design consideration

The fifth phase consists of the consideration of the experimental design. After identification of the alternatives, attributes, number of attribute levels and the attribute-level labels and the choice of measurement task has been conducted, the experimental design should be chosen. Due to the wide range of different classes and designs that are available, Henser et al. (2005) focuses on the most applicable designs. In order to determine the most suitable experimental design a number of choices should be conducted; for example full factorial or fractional factorial design, the coding format (orthogonal, dummy or effects coding), labelled or unlabelled experiments and effects between the attributes (Henser et al., 2005). To generate the experimental design it is important what specific relation should be investigated, more specifically *"whether a main effects only design is to be generated or whether a main effects plus selected interactions design is required"* (Henser et al., 2005, p. 127). In determining the relation between the attributes it is important to correspond names to the attributes in such a way that these respond to a generated design column that is reflecting a specific attribute. Therefore it is recommended to code the attribute levels by implementing orthogonal codes. And after the design process is completed, choice sets will be generated in order to randomize the choice sets and to receive reliable data (van Swam, 2014).

6) Construction of the questionnaire

After the design has been constructed, the questionnaire is composed and distributed among the respondents. The construction of the questionnaire it highly depending on the integrity of the data that is obtained from the respondents. In overcoming misinterpretation or their ability to process the information it is therefore important that; (i) the instructions are simple and understandable for the respondents; (ii) to thrive for task uniformity by avoiding differences in interpretation; (iii) to clarify the attribute combinations with examples; (iv) to derive an explanation that clarifies the domain of the experiment; and (v) to keep the respondents informed about the objectives of the experiment.

7) Analyzing results

The analysis of the results is depending on the type of data, the specification of the utility function and the specification of the choice process. The data is analysed with multinominal regression model (MNL). Kemperman (2000), states that *the "multinomial logit model is the most widely applied model in dicrete choice analysis to predict the probability that a choice alternative, such as the location of a new office, will be chosen".* (Kemperman, 2000, p. 80) In the MNL model the attribute level of other choice alternatives in the specification of the utility function are included. And from the MNL model information can be gathered about to what extent the different alternatives are complimenting or substituting to each other.

Furthermore, Kemperman (2000) also states that *"the dependent variable in the analysis is the profile rating and the independent variables are the coded attribute levels"* (Kemperman, 2000, p. 98). There are three different ways to code the attribute levels; dummy coding, effect coding and orthogonal coding. The difference of the coding consists of the regression equation and the interpretation.

5.3   Elicitation of influential attributes

Through a literature review the characteristics and attributes are defined. Within the investigation in determining the relative importance between intrinsic housing attributes, such as the size and the costs, and the extrinsic attributes, such as location factors, differ in importance regarding the wishes of the target group. Preferences and wishes of each individual within the target group can be translated into a choice (Opoku & Abdul-muhmin, 2010). Choices are based on income combined with the degree of satisfaction, utility, that the product offers (Henser et al., 2005). Besides the attention of who is making the choice, it is important for this experiment to describe the settings of a decision moment, a so-called scenario. To conclude, the attributes that are 'less' important are not implemented within the questionnaire.

The target group that is investigated with this research method consists of highly educated/ creative workers/people who work in small and medium businesses. The economic crisis contributed substantially to the exponentially increase of this target group. By investigating their location preference in the decision making process for locating themselves on Strijp-S new insights can be gathered in order to determine a new development strategy.

Fixed attributes

Throughout the experiment and the questionnaire there are attributes that are constant, the so-called scenarios. These scenarios define the scope of the research. For example, the defined target group consist of the highly educated and creative workers, who work in small and medium businesses that are located at the former Brownfield Strijp-S. Besides this, the office market is a rental market. In collaboration and with the participation with the project developer SDK some additional alternatives were identified. The different scenarios were also communicated to the respondents. The scenarios are shown in Table 18.

Fixed attributes (scenario)			
Attribute			Explanation
Target group	0	Small and medium businesses	Freelancer / 1- 5 employees / 5 – 10 employees
	1	Large businesses	>11 employees
Market	0	Rental market	Office spaces rented realized in transformed (vacant) buildings
	1	Buyers' market	
Location /environment	0	A- location	Location in the centre of cities
	1	B-location	Location on Brownfield
	2	C-location	Location in a suburban area
Quality	0	Quality 3	Energy label E/F/G
	1	Quality 2	Energy label C/D
	2	Quality 1	Energy label A/B

Table 18 Fixed attributes and levels

Target group and market

The economic crisis, socio demographic changes and differences in the labour market have contributed substantially to the expanding growth of small and medium businesses. Besides this, new emerging trends such as the new way of working are influencing the required floor space of companies. Within this experiment the target groups consists of highly educated/creative workers who work in small and medium businesses. The companies are located on Strijp-S in transformed (former vacant) buildings. Therefore, the focus is on the rental market.

Environment

The city of Eindhoven has been ranked as one of the smartest regions of the world, however it is missing a real urban surrounding area that is evident for the future to maintain its economic positioning and to attract certain knowledge workers and artists. The area of Strijp-S as an urban centre has this ability, this is further emphasized by in the master plan ((Van Winden et al., 2010);(ED, 2011); (Boterman & Sleutjes, 2014)).

"The area Strijp-S has been considered as the location in which Eindhoven can fulfil its needs to create its missing metropolitan environment. Therefore, it is a key element in the Brainport strategy to make the city attractive for international oriented knowledge workers and artists. Strijp-S has to create the living, work and stay conditions to tie tis target group to Eindhoven"(KuiperCompagnons, 2007, p. 25).

In order to become a metropolitan area the interaction with the environment plays a key role. The diversity of functions in combination with the historical identity of the area, the public awareness and place identification of the inhabitants is necessary in order to transform the area into a multifunctional area, labelled as 'Creative City'. More specifically, as stated by KuiperCompagnons (2007) *"the best practice of an historical important industrial complex into a dynamic post-industrial city district, in which culture and technology play a key role"* (KuiperCompagnons, 2007, p. 58).   Through the creation of a sub urban area in which there is an intertwined diversity of functions that consist of a

combination of living, working, cultural and recreational facilities. Furthermore, in a research that was conducted by Timmermans (1986), the presence of amenities or agglomeration effects are considered as important. Therefore, it is interesting to investigate in which way this attribute will influence the decision of the potential tenant. This attribute is divided into three different levels to be able to estimate how this decision will be influenced or not.

The specific location is evident in the determination and evaluation of the attractiveness of an area. For the case study the Brownfield Strijp S will be investigated. In an overview of Strijp-S, which is shown in Appendix C in Figure 34, the amount of buildings is shown in which companies are clustered. Moreover, the target group that will be investigated is located on Strijp-S.

Quality

The level of transformation is highly depending on the financial feasibility of the project by the developer (and the investor). On the other hand, the financial feasibility is depending on the cash flow of the building and therefore the amount of tenants that is occupying the building or will occupy the building in the future. From the collaboration of the project developer SDK the main rule is that with a transformed building it is financial feasible if 30% is occupied and with a new constructed building it is financial feasible of 70% is occupied.

The occupation rate is influenced by the quality of the building. The buildings that are occupied by the small and medium business have been transformed to quality 2. This is referring to the Energy label C/D in order to comply with current regulation on energy efficiency (Vasilache, 2013).

5.4   Influential attributes

The determination of location preference of the target group is a complex process that consists of a wide range of attributes. The attributes used in this experiment are derived from a literature study and in correlation with the input from the experts of Park Strijp Beheer and represent the input for this experiment. From the investigated literature it can be stated that through the continuously shifting economy, through the deindustrialisation, adaptations in the work force (the professionalization of the work force and the new way of working) and the transition to a service-based economy, in accordance with trade-offs between these fields have substantially contributed to the appearance on the one hand of small and medium businesses and parallel to new residential attributes that create a new type of urban geography of class (Boterman & Sleutjes, 2014b). And that class consists of highly educated and creative workers.

In the redevelopment of Brownfields, such as the area Strijp-S that is located in Eindhoven, the policy makers and developers are trying to attract highly educated/ creative workers in order to improve the attractiveness and development of this area. Furthermore, the economical crisis and the evolving attributes of the demand side contributed substantially to the appearance of a new type of urban geography of class, the so-called communities (networks). These networks consisted of small- and medium companies that formed new location preferences. Furthermore, within society new trends are gaining popularity that in the future will consist of a combination of functions. An example could be to combine residential mobility with the continuously changing market forces of the office market. For

example, the Fenixloods in Rotterdam, that consists of a vertical layering of living and the new way of working. However, within literature a lot of research has been conducted in order to determine the residential preferences of different target groups, such as that of highly educated people/ creative workers. The research to implement the residential satisfaction in combination with the most important attributes that influence the location decision behaviour is however limited. Therefore, from the theoretical chapter (CH4: Analytical Framework) the most important attributes were derived in in order to identify the location preferences of offices. This research will contribute in the identification of the most important location variables to determine a decision-support tool that takes both the supply and demand side into account.

Throughout literature there is an emphasis on the location selection and the location decision. More specifically, the constraint that the location decision is directly related with the long-term commitment of resources and the irreversibility of this decision. And this irreversibility is then related to impact that it could derive for the strategic positioning on the market, the operating cost, delivery speed performance, and firm's flexibility to compete in the marketplace. However, this involves the larger companies. In contrast to the obviously interest of a company to investigate their location preferences there is also a public interest from local government or their development agencies that stimulate the attractiveness of companies to relocate themselves in order to create stimulus and economical well being for their region and communities (Yang & Lee, 1997).

The suitability in for determining the location selection is depending on a wide range of location factors that are selected and evaluated and that eventually determine the intention to move and the actual moving behaviour. Remoy (2010) is referring to the continuously tension and evaluation between the push and pull factors of the market. The push factors are related to criteria for leaving a location/building and the pull factors are related in the evaluation that uses apply when searching for a new location/building. Yang & Lee (1997) derive the following categorization of location factors as the most evident in location selection throughout several industries; Market, Transportation, Labour, Site considerations, Raw materials and services, Utilities, Governmental regulations, and Community environment. The different factors are further decomposed in Appendix C in Table 19. The specific correlation between the different location factors is depending on uniqueness of industry type, facility type, product life-cycle stage and is strongly influenced throughout the different decision process stages. For example, if the stage is reached that a specific location should be selected, the site-specific location factors become more evident. Furthermore, if the final stage is reached and an evaluation takes place between the different locations, the choice may be affected by qualitative factors. These are shown in Appendix C in Table 20. In the process of evaluating the attractiveness of a location it is highly depending on the industry or industry group, because they have a unique priority consideration process between the different location factors (Yang & Lee, 1997).

As literature suggest, a lot of research has been conducted in order to derive the relation between demographic mobility and location factors that eventually influenced the actual moving behavior. As stated by Srour et al. (2002) a important location factor is the accessibility. More specifically, the *"accessibility of a location is a measure of how well transportation networks interact with land use attributes to satisfy household, business, or others' preferences"* (Srour et al., 2002, p. 2). Each potential location consists of a network of transportation and attributes related to the household's workplace, housing attributes,

locational attributes, and socio-economic characteristics. The factors that influence the accessibility, and the location decision process, consist of the continuously evaluation of the workplace location, the characteristics of the household and as well the individuals' socioeconomic characteristics. To summarize, the costs of a location are actually dependent of the potential and accessibility of a location (Srour et al., 2002).

From a research that was conducted by Cheng et al. (2005) the following categories were identified for the location selection; transportation (demand/supply), total costs of investments, environmental considerations, potential continuous development, investor's capability and benefits of the investments. The different categories and the criterion of the categories consists are shown in Appendix C in Table 21.

Mărgulescu & Mărgulescu (2013) define the following distinction of factors, that act simultaneously, in the evaluation of the decision process of the relocation; differences in costs, search for valuable assets, clustering, the growth potential of markets and other factors. A more elaborate explanation of the factors is shown in Appendix C in Table 22 and Table 23. Besides this, Mărgulescu & Mărgulescu (2013) also identify the barriers for a company to relocate. These barriers consist of technological limitations (services that can not be detached for specific activities), risk aversion, law and intellectual property rights protection, the need for face to face interaction, the necessity for close interaction with customers, labour market restrictions and etc. However, through the technological developments and 'new' governmental policies, most of these barriers are overcome in time. Furthermore, it is also addressed which factors are important or have influence in the decision process to outsource aspects of the company; political risk, risk related to intellectual property rights, cost of raw materials, energy and equipment, ttransportation costs, interest rates and taxes-trade policies of states (Mărgulescu & Mărgulescu, 2013). This is highly depending on the relocation strategy and the type of industry.

Ernst & Young (EY, 2015b) conducted a research in order to determine the attractiveness of a for a company to (re)locate themselves to a (new) region to overcome the existing challenges between the intention to move (and the actual moving behaviour) of companies and the governmental policies. The location factors that had a negative influence consisted of; costs and (in)flexibility of labour legislation (for example; labour costs, corporate income tax, subsidies and incentives). The research identified the following success factors to be crucial; the country's international orientation, regulatory stability (in line with international legislation) and the presence of foreign companies and their positive experiences. Furthermore, in order to further improve the Dutch business climate and to stimulate investments it is evident that improvements are implemented in innovation, creativity and entrepreneurship (EY, 2015a). This is further emphasized in an interview with the minister Kees Verhoeven (D66), who proposes a shift from the traditional existing companies towards the small and innovative companies. From an international perspective, the attractiveness was highly influenced through new transportation and communication technologies are diminishing the traditional distance barrier in the process of location selection. And as stated by Yang & Lee (1997) *"new telecommunication technologies expand business boundaries by increasing the distance over which labour, product, capital, and everything else can be moved around"* (Yang & Lee, 1997, p. 243). This is implying that businesses are no longer dependent on their location. Therefore it can be stated that, the variable distance is becoming less important in terms of customer service, information sharing, and financial transactions.

5.5   Choice attributes (variables) & relevant attribute levels

The criteria are grouped in main categories: the (the presence) availability of services, the location potential, the costs, the accessibility of the locations and the presence of a business climate. The definitions of the specific attributes and the levels are clarified and elaborated within this paragraph.

Furthermore, as stated by Glumac (2012) and Henser et al. (2005), the list of attributes is decomposed to the key attributes that are the most important for the choice of the tenant. And the most applicable number of attributes for modelling is between 7 and 10 attributes. The derived attributes are listed in Table 24. The attribute levels represent the levels assigned to an attribute as part of the experimental design process. The levels are represented by numbers that will have no meaning to the decision maker being surveyed.

Choice attributes			
Attribute	**Level**	**Labels**	**Explanation**
1. Building	0	Current building.	The (initial) use of the building.
	1	Former industrial building.	
	2	New constructed building.	
2. Facilities/ Services	0	No services / facilities.	No services are offered in the building.
	1	Semi services / facilities.	Minimal services are offered in the building (coffee corner / lunch area / post office).
	2	Full services / facilities.	All services are offered in the building (sport / leisure activities).
3. Accessibility	0	Distance ≤ 500 m.	The distance to the city centre or an environment that is equivalent .
	1	500 ≤ Distance ≤ 1,5 km.	
	2	Distance ≥ 1,5 km.	
4. Price	0	100 ≤ Rental price ≤ 155 €/m2.	Average rental prices (including service costs and furnishing costs).(p/m)
	1	155 ≤ Rental price ≤ 200 €/m2.	
	2	Rental price ≥ 201 €/m2.	
5. Network (clustering)	0	None.	The presence of a business climate / clustering of companies.
	1	Current network.	
	2	New network(s).	
6. Outdoor space (environment)	0	No amenities.	The presence of supporting facilities in the environment.
	1	Existing amenities.	
	2	More amenities.	
7. Office space	0	50 ≤ Office space ≤ 100 m2.	The amount of office space.
	1	101 ≤ Office space ≤ 150 m2.	
	2	Office space ≥ 151 m2.	
8. Flexibility	0	None.	The flexibility of the office space (increasing office area).
	1	Current flexibility.	
	2	Future extension possibilities.	

Table 24 Choice attributes and levels

1) Type of building

Within the Netherlands there is a high vacancy rate in the office market. This vacancy is caused by an imbalance between the supply and demand side. Throughout the course of time, the office user preferences for specific buildings or locations have changed. And the characteristics of buildings and location are more or less static. The changes in office preferences have also been influenced in the last fifty years through revolutions in office work and organisational forms. Work is becoming more informal and individual and within organisations there is less preference for hierarchy. This resulted in current office buildings

that include less informal work and meeting spaces compared to offices that could be categorized as monotonous in its spatial layout fifty years ago (Van Meel, 2010; Remøy, 2010).

Buildings can be categorized as static. According to the life cycle of buildings, a stage is reached in which an assessment should be established between its future usability and value. Within this phase a mismatch could occur between the technical and functional life span of the building. This imbalance could be overcome through transformation. Through the increase of the target groups small and medium business and the attractiveness and characteristics of these transformed buildings, the target groups created communities (networks). By investigating the importance of the type of building in relation to the choice behaviour of target groups, opportunities can be identified in the preferences or utilities for planned future (new) location decision behaviour. The different levels are:

0.   Current building;
1.   Former industrial building;
2.   New constructed building.

2) Services / Facilities

Within the redevelopment of (vacant) buildings an important stimulus for small and medium in the relocation of their company, is the presence of services/facilities. This pull factor is gaining distinguishable importance in the creation of the ideal environment in which companies thrive to operate. This is emphasized in an interview with Thijs van Dieren that states that through the offering of services/facilities networks are strengthened (Mak & Roodbol, 2014). Furthermore, within the emerging and developed concepts, such as the concept Spaces, through collaboration, inspiration and facilities an environment is created that is distinctive and unique. And therefore is facilitating a diverse mix of professional companies (Inside, 2007; Spaces, n.d.).

From the moment that the small and medium businesses located themselves an important aspect of the regeneration of the vacant buildings was the total concept of the flexibility and the presence of certain facilities (lunchroom / coffee room / meeting rooms and etc.). The different levels are:

0.   No services / facilities;
1.   Semi services / facilities (existing);
2.   Full services / facilities.

3) Accessibility

Within literature a lot of research has been conducted in determining the importance of accessibility in relation to location pull-factors. In a research that was conducted by Korteweg (2002a), in which Dinteren (1989) and Walen (1988) were cited, that recognized the importance of the 'direct availability of office space' as a pull factor. This is also emphasized by Timmermans (1986), in which is referred to the so-called economic factors (accessibility / size / competitiveness) as the most important factors. However, another perspective is introduced by Louw (1996), that relates accommodation as a subordinate to the location. This is interrelated with the multidisciplinary character of the built

environment, namely if the location of the office is of more significance for the investors/developers or for the users.

However, the attribute accessibility is interrelated with a number of aspects. For example, in several studies the relation between the location and the accessibility by public transport or car was investigated. From a research that was conducted by Korteweg (2002a), there is emphasises on that the decision to relocate is highly depending on the re-evaluation of the location factors accommodation and location. These factors are closely correlated to the accessibility by car, the presence of sufficient parking space and the possibility of flexible use of space (Rodenburg et al., 2011). This factor, strengthened by the appearance, visibility and representativeness of the building, is creating a so-called corporate identity.

Within this experiment the location decision behaviour of tenants will be investigated. Therefore, for the attribute accessibility, the proximity of the city centre in relation to the business climate, is interesting to investigate in relation to what extent this influenced their decision behaviour. Therefore, the following distinction of levels is composed:

0.   Distance ≤ 500 m;
1.   500 ≤ Distance ≤ 1,5 km;
2.   Distance ≥ 1,5 km.

4) Price

In the evaluation of the location factors for companies to relocate the price is one of the most important aspects. Within product selection the price evaluation is an evident criteria or attribute. Through a participation of SDK Real Estate and Park Strijp Beheer prices were determined that correspond to the market. From their expertise, an average rental price per sqm has been composed.

The rental price is also representative of the market conditions. The market conditions are correlated to both macro-economic factors that affect the construction costs and the value of real estate (interest rates, inflation, initial yield) as the economic growth and it has eventually impact on the demand for property and the rent that users will pay. As a result of this, the composition/ development of the rental price is depending to a large extent on the cyclical fluctuations between supply and demand. To conclude, the rent that is imbedded within the return of investments in the redevelopment/renovation could be much higher than the feasible rent (Korteweg, 2002a).

An important aspect in the transformation of (vacant) buildings is the importance of the (rental) price in relation to the evaluation of the attractiveness of an area/building. The attractiveness of an area and the building can be stimulated by a slightly lower rental price in comparison to new constructed buildings. This can attract tenants. Furthermore, from the perspective of the supply side, through the continuously and dynamic market situation, there is a higher preference for the certainty of rental income than the uncertainty of the return of investment through new constructed buildings (Korteweg, 2002a). However, it is important to mention that the investment costs become higher if a rental contract is ended. And as a result of the market dynamics and the increasing vacancy the revenues are decreasing and subsequently this will influence the rent. It is therefore interesting to

investigate in which way the attribute price influenced the decision maker. The different levels are:

    0.   100 ≤ Rental price ≤ 155 €/m2;
    1.   155 ≤ Rental Price ≤ 200 €/m2;
    2.   Rental price ≥ 201 €/m2.

5) Network

The economical crisis, the increasing vacancy rate in the office market and the interrelated problems that were created through the emergence of new trends such as 'the new way of working', created a stagnation in the office development of new constructed office buildings in the Netherlands. As a result of this stagnation, small and medium businesses established themselves at Strijp-S. As described before, there a number of clustered buildings at Strijp-S. The total amount of businesses, the creative sector and the clustering is shown in Appendix C in Figure 35, Figure 36 and Figure 37. Together they formed a business climate that consists of a diversity of networks. The importance of the presence and strength of the community was emphasized in an interview with important stakeholders at Strijp-S ("Members-S magazine," 2014). Furthermore, as stated by Thijs van Dieren, the community is becoming more evident then the building(Mak & Roodbol, 2014). Therefore, it is interesting to investigate in which way this attribute has influenced the decision maker. The three different levels are:

    0.   No network;
    1.   The current network;
    2.   A new network.

6) Environment

Within the residential market there is the continuously evaluation of the residential situation and the residential satisfaction. There is a clear relationship between the resident's aspirations and preferences and the residential satisfaction. Furthermore, residents are always seeking a certain status quo in their dwelling preferences (Jansen, 2013). An aspect that is highly correlated with the residential evaluation is the environmental perception, the so-called place identification. Within literature, as stated by Fleury-Bahi et al. (2008), the length of residency is more associated with the place identification. The intensity, in which inhabitants feel identified with their environment, is influencing the residential satisfaction and this is subsequently increasing as a result of a longer duration of the residency. Furthermore, if an inhabitant perceives a strong place identification and a feeling that the neighbourhood is contributing to the definition of oneself it will parallel contribute in a positive evaluation of the environment and eventually create a positive housing satisfaction (Fleury-bahi et al., 2008). The characteristics of the neighbourhood, as stated by Grigolon et al. (2014), determine in both physical and social way, the housing satisfaction. In line with this, it can be stated that the accessibility to work, services, leisure, friends and family could determine the residential satisfaction and eventually the intention to move.

Next to the residential evaluation, is this aspect also very important in the evaluation of the location factors and to determine the decision behaviour of small and medium companies.

However, for companies the place identification is referring to the presence of amenities. The presence of amenities can contribute considerably to economic growth and consist of a diversity of functions that revolves around the consumption of cultural amenities such as concerts, theatre and restaurants. In a more broad perspective it can be seen as a diversity of functions that create an environment in which a person can identify them selves and that can boast the urban region. This is also emphasized by Sleutjes (2013), that states that there is a strong relation to highly educated inhabitants and the presence of urban amenities, such as a diversified supply of restaurants, theatres and concert halls. The presence of amenities also facilitate to the importance of social networks. Furthermore, people have a higher preference for work opportunities that are relative to amenities. And that by clustering (type of) people and economic activities this could contribute to the attractiveness of a region. Within an interview with the companies that are located in Strijp-S the importance of place identification was emphasized (Van Maurik, 2014). The three different levels are:

0. No amenities;
1. Existing amenities;
2. More amenities.

7) Office space

Throughout the course of time, changes occurred in the quality preferences of offices regarding to their accommodation and their location. For example, changes in the preferences were the result of a higher flexibility in the organizational and management structure of companies, as a response to the technological and economic developments and an increasing competition. Companies started to implement new technologies and office systems within their organization. Therefore, new workings methods were introduced and the organizations were forced to change. And as a result of this, companies had to relocate and some buildings became functional obsolete (Korteweg, 2002a).

Another important aspect is that office users are becoming more efficient with their office space. This is emphasized by Steinmaier (2011), that states that the number of square meters per workspace has decreased from approximately 22 sqm in 2003 to about 18 sqm in 2010. Many companies are trying to reduce the number of square meters of office space by dealing efficiently with the space (JLL, 2015). An recent example is the new built office space of the Rabobank in Eindhoven in which the former building is demolished and is replaced by a more sustainable building that consists of less number of square meters per workspace (VolkerWessels, 2015). In determining the location decision behaviour of the target group, from the moment the small and medium businesses established themselves at Strijp-S, it is therefore interesting in which way the amount of the number of square meters influenced the decision maker. The three different levels are:

0. $50 \leq$ Office space ≤ 100 m2;
1. $101 \leq$ Office space ≤ 150 m2;
2. Office space ≥ 151 m2.

8) Flexibility

The functionality of an office space has undergone several changes. An aspect that is highly correlated with the building characteristics is the flexibility and efficiency of the lay-out.

More specifically, the appearance and quality of the interior finish, flexibility and efficiency, and comfort are all characteristics that are related to the year of construction of the building. In a research that was conducted by Remøy (2010), a relation was established between the year of construction and the structural vacancy. Therefore, it can be concluded that the year of construction, the flexibility and efficiency, is determining the suitability for transformation and the future functionality of the building.

Furthermore, through a wide range of aspects, such as changes in the labour market and demographic changes, a broad range of working concepts are emerging/being developed within the office market. Each of these concepts have the same characteristic, namely flexibility. This aspect is substantially increasing in importance. For the establishment of the small and medium businesses it is interesting to investigate in which way the attribute flexibility has influenced the decision maker. The three different levels are:

0. None;
1. Current flexibility;
2. Future extension possibilities.

5.6   Choice of measurement task

By comparing the different approaches it can be stated the conjoint choice approach is more suitable for this research for a number of reasons. First, the choice tasks are much more representative for real world behaviour than in comparison with rating or ranking tasks. Secondly, by implementing the conjoint choice approach the derived choice tasks directly support the predictions of demand and market share. This is in contrast with the conjoint preference approach, in which ad hoc assumptions have to be formulated concerning the location preferences. Thirdly, by implementing the conjoint choice approach the derived choice data is allowing the adaptation current existing alternatives and non-choice options as well as profiles. To conclude, from the comparison of the different approach, the conjoint choice approach is most the suitable approach for this experiment.

In the conjoint choice experiment the prediction of choice is straightforward. Through the implementation of a test of external validity it is possible to determine if the data is comparable/ estimation of the real market of interest.

5.7   Experimental design consideration

After the specification of the attributes, the relevant levels and the corresponding labels the next step consists of the experimental design consideration. The different steps for the Discrete Choice Experiment are described below and are based on the book "Applied choice analysis: a primer" from Hensher et al. (2005) and the dissertation by Kemperman (2000).

Full factorial design or a fractional factorial design

With the full factorial design the estimation can be constructed that is imbedded with all main effects and all interaction effects are independent of one another. By implementing the full factorial design all possible combinations would be covered. To calculate the size of the full fractional design, the total number of attribute profiles, that is equal to the multiplication of all attribute levels, a formula can be implemented. This formula is L^A, in

which L are the number of attribute levels and A the number of attributes. For example, if the experiment would consist of seven attributes with each three levels, this would produce 3^7 = 2187 alternatives. Subsequently, if the number of attributes and levels are increasing, the number of alternatives would increase and therefore the complexity and the expectation is that there would be an increase in the response error of the respondents.

However, as stated before it is evident to ensure the complexity of the questionnaire and therefore to keep in mind the integrity and suitability of the data, the experiment will be based on fractional factorial design. For this experiment, the (minimal) number of treatment combinations that are necessary for the fractional factorial design is based on Figure 38. By reviewing Figure 38 it becomes clear that for this type of experiment, the (minimal) number of treatment combinations is 27.

DESIGN INDEX
A SUMMARY OF EXPERIMENTAL PLANS
Page 3

1	2	3a	3b	3c	3d	4	5	6	7	8	9	10
Experimental Plan Code Number	Total Number of Variables	Number of Variables at				Number of Tests Required	Are All Main Effects Independent of 2 Factor Interactions?	Number of Independent Two-factor Interactions Under Assumed Model	Residual Degrees of Freedom	Master Plan #	Using Columns Number	Columns From Which 2 Factor Interactions Can Be Estimated
		2 Levels	3 Levels	4 Levels	5 Levels							
21a	8	0	8	0	0	27	No	1	6	8	1,2,5,6,10,11,12,13	AC: 1,2
21b	8	0	8	0	0	81	Yes	10	24	13	1,2,5,6,11,15,35,38	AC: 1,2,5,6,11
21c	8	0	8	0	0	81	No	7	36	13	1,2,5,6,10,14,22,26	WAO: 1
21d	8	0	8	0	0	243	Yes	28 (All)	114	NBS 54	Pg. 25	All

Figure 38 The number of treatment combinations

Labelled or unlabelled experiment

The next step consists of the choice between a labeled or unlabeled experiment. The respondents have to choose between the alternatives, given the levels each alternative represents. For example, if the decision maker has to select from generic titles without any additional information, this would be called unlabeled experiments. On the other hand, if the decision maker has to select from labeled alternatives, this would be called labeled experiments. The difference is shown in Figure 39. By making a distinction in this type of experiment an important advantage is imbedded in the unlabeled experiments, because this type of experiment does not require the identification and use of all alternatives within the universal set of alternatives. Therefore, the selected attributes and attribute levels can be implemented.

Treatment combination	Alternative 1		Alternative 2		Treatment combination	Car		Plane	
	Comfort	*Travel time*	*Comfort*	*Travel time*		*Comfort*	*Travel time*	*Comfort*	*Travel time*
1	Low	10 hours	Low	1 hour	1	Low	10 hours	Low	1 hour

Figure 39 The choice treatment combination vs. labelled choice experiment (derived from(Henser et al., 2005))

As stated by Hensher et al. (2005) an effect is the impact of an attribute level on a choice. Within experimental designs, an effect is defined as the difference in treatment means. And a main effect is the direct independent effect of each attribute upon the response variable, choice. Therefore, it is the difference in the means of each level of an attribute and the overall or grand mean. An interaction occurs when the preference for the level of one attribute is dependent upon the level of a second attribute or the impact two attributes are having when acting in concert. An interaction effect is an effect upon a

response variable, choice, obtained by combining two or more attributes which would not have been observed had each of the attributes been estimated separately ((Vasilache, 2013);(van Swam, 2014) cited (Henser et al., 2005)).

Within this experiment only the main effects will be estimated, as no interactions between the chosen attributes are considered to be relevant. This type of design is called orthogonal main effects only design (Vasilache, 2013).

Dummy, effect and orthogonal coding

The next step consists of the coding of the attribute levels; dummy coding, effect coding and orthogonal coding. If dummy coding is implemented, all the attribute levels except one are coded as 1 on their corresponding vector and 0 on all others. One of the attribute levels is coded as 0 on all vectors. The estimated intercept is then equal to the mean of the attribute level assigned 0's on all attribute vectors (base level). The estimated parameters are equal to the difference between the mean of the attribute level assigned 1's in a given vector and the mean of the attribute level assigned 0's on all attribute vectors (Kemperman, 2000).

When effect coding is used, attribute levels are coded as 1 on their corresponding vector, except for one of the attribute levels which is coded as −1 on all vectors. The sum of the effects is equal to zero for each attribute. The intercept is equal to the grand mean of the dependent variable, and the parameter estimates are equal to the deviation of the mean of the attribute level assigned 1's in the corresponding vector from the grand mean (Kemperman, 2000).

Attribute	Dummy coding			Effect coding			Orthogonal coding		
2 levels									
0	1			1			1		
1 (base)	0			-1			-1		
3 levels									
0	1	0		1	0		1	1	
1	0	1		0	1		0	-2	
2 (base)	0	0		-1	-1		-1	1	
4 levels									
0	1	0	0	1	0	0	3	1	1
1	0	1	0	0	1	0	1	-1	-3
2	0	0	1	0	0	1	-1	-1	3
3 (base)	0	0	0	-1	-1	-1	-3	1	-1

Figure 40 The different coding schemes (derived from (Kemperman, 2000))

In orthogonal coding a different scheme is implemented that ensures that the attribute vectors are independent. Orthogonal codes allow the analyst to observe the design columns for the interaction effects. The intercept can be interpreted as the grand mean of the dependent variable. The parameters estimates reflect the difference in mean attribute scores between the attributes of interest, when applied to the codes in the attribute

vectors (Kemperman, 2000). An example of the different coding schemes is shown in Figure 40.

By implementing dummy or effects coding, it is possible to estimate non-linear effects. More specifically, this is accomplished through the creation of a number of variables for each attribute being coded. The number of new variables created is equivalent to the number of levels of the attribute being coded, minus one. As stated by Hensher et al. (2005), by implementing dummy coding the base level of an attribute is perfectly confounded with the grand mean. However, this is followed by an important question what exactly has been measured, the utility for the base level or the overall or grand mean? Therefore, it is preferred to use effects coding among dummy coding, because parallel to the advantage of dummy coding that non-linear effects in the attribute levels may be measured, within this research the effect coding will be implemented, because an important characteristic of the effects coding is that there is no perfectly confounding of the base attribute level with the grand mean of the utility function.

Within the design experiment consideration, the last aspect that has to be considered is the opportunity for the respondents to include the no choice alternative. More specifically, by the inclusion of a non-choice alternative, the decision maker will not be forced to select from the available alternatives. If the respondents would only be able to choose from the presented alternatives this could lead to overestimated results (Henser et al., 2005).

5.8 Generated experimental design

In order to generate the experimental design, the first step is to construct the design matrix. The number of treatment combinations is known next to the attributes and the levels. By implementing the described variables in the SAS software, the design matrix was derived. This is shown in Appendix D in Figure 41 and Table 25. The design matrix is shown in Table 26a and 26

Symbol	Explanation
Tb	Type of building
Fa	Facilities / services
Ac	Accessibility
Pr	Price
Ne	Network
En	Environment
Os	Office space
Fl	Flexibility

Table 26a Explanation of symbols

Treatment combinations	Design matrix							
	Tb	Fa	Ac	Pr	Ne	En	Os	Fl
1	1	1	1	1	1	1	1	1
2	1	1	1	2	2	2	3	3
3	1	1	1	3	3	3	2	2
4	1	2	3	1	2	3	1	2
5	1	2	3	2	3	1	3	1
6	1	2	3	3	1	2	2	3
7	1	3	2	1	3	2	1	3
8	1	3	2	2	1	3	3	2
9	1	3	2	3	2	1	2	1
10	2	1	3	1	3	2	3	1
11	2	1	3	2	1	3	2	3
12	2	1	3	3	2	1	1	2
13	2	2	2	1	1	1	3	3
14	2	2	2	2	2	2	2	2
15	2	2	2	3	3	3	1	1
16	2	3	1	1	2	3	3	1
17	2	3	1	2	3	1	2	3
18	2	3	1	3	1	2	1	2
19	3	1	2	1	2	3	2	3
20	3	1	2	2	3	1	1	2
21	3	1	2	3	1	2	3	1
22	3	2	1	3	1	2	2	1
23	3	2	1	2	1	3	1	3
24	3	2	1	3	2	1	3	2
25	3	3	3	1	1	1	2	2
26	3	3	3	2	2	2	1	1
27	3	3	3	3	3	3	3	3

Table 26b Design matrix regarding DCE

5.9   Choice sets

As stated by Hensher et al. (2005), a choice set is representing the basic mechanism for transferring the information to decision makers about the alternatives, attributes and attribute levels that exist within the hypothetical scenarios of the study. More specifically, as stated by Vasilache (2013), a choice set is representing the way by which information on the choices made by sampled decision makers is gathered. If there is no preferable treatment combination the respondent can choose the option "No preference".

Before composing the choice sets, first the derived design matrix is transformed, by using Excel, in the effect coding. This is shown in Appendix D in Table 27. Within this experiment there are 27 treatment combinations that consist of attribute levels that are related directly to a set of attributes, which are in turn related specifically to a set of alternatives. The 27 treatment combinations are presented as 9 choice sets of 3 alternatives. An example is shown in Table 28. The detailed version of the choice sets of shown in Appendix D in Table 29(a/b/c) .

Block 1	1_Tb	1_Fa	1_Ac	1_Pr	1_Ne	1_En	1_Os	1_Fl
Treatment combinations								
1	2	1	0	0	1	1	2	0
2	0	2	2	0	1	1	0	1
3	1	0	0	1	0	2	2	0
4	0	0	1	0	0	0	0	0
5	2	2	0	2	1	2	1	1
6	0	2	2	1	0	2	1	1
7	1	0	0	2	2	0	0	1
8	2	1	1	2	2	0	1	2
9	1	1	2	1	2	1	2	2

Table 28 Generated choice sets

The 27 treatment combinations that are presented as 9 choice sets of 3 alternatives are then composed into the tables. An example is shown in Table 30.

Attributes	Alternative 1	Alternative 2	Alternative 3	No preference
Buiding type	*Present building*	*Former industrial building*	*New constructed office building*	
Facilities/services	*None*	*Shared*	*Total package*	
Accessibility	*Distance ≤ 500 m*	*500 ≤ Distance ≤ 1,5 km*	*Distance ≤ 500 m*	
Price (euro/m2)	*100 ≤ Rental price ≤ 155 €/m2*	*Rental price ≥ 201 €/m2*	*Rental price ≥ 201 €/m2*	
Network	*None*	*Present*	*None*	
Environment	*None*	*Existing*	*Existing*	
Office space	*50 ≤ office space ≤ 100 m2*	*50 ≤ office space ≤ 100 m2*	*office space ≥ 150 m2*	
Flexibility	*None*	*Present*	*Enlargement*	
Your choice:	*O*	*O*	*O*	*O*

Table 30 Example of questionnaire choice sets with alternatives

5.10 Questionnaire

The discrete choice experiment is dependent on the integrity of the data that is collected from the respondents. If the tasks are to complex or too long, or they lack sufficient reality, the respondents will face some limits in their ability to process the information. As a result the data quality will not be sufficient and contain the information that is sought. To maintain the integrity of the collected data it is therefore important to make the instructions for the respondents simple and straightforward. By avoiding differences in interpretation, task uniformity is sought and respondents are given examples of choice tasks and attribute combinations. Furthermore, to encourage the involvement of the respondents, extra information for the respondents is provided that contain the domain of the experiment and to inform about the objectives of the experiment (Kemperman citied in (Vasilache, 2013)).

The survey will be conducted online by using a questionnaire system from the university, namely the Berg Enquête System © 2007, an on-line survey tool. The survey will be an one-time (cross-sectional) survey that will be distributed anonymous.

The process of decision making in selecting a product or not is depending on the characteristics of the person and the available attributes of the alternatives. When investigating the choice behaviour of a specific target group, the demographic profile is therefore is important and ensures that that the individuals within the group have similar needs and benefits sought by them on purchase of a product. For this reason the questionnaire is composed into three parts. In the first part of the questionnaire, the focus is on the personal characteristics of the respondents. The second part consists of the present location preference. And the third part consists of the future location preference. The questionnaire is shown in Appendix D.

5.11   Sample set

The target group consists of highly educated/ creative people who work in small and medium businesses. The businesses are located at Strijp-S and in total there are more than 650 companies located at this location. Within this experiment the objective is to estimate the importance of different attributes (location factors) that influence the decision maker. It is therefore important to determine the sample set of respondents that is sufficient.

Within literature different rules exist in order to determine the minimum sample of respondents. Hensher et al. (2005) suggest that a total sample of 100 respondents, each with 8 choice sets and fully generic parameter specification for design attributes is sufficient. From a literature study that was conducted by Bekker-Grob et al. (Pearmain et al. cited in (De Bekker-Grob, Donkers, Jonker, & Stolk, 2015), the sample size of 100 respondents is suggested as a basis for modelling preference data. However, Johnson and Orme (2003);(Orme, 2010) cited in (Vasilache, 2013) developed one of the most citied rule of thumb (Rose & Bliemer, 2013). Within this rule;

$$n \geq 500 \ \frac{L}{Sa}$$

L is representing the highest number of level of attributes, S-number choice sets and a-number of alternatives. Within this experiment there are 3 levels of attributes, 9 choice sets and the number of alternatives is 3. The number 500 is intended as the minimum threshold when researchers cannot afford to do better. However, the quality of the derived results would be better if, when possible, 1000 or more representations per main effect level would be reached (Vasilache, 2013).

Considering this rule of thumb and the remark placed by Vasilache (2013), for this experiment the minimum number of respondents is n ≥ 1000 * $\frac{3}{9*3}$ = 112. Furthermore, as stated by Orme (2010), a minimum sample size of 200 respondents is sufficient for studies that involve an analysis of differences between sample segments. For the scope of this research, based on the above describes findings, the aim of the sample of respondents is set at 200.

6. Data collection demand and supply side

6.1 Introduction

This chapter consists of the data analysis and collection of both the demand and supply side. The aim of the data collection is to identify the most important building and location determinants that influence the location decision behaviour of highly educated and creative workers. First, the demand side is investigated with a questionnaire that consists of multiple parts. The data is analysed from the DCM experiment and estimated using multinomial logit model (MNL). Secondly, from conducted interviews with the most important stakeholders from the supply side, the most relevant determinants and aspects that influence the location decision behaviour are investigated and defined. Subsequently, the derived building and location determinants, barriers and opportunities in the office market from both the demand side and supply side are compared. To conclude, the sub questions of the development strategy are described and discussed.

6.2 Data analysis demand side

The data was gathered using Berg Enquête System © 2007, an on-line survey tool. The questionnaire was distributed among the highly educated and creative workers that work in small and medium businesses at Strijp-S. Therefore, the data analysis is representing the situation at Strijp-S. The questionnaire was open for public from the 27/04/2016 until 20/05/2016. The questionnaire was promoted through several communication platforms on Strijp-S, in collaboration with the help from the TU/e and Park Strijp Beheer, which consisted of the following buildings; Glasgebouw, SX Gebouw, Microlab and Videolab. In total there are 250 small and medium businesses located in these buildings. Besides this, in order to convince the highly educated and creative workers to collaborate with the research, a personal approach was also implemented to increase the participation. Throughout the distribution of the survey and in collaboration with the TU/e, the target group was extended with graduate students of the TU/e. In total 142 respondents started the questionnaire, which has resulted in 64 complete responses. The minimum amount of responses was set at 200 complete questionnaires, so from the perspective to get the desired amount of respondents this is not completely satisfying. The overall response rate was 45,8%. However, in overall for the aim of this research it is a sufficient representation of the target group. As stated by Kemperman (2000), the conjoint choice and preference modelling is dependent on the integrity of the data that is collected from the respondents. Within this data collection the respondents could be faced with a certain limitation in their ability to process the information. This is one of the reasons that could clarify the response rate. Another reason that emerged from the personal approach is that the respondents indicated that the DCM methodology consisted of a high complexity, because of the large amount of attributes and levels. Therefore, their willingness to participate was restrained.

Levels	3 levels		2 levels
High	1	0	1
Medium	0	1	
Low	-1	-1	-1

Table 31 Effects coding

As mentioned in the previous chapter (paragraph 5.2.5), it is important to test the DCM experiment for non-linear effects and therefore the data is recoded by implementing

effects coding. The attributes are coded based on the scheme that is shown in Table 31. The next step, after the cleaning and recoding of the data, is the data analysis. The data will be analysed by using Excel and SPSSStatistics. Each alternative within a choice set is allocated to a separate row of data. Considering this, each respondent will be represented by 9 blocks, representing an individual choice set. Each block consists of 4 rows, corresponding to an alternative within the choice set. Thus, for each respondent there will be 36 rows of data.

Respondents

The questionnaire is composed of several parts. The first part is the identification of the target group. The second part consists of their current location factors. The third part consists of the choice sets of alternatives. More specifically the DCM experiment. To conclude, an investigation is conducted about their future building and location determinants that influence their location decision behaviour. Within this distinction, the respondents can be categorized based on answers in "the identification of the target group". The most important characteristics to identify the respondents for this research are education, age and whether the respondents have a business on Strijp-S or not. An overview of the identification of the target group in shown in Figure 42.
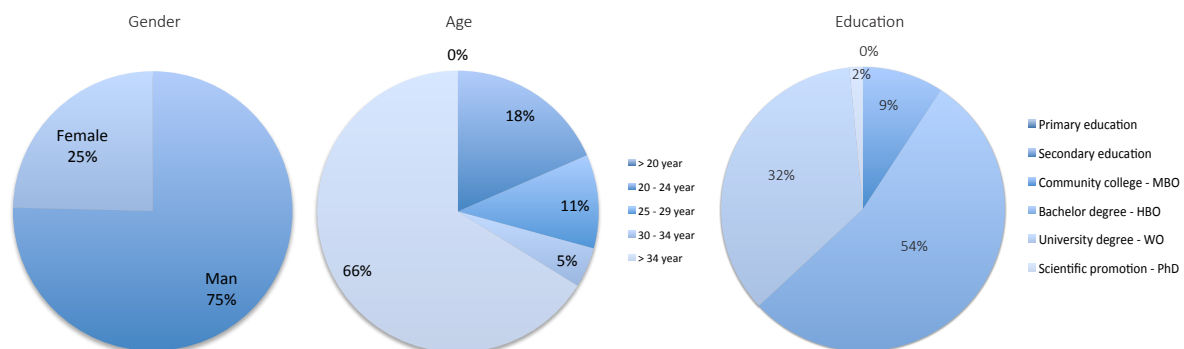
Figure 42 The characteristics of the target group

By reviewing the characteristics of the respondents it becomes clear that the largest amount of respondents is between the age of 25 < age > 34 years (82%) and that the largest part is highly educated (86%). Furthermore, it important to make a distinction in the respondents that have a company on Strijp-S (and the size) and the students or respondents that do not have a company. This is shown in Figure 43.
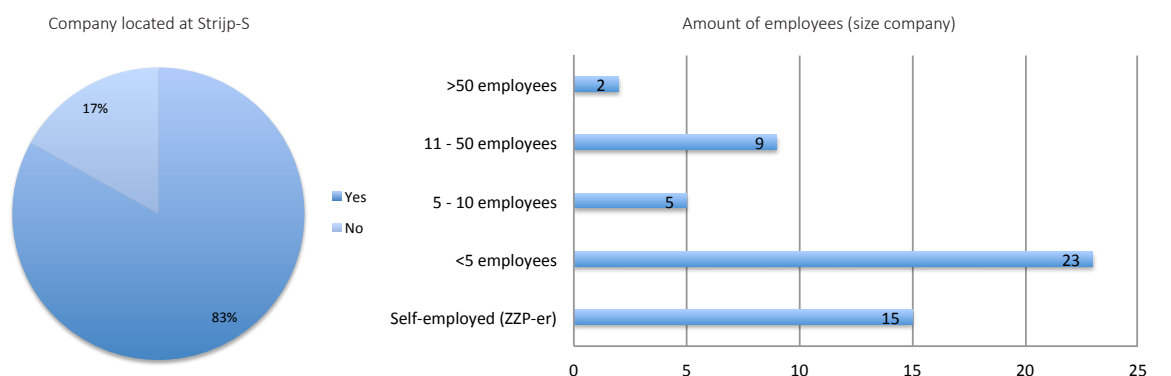
Figure 43 Identification of the target group.

By reviewing Figure 43, it can be stated that from the highly educated respondents the largest amount is located at Strijp-S (83%). From these companies the largest amount consists of small and medium businesses (79%). More importantly, if the respondents have filled in the complete questionnaire and therefore have not chosen in the DCM experiment the possibility "no preference". Another important step from the derived data and for the further data analysis it is important to make the distinctions which of the respondents have finished the questionnaire consistently. By examining the results of the completed questionnaires, it becomes clear that of the 64 completed questionnaires that 3 respondents only have chosen "no preference" and are therefore rejected. Therefore, for further analysis 61 respondents will be taken into account. This is shown in Appendix E in Figure 44. In Table 32, it becomes clear that 11,0% is not within the target group of this research. Even though there was a response rate of 45,8%, for the purpose of the DCM experiment and the analysis, the assumption is made that this 11.0% (7 respondents) also consists of highly educated and creative workers.

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Secondary education	1	1,6	1,6	1,6
	Community college	6	9,4	9,4	10,9
	Bachelor degree	36	56,3	56,3	67,2
	University degree	20	31,3	31,3	98,4
	Scientific promotion	1	1,6	1,6	100,0
	Total	**64**	100,0	100,0	

Table 32 Education respondents questionnaire

6.2.1 Building and location determinants from the demand side

The second part of the questionnaire consists of the identification of the location and building determinants that influenced the highly educated and creative workers in their location decision behaviour. The focus of the second part was on the moment of establishing the company at Strijp-S. The location and building determinants, as derived from the literature study (discussed in CH5), behaviour are shown in Figure 45 and 46.
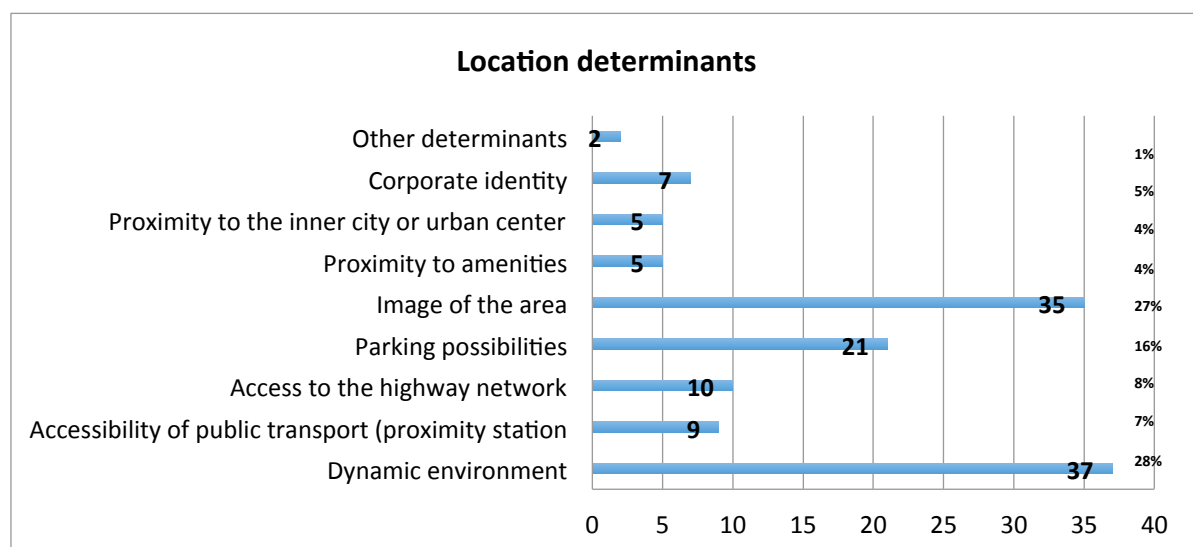
Figure 45 The location determinants of the moment of establishing the company at Strijp-S (frequency)
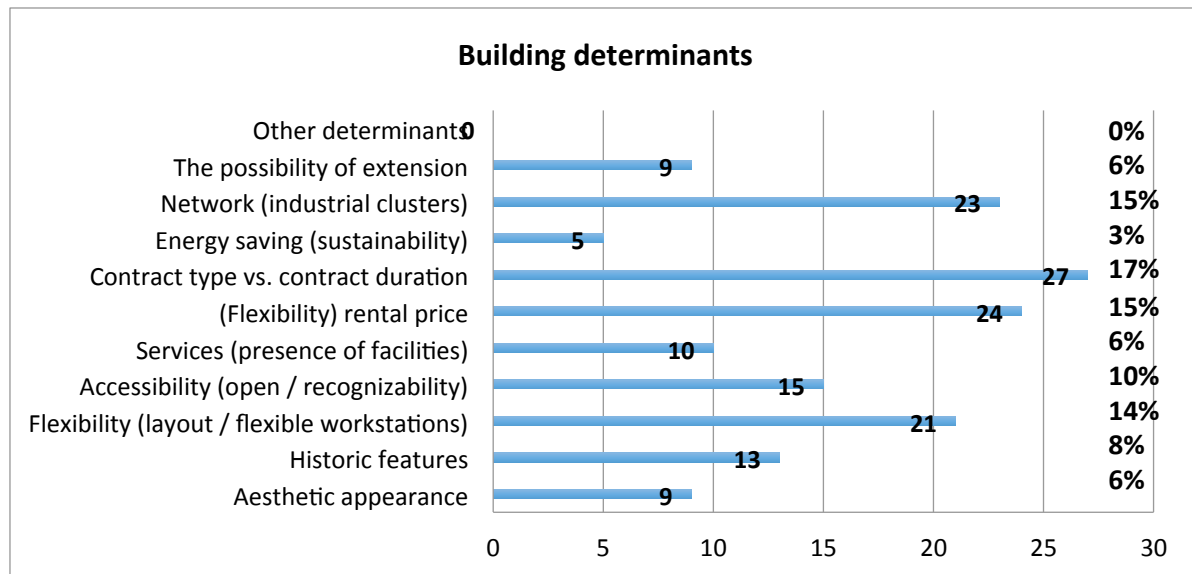
Figure 46 The building determinants of the moment of establishing the company at Strijp-S (frequency)

By reviewing the location determinants, it becomes clear that the most important determinants are; (i) dynamic environment (28%), (ii) image of the area and (27%) parking possibilities (16%). This is correlating with the increasing importance of the place identification of individuals and to work in a dynamic environment that consists of a high diversity of functions and activities. The location determinant accessibility is also important (8% + 7% = 15 %). However, the expectation that the determinants (iv) corporate identity (5%), (v) proximity to amenities (4%) and (vi) proximity to the city centre (4%) are important is contradicted. Furthermore, as stated by Thijs van Dieren, the community is becoming more evident than the building (Mak & Roodbol, 2014). This is directly related to the presence of facilities/services.

By reviewing the building determinants that influence the location-decision behaviour, a less distinctive distribution can be recognized. The most important determinants are; (i) contract type vs. contract duration (17%), (ii) flexibility rental price (15%), (iii) network (15%) and (iv) flexibility (14%). The increase of small and medium businesses, the fluctuation of the market dynamics, the limited financial resources and therefore an uncertain economic environment to which the companies are subject to are explaining the relevance of the first two determinants. As suggested in the literature study, the clustering of companies and the created networks, are becoming more and more important. In a society that can be characterized as individualistic, with the exponential growth of technological innovations, individuals have an increasing need to meet each other and collaborate much more. By reviewing Figure 46 it becomes clear that as a result of the changes in the demand preferences the flexibility, collaboration and sharing knowledge have become much more important. More specifically, the characteristics are becoming less important. As suggested by literature, individuals are becoming less dependent on the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010). The determinants historic features (8%), services (6%), aesthetic appearance (6%) and energy savings (3%) are less important.

After determining the increasing importance of the dynamic environment and the presence of networks, and that there is a much higher awareness and commitment for interaction and collaboration, it is interesting to investigate in which way this contributed to the

development of the companies. Rocco (2008) states that *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). Therefore, first it was investigated to what extent the location of Strijp-S contributed to the development of the companies. This is shown in Figure 47.
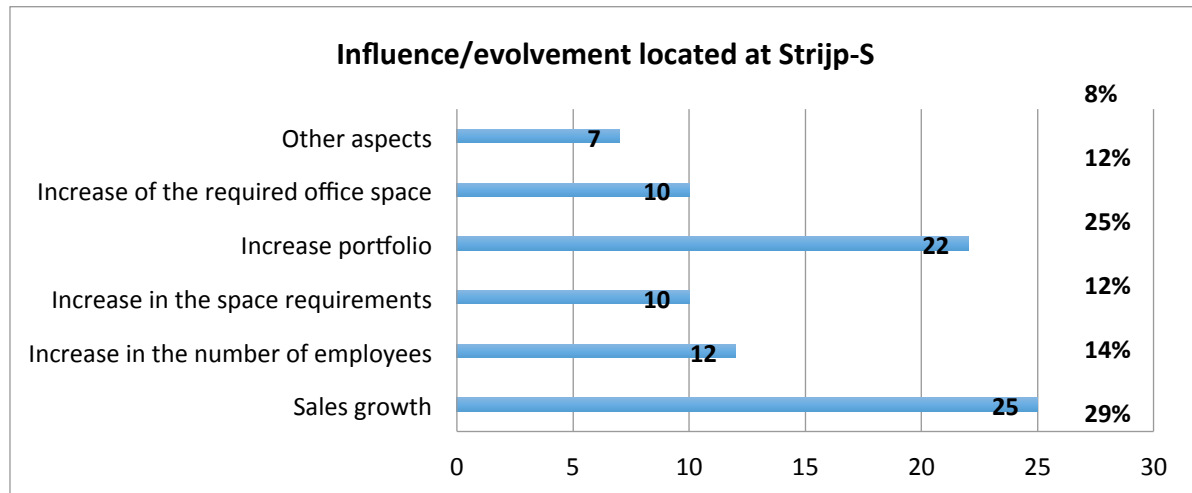
Figure 47 The contribution of the location Strijp-S to the development of the company (frequency)

By reviewing Figure 47, it becomes clear that the location and environment of Strijp-S contributed the most to (i) the sales growth (29%), (ii) an increase in the portfolio (25%) and (iii) an increase in the number of employees (14%). Through an increase in the networking and collaboration activities, the companies are evolving. Secondly, it was investigated in which way the presence of the network contributed to the development of the company. This is shown in Figure 48.
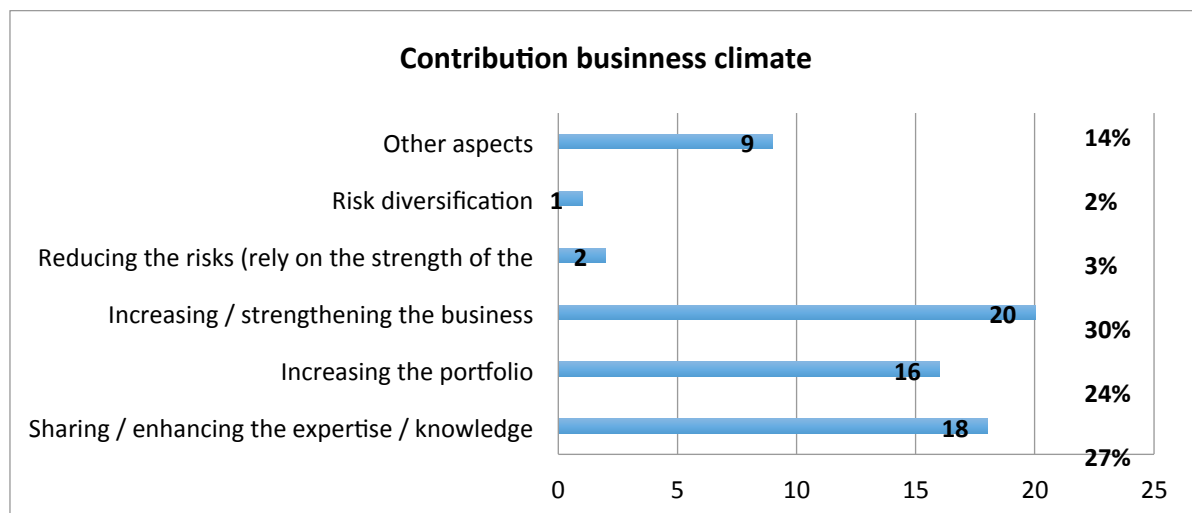
Figure 48 The contribution of the business climate to the development of the company (frequency)

By reviewing the contribution of the network in relation to the development of the companies a more distinctive difference is noticeable. The presence of the business climate, had a large influence to the increase of (i) the business opportunities (30%), (ii) the sharing of expertise (27%) and (iii) increasing the business portfolio (24%). Before implementing the data analysis with Multinominal Logistic Regression (MNL), the derived data is checked for consistency with a data check, which is explained in the next paragraph.

6.2.2 DCM experiment

Through a quick data check, by using the derived data set and with the program SPSS, it is checked if all variables are within the expected parameters. More specifically, by reviewing the analysis of the descriptive statistics output that is shown in Figure 49, all attributes are between -1 and 1 and the alternative choice is between 1 and 4. The number of cases (2.196) shows that all observations were read: 61 * 36 = 2.196. Therefore, the table shows that no errors have occurred.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Alternative	2196	1	4	2,50	1,118
Choice	2196	0	1	,25	,433
prop.1_Tb	2196	- 1	1	,00	,707
prop.1_Fa	2196	- 1	1	,00	,707
prop.1_Ac	2196	- 1	1	,00	,707
prop.1_Pr	2195	- 1	1	,00	,708
prop.1_Ne	2196	- 1	1	,00	,707
prop.1_En	2196	- 1	1	,00	,708
prop.1_Os	2196	- 1	1	,00	,707
prop.1_Fl	2196	- 1	1	,00	,707
prop.2_Tb	2195	- 1	1	,00	,707
prop.2_Fa	2195	- 1	1	,00	,707
prop.2_Ac	2196	- 1	1	,00	,707
prop.2_Pr	2195	- 1	1	,00	,707
prop.2_Ne	2196	- 1	1	,00	,707
prop.2_En	2196	- 1	1	,00	,707
prop.2_Os	2196	- 1	1	,00	,707
prop.2_Fl	2196	- 1	1	,00	,703
prop.3_Tb	2196	- 1	1	,00	,705
prop.3_Fa	2196	- 1	1	,00	,708
prop.3_Ac	2196	- 1	1	,00	,707
prop.3_Pr	2196	- 1	1	,00	,706
prop.3_Ne	2196	- 1	1	,00	,707
prop.3_En	2196	- 1	1	,00	,708
prop.3_Os	2194	- 1	1	,00	,707
prop.3_Fl	2194	- 1	1	,01	,707
Valid N (listwise)	2188				

Figure 49 Descriptive analysis

Furthermore, a correlation matrix was generated and analysed to check for correlations. This is shown in Appendix E in Figure 50. The relevance of a correlation matrix is very high, since by determining the correlation matrix it shows that if significant correlations are generated this could eventually result in the situation that multi-collinearity occurred at the time of modelling. This could have major implications for both the model estimation

and the predictions. By reviewing Figure 50, it becomes clear correlation occurred between a number of attributes. In for example, the attribute the Type of Building (Tb), more specifically the current building (prop._Tb), there is correlation with the Facilities (no services/facilities), Accessibility (distance < 500 m), Price (100 < Rental price < 155) and etc. The explanation for this can be found in a number of reasons. Even though there was a high response rate, in comparison with other DCM experiments; the number of respondents is low. As stated before, because of the large amount of attributes and correlating values, the respondents indicated that the DCM methodology consisted of a high complexity and was time consuming. Besides this, the number of alternatives (three) could also have influenced the complexity of the questionnaire. For the further analysis of this research the assumption is made that the orthogonality is not seriously compromised and data analysis can be pursued.

6.2.3 Model estimations

The data analysis is based on the Multinomial Logit Model (MNL) where, for current choice experiment with three unlabelled alternatives and a "no preference" option, the utility of each alternative is based on the following choice model estimation (van Swam, 2014):

$U(1) = U(2) = U(3) = B_0 + (\text{Coefficient Tb})^2 + (\text{Coefficient Fa})^2 + (\text{Coefficient Ac})^2 + (\text{Coefficient Pr})^2 + (\text{Coefficient Ne})^2 + (\text{Coefficient En})^2 + (\text{Coefficient Os})^2 + (\text{Coefficient Fl})^2$ and $U(4) = 0$ for the "no preference" alternative.

B_0 is a constant defined as the base alternative, it is representing the utility of the undefined attributes. During the composition of the DCE and the analysis no levels were assigned for the coding of the "no preference" alternative. The reasoning for this is that there is nothing known by definition of its attributes and levels. Furthermore, as stated by Haaijer et al. (2001), an important advantage of the implementation of the no-choice alternative it that it makes the choice decision more realistic and therefore could provide more suitable predictions of market penetrations. However, an important disadvantage is that the no-choice alternative gives the respondents the opportunity to avoid difficult choices and therefore affects the outcome of the experiment. Within this experiment, in examining the "no preference" utility perceived by respondents, it is equal to $-B_0$ (Haaijer, Kamakura, & Wedel, 2001; Vasilache, 2013).

The coefficient is indicating the general attitude toward the proposed location alternative. This attitude can be positive or negative. When the coefficient's value is positive, the utility offered by the proposed alternative starts from a value above 0, indicating that the alternative is of interest and that the respondents are positive toward this type of building/ location determinants. On the other hand, when the coefficient's value is negative, it suggests that the respondent or group of respondents is not interested in the proposed type of building/ location determinants. Similar to any other variable, the bigger the value of the coefficient, the more influence it has on the overall preference of a certain group (Vasilache, 2013).

6.2.4 MNL Model

An MNL model is generated and parameters were estimated for the target group highly educated and creative workers (who work in small and medium businesses). The model estimations are shown in Appendix E. By reviewing the results of the developed MNL model, shown in Figure 51, it becomes clear that there is one case missing (N = 2195).

Case Processing Summary

		N	Percent
Cases available in analysis	Event[a]	549	25,0%
	Censored	1646	75,0%
	Total	2195	100,0%
Cases dropped	Cases with missing values	1	0,0%
	Cases with negative time	0	0,0%
	Censored cases before the earliest event in a stratum	0	0,0%
	Total	1	0,0%
Total		2196	100,0%

a. Dependent Variable: time

Figure 51 The case summary of the MNL model

Each possible MNL model performs differently and their goodness of fit is tested using the McFadden's pseudo-R2: pseudo-R2 = 1 – (LLM / LL0), where LLM is the likelihood function for the estimated model and LL0 is the likelihood function for the model estimated with no coefficients, also known as the base model.

The value of pseudo-R. from a model can not be evaluated as good or bad in singularity, but it can be judged relative to other models that have been estimated similarly. Values of 0.2 to 0.4 are considered highly satisfactory and that the model has an excellent fit, while models with values of pseudo-R. below 0.1 are considered weak. The models with higher R. will be considered as better performing models (van Swam, 2014).

The pseudo-R. for the current model is 0,410. This is shown in Appendix E. Given the previous comment this model could be considered strong. It should be stated however that the target group is not always homogeneous and that there are just three levels for each attribute, and this could have influenced the value for pseudo-R. Therefore, by reviewing the value for the coefficient that is shown in Table 33 it becomes clear that the negative (and relatively high) value for the coefficient, for Pr (-0.357) is suggesting that generally respondents have a negative attitude towards the proposed alternative. By reviewing Table 33, it becomes clear that the coefficients for Rental price (Pr3 = 0.298), Flexibility (Fl1 = 0.132), Network (Ne1 = 0.123), Office space (Os2 = -0.145), Accessibility (Ac1 = -0.164) and Rental price (Pr1 = -0.357) are relatively high (positive or negative) and thus this is indicating that these attributes have the most impact in the location decision behaviour. Furthermore, by comparing the coefficients for each of the attributes, it becomes clear that the respondents have a positive attitude towards the following aspects; former industrial building, full services/facilities, distance <500 m, 100 ≤ Rental price ≤ 155 €/m2, New Networks, Existing Amenities, Office space ≥ 151 m2 and Future extension possibilities. Of these aspects the highest preference consist of; (i) Rental price (Pr3 = 100 ≤ Rental price ≤ 155 €/m2), (ii) Flexibility (FL1 = Future extension possibilities) and (iii) New networks(s).

Attribute	Explanation	B_0	significance
Tb1	New constructed building	-0.183	**0.015**
Tb2	Former industrial building	0.115	**0.110**
Tb3	Current building	0.068	
Fa1	Full services/facilities	0.013	0.880
Fa2	Semi services/facilities	-0.04	0.963
Fa3	No services/facilities	-0.09	
Ac1	Distance ≥ 1,5 km	-0.164	**0.028**
Ac2	500 ≤ Distance ≤ 1,5 km	0.066	0.358
Ac3	Distance ≤ 500 m	0.098	
Pr1	Rental price ≥ 201 €/m2	**-0.357**	**0.000**
Pr2	155 ≤ Rental price ≤ 200 €/m2	0.059	0.414
Pr3	100 ≤ Rental price ≤ 155 €/m2	**0.298**	
Ne1	New network(s)	**0.123**	**0.085**
Ne2	Current network	0.070	0.319
Ne3	None	-0.193	
En1	More amenities	-0.099	0.185
En2	Existing amenities	0.110	**0.115**
En3	No amenities	-0.011	
Os1	Office space ≥ 151 m2	0.103	0.160
Os2	101 ≤ Office space ≤ 150 m2	-0.145	**0.052**
Os3	50 ≤ Office space ≤ 100 m2	0.042	
Fl1	Future extension possibilities	**0.132**	**0.065**
Fl2	Current flexibility	0.056	0.449
Fl3	No flexibility	**-0.188**	

Table 33 The coefficient & significance for all the attributes and the explanation

By examining the coefficients of the attributes itself it becomes clear that for the attribute *Type of Building*, there is a more positive evaluation for the former industrial building and then that of the current building. The evaluation is negative for a new constructed building. For the attribute *Facilities* the evaluation is only positive for full services/facilities. For the attribute *Accessibility*, there is a more positive evaluation for the Distance ≤ 500 m then that of 500 ≤ Distance ≤ 1,5 km. The evaluation is negative for Distance ≥ 1,5 km. For the attribute *Price*, the evaluation is the most positive (also in comparison with the other attributes) for 100 ≤ Rental price ≤ 155 €/m2. The evaluation is also positive for 155 ≤ Rental price ≤ 200 €/m2. The evaluation is negative (also in comparison with the other attributes) for Rental price ≥ 201 €/m2. For the attribute *Network*, the evaluation is the most positive for New networks. The evaluation is also positive for Current Networks. The evaluation is negative for None networks. For the attribute *Environment*, the evaluation is only positive for Existing amenities. The evaluation is the most negative for More amenities. For the attribute *Office Space*, the evaluation is the most positive for Office space ≥ 151 m2. The evaluation is also positive for 50 ≤ Office space ≤ 100 m2. The evaluation is negative for 101 ≤ Office space ≤ 150 m2. To conclude, for the attribute *Flexibility*, , the evaluation is the most positive for Future extension possibilities. The evaluation is also positive for Current flexibility. The evaluation is negative for No flexibility.

In overall it could be stated that the respondents have the most positive evaluation for the following determinants; former industrial building, full services/facilities, the Distance ≤ 500 m, 100 ≤ Rental price ≤ 155 €/m2, New networks, Existing amenities, Office space ≥ 151 m2 and Future extension possibilities. The respondents have the a negative evaluation for the following determinants; new constructed building, semi or none facilities/services, Distance ≥ 1,5 km, Rental price ≥ 201 €/m2, None networks, More amenities, 101 ≤ Office space ≤ 150 m2 and No flexibility.

In order to determine which of the attributes and their correlating levels have the most influence in the decision behavior of highly educated and creative workers, it is important to investigate the significance of the attributes and their corresponding levels. By reviewing Table 33, it becomes clear that a large amount of the attributes is not significant ($p>0.05$). A number of reasons could explain the lacking of significance within this experiment. By reviewing literature, it becomes clear that other Discrete Choice Modeling experiments have (i) a larger amount of respondents, the (ii) methodology DCM is not suitable for this target group because of its complexity, (iii) the time that is needed for completing the questionnaire and (iv) the correlation between the attributes. As stated by Kemperman (2000), the amount of attributes that are imbedded in the experiment is imperative for the complexity and reliability of the experiment. And as mentioned before, the respondents indicated that they perceived the DCM experiment and clarification as complex. Therefore, for this experiment the value of the significance is increased ($p>0.10$). By reviewing the significance of the attributes, it becomes clear that the following attributes are insignificant; Facilities (Fa1/Fa2), Accessibility (Ac2 = 500 ≤ Distance ≤ 1,5 km), Rental price (Pr2 = 155 ≤ Rental price ≤ 200 €/m2), Current network and Flexibility (Fl2 = Current flexibility). The following attributes and their correlating levels are significant; *Type of Building* (Tb1/Tb2 = New constructed building /Former industrial building), *Accessibility* (Ac1 = Distance ≥ 1,5 km), *Rental Price* (Pr1 = Rental price ≥ 201 €/m2), *Networks* (Ne1 = new networks), *Environment* (En2 = existing amenities), *Office Space* (Os2 = 101 ≤ Office space ≤ 150 m2) and *Flexibility* (Fl1 = future extension possibilities). By reviewing the attributes in the situation if the significance level would not have been increased, only *Type of Building* (Tb1 = New constructed building), *Accessibility* (Ac1 = Distance ≥ 1,5 km), *Rental Price* (Pr1 = Rental price ≥ 201 €/m2) and *Office Space* (Os2 = 101 ≤ Office space ≤ 150 m2), are significant. Therefore, from the aspect significance these determinants have the most influence on the location decision behavior of highly educated and creative workers who work in small and medium businesses on Strijp-S.

By comparing the coefficients with that of the significance, it becomes clear the significance is supporting the importance in the location decision behavior of highly educated and creative workers, for the following attributes in the sequence of their significance and coefficient; (i) *Flexibility* (Fl1), *New Networks* (Ne1), *Former industrial building* (Tb2) and *Existing amenities* (En2). By comparing the coefficient and the significance there is a contradiction for the following determinants, namely; *Type of Building* (Tb1 = New constructed building), *Accessibility* (Ac1 = Distance ≥ 1,5 km), *Rental Price* (Pr1 = Rental price ≥ 201 €/m2) and *Office Space* (Os2 = 101 ≤ Office space ≤ 150 m2). Especially, because the coefficient is showing another relation for the positive evaluation for other attributes and their correlating levels. Therefore, it is important to increase the significance level.

To conclude, it could be stated that the determinants Fl1, Ne1, Tb2 and En2 have influence in the location decision behaviour of highly educated and creative workers who work in small and medium businesses on Strijp-S. In the next paragraph the findings of the moment of establishing the company at Strijp-S and the DCM experiment are compared.

6.2.5 Comparison

In order to derive insights in the location decision behaviour of highly educated and creative workers, more specifically to understand the importance of the location and building determinants and the relations between the determinants, it is evident to compare the findings of the moment of establishing the company at Strijp-S with that of the DCM experiment. The comparison is shown in Table 34.

Comparison establishing vs. DCM experiment			
Moment of establishing		**DCM**	
Location	*Building*	*Location*	*Building*
Dynamic environment (28%)	Contract type vs. contract duration (17%)	Accessibility	Type of Building
Image of the area (27%)	(Flexibility) rental price (15%)	Existing Amenities	Rental Price
Parking possibilities (16%)	Network (15%)		Office Space
Accessibility (15%)	Flexibility (14%)		Network
			Flexibility

Table 34 Comparison location and building determinants

In the DCM experiment there was more emphasis on the building determinants. However, by reviewing Table 34, it becomes clear that the accessibility is important in the location decision behaviour of highly educated and creative workers. This is also supported by the outcome of the DCM experiment. As literature suggests, the accessibility is one of the most important pull factors that influence the location decision behaviour (Louw, 1996; Timmermans, 1986). Srour et al. (2002), state that the *"accessibility of a location is a measure of how well transportation networks interact with land use attributes to satisfy household, business, or others' preferences"* (Srour et al., 2002, p. 2) The accessibility is also closely related to the networks and place identification. Rocco refers to connectivity as the 'transferability' between different urban networks, *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). Furthermore, in the locational evaluation of the demand side (DTZ, 2016a) there is a higher interest to relocate in an environment in which there is a high degree of dynamism. This dynamism is the highest at city centres that consist of a high concentration of companies, retail and leisure and are characterized by a high accessibility. The presence of amenities or agglomeration effects are evident for the dynamics of an environment (Timmermans, 1986).

By reviewing the comparison of the building determinants, it becomes clear that there are a lot of similarities in the determinants that influence the location decision behaviour. The presence of amenities are facilitating the importance of (social) networks. And the presence of networks is directly related to the place identification and therefore influencing the location decision behaviour. Through the increasing importance of place

identification, specifically the perception of the environment, individuals and companies have a high willingness and commitment to accommodate themselves within clusters (Rocco, 2008b). The increasing individualization is explaining the importance of the Rental price (Lizieri, 2009). The concept of flexibility can be defined as the degree in which an organization is able to adapt or respond on changes (Mooij, 2002). By renting flexible office spaces, organizations are able to minimize their costs and to optimize the work environment and their revenues (Lizieri, 2009; Straatman, 2014;DTZ, 2016a).

There is an important determinant that is contradicted by the findings of the DCM experiment, namely the importance of the building in relation to the location decision behaviour. From the investigated literature, it becomes clear that the type of building is highly correlating with a wide range of characteristics that influence the location decision-making process. As stated by Korteweg (2002a), the decision to relocate is highly depending on the re-evaluation of the both the factors accommodation and location. And this evaluation is highly correlated with the appearance, visibility and representativeness of the building is creating the so-called corporate identity. Besides, through the individualization of highly educated/creative workers, people have a higher awareness to be part of a corporate identity that meets their place identification (Korteweg, 2002a; Boterman & Sleutjes, 2014a). Through the individualization of employees, people are creating a higher awareness and perception in which way the corporate identity reflects their values and standards. Even though, literature is suggesting that employees/individuals are becoming less dependant on the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010), from the conducted DCM experiment it can be stated that the determinants Type of Building and the Office Space are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S.

In overall it can be stated that the location decision process is a comprehensive complex process that is interrelated with a wide range of both building and location determinants. And that the relations between the determinants are not that straightforward and therefore it is interesting to investigate the future building and location determinants of the highly educated and creative workers, which are shown in the next paragraph.

6.2.6 Future location decision behaviour

The fourth part consisted of the investigation of the future building and location determinants that could affect the future the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. The future building and location determinants are shown in Figure 52 and 53. By reviewing the location determinants in Figure 52, it becomes clear that the most important location determinants are; (i) parking possibilities (20%), (ii) dynamic environment (18%) and (iii) image of the area (15%). Furthermore, the accessibility to the highway network and public transport is also important (11% + 10% = 21%). The increasing importance of mobility, place identification and network explain the importance of the determinants parking possibilities, accessibility, dynamic environment and network. However, from the derived literature, with the expectation that the determinant corporate identity is becoming more important is contradicted.

Future location determinants

Determinant	Frequency	Percentage
Other determinants	0	0%
Corporate identity	10	5%
Proximity to downtown or urban center	6	3%
Proximity to amenities	20	9%
Image of the area	31	15%
Proximity to customers and associates (network)	20	9%
Parking possibilities	43	20%
Access to the highway network	23	11%
Access by public transport (proximity station	21	10%
Dynamic environment	38	18%

Figure 52 The future location determinants (frequency)

By reviewing Figure 53, there is a less distinctive difference noticeable. The most important future building determinants consist of; (i) contract type vs. contract duration (13%), (ii) (flexibility) rental price (13%), (iii) accessibility (12%) and (iv) network (11%). The building characteristics, flexibility/historic features/ aesthetic appearance / possibility of extension, are also important (10 + 9 + 9 + 5 = 33%).

As stated in the comparison between the moment of establishing and DCM experiment, the accessibility, proximity of amenities and the network remain important. Furthermore, through the increasing changing demand requirements that consist of a higher emphasizes on individualization, flexibility, more sharing of knowledge, collaboration and services is explaining the importance of the (i) contract type vs. duration, (ii) (flexibility) rental price and (iii) services (DTZ, 2016a).

Future building determinants

Determinant	Frequency	Percentage
Other determinants	0	0%
The possibility of extension	12	5%
Network (industrial clusters)	26	11%
Energy savings (sustainability)	16	7%
Contract type vs. contract duration	30	13%
(Flexibility) rental price	30	13%
Services (presence of facilities)	24	10%
Accessibility (open / recognizability)	27	12%
Flexibility (layout / flexible workstations)	24	10%
Historic features	22	9%
Aesthetic appearance	22	9%

Figure 53 The future building determinants (frequency)

6.2.7 Comparison

If one would compare the building and location determinants from the moment of establishing the company and the future building and location determinants, which is shown in Table 35, the first aspect that stands out is that the differences in location determinants have become more distinctive. Secondly, the dynamic environment remains very important. The image of the area is also important, however it has decreased in importance. Furthermore, a number of determinants have increased considerably; (i) accessibility, (ii) parking possibilities and (iii) the proximity to amenities. Especially the parking possibilities and the accessibility have increased substantially. The importance of the accessibility is supported by literature as one of the most evident pull factors (Louw, 1996; Srour et al., 2002; Timmermans, 1986). The increasing importance of networks, or more specifically the clustering of companies in relation to proximity of customers, is explaining the increase of the accessibility and the network (Boterman & Sleutjes, 2014b). This is also supported from the findings of the DCM experiment. As a result the place identification is increasing. Subsequently, the combination of these determinants are contributing to a more dynamic environment and a higher perception of the image of the area (Remøy, 2010; Vos, 2013). Furthermore, the determinant the proximity to an urban or city centre remains relatively low in comparison with other determinants. Therefore, the assumption could be made that through the intensification of the network, the clustering of companies, more amenities and etc., there is a higher preference for a dynamic metropolitan area that consists of high diversity of functions.

Comparison establishing vs. future building and location determinants					
Moment of establishing		**DCM**		**Future**	
Location	*Building*	*Location*	*Building*	*Location*	*Building*
Dynamic environment (28%)	Contract type vs. contract duration (17%)	Accessibility	Type of Building	Accessibility (21%)	Contract type vs. contract duration (13%)
Image of the area (27%)	(Flexibility) rental price (15%)	Exisiting Amenities	Rental price	Parking possibilities (20%)	(Flexibility) rental price (13%)
Parking possibilities (16%)	Network (15%)		Office Space	Dynamic environment (18%)	Accessibility (12%)
Accessibility (15%)	Flexibility (14%)		Network	Image of the area (15%)	Network (11%)
			Flexibility		

Table 35 Comparison location and building determinants

By comparing the building determinants, the differences have become less distinctive. The individualization and the higher preference to collaborate of highly educated and creative workers is explaining the increase in; (i) contract type vs. contract duration, (ii) (flexibility) rental price, (iii) services and (iv) network. This is also supported by the findings of the DCM experiment. The determinant that increased the most is the presence of services. Through an increase of the network, the clustering of companies and more collaboration, there is a higher need for services. This is supported by literature by an interview in an interview by with Tom van Putten (DTZ, 2016a) that emphasises the importance of services and an interview with Thijs van Dieren that states that through the offering of services/facilities networks are strengthened (Mak & Roodbol, 2014). The specific services/facilities are shown in Appendix E in Figure 54. There is a difference in the importance of the building characteristics. For example, in the comparison with the moment of establishing and that of the future there is a lower interest in the possibility for extension of the required floor area. However, from the derived results from the DCM experiment the future extension possibilities are significant. Furthermore, the increase in the network is directly related to

an increase in the business opportunities. This is increasing the place identification. Together with the increasing place identification and the importance of the individualization is contributing that the building characteristics are becoming more evident; (i) aesthetic appearance, (ii) historic features and (iii) accessibility (Rocco, 2008b;Lizieri, 2009). From the derived DCM experiment there is a higher preference for an industrial building/ office space and flexibility. This is supporting the increasing importance of the presence of networks (DTZ, 2016a). Besides this, even though, literature is suggesting that employees/individuals are becoming less dependant on the office building/space (Brouwen & Eichholtz, 2004; Remøy, 2010), from the conducted DCM experiment and the future location and building determinants it can be stated that the determinants Type of Building and the Office Space are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. Another determinant that has increased considerably is the sustainability. In an interview with Tom van Putten (DTZ, 2016a), the importance of the changing demand requirements in relation to sustainability is emphasized with the correlating aspect that there is an increasing demand for 'experience'. This experience consists of flexibility, the concept, the services and the sustainability.

To conclude, it can be stated that through the individualization of highly educated and creative workers, the increasing importance of collaboration and the emergence of networks, the investigated building and location determinants are affecting the location decision behaviour. Furthermore, through the evolvement of the companies from the moment of establishing the company at Strijp-S, the location and building determinants have changed. The differentiation of the changed demand requirements and their importance are shown in Table 36. By reviewing Table 36, it becomes clear that the mobility and interrelated determinants have increased substantially. Furthermore, it also shows that through the increasing aspects such as collaboration, sharing knowledge, the clustering of companies is strengthening the network. As a result there is an increase in the accessibility that also is supported by the findings of the DCM experiment. Furthermore, this is then directly related to the positive evaluation of the place identification and providing a sustainable environment in which people want to life, work or recreate (Remøy, 2010; Vos, 2013). In the next paragraph, through expert interviews from the supply side, the location and building determinants are determined and explained.

Changing demand requirements		
Determinant	*Increase*	*Interrelated determinants/aspects*
Accessibility (highway / public transport)	19 -> 44 (+25)	Individualization / Network
Parking possibilities	21-> 43 (+22)	Network/ Increasing mobility
Proximity to amenities	5 ->20 (+15)	Network
Services	10 -> 14 (+14)	Network
Aesthetic appearance	9 - > 22 (+13)	Place identification / dynamic environment/ Building characteristics
Accessibility	15 -> 27 (+12)	Increasing mobility
Sustainability	5-> 16 (+11)	Individualization
Historic features	13 -> 22 (+9)	Place identification / dynamic environment

Table 36 Changing demand requirements highly educated and creative workers

6.3   Data analysis supply side (expert opinions)

Within the office market the most important stakeholders from the supply side that influence the development of office, are as described before; (i) the investor, (ii) the project developer, (iii) the municipality and (iv) the broker. Within literature there is limited research conducted about the building and location determinants that contribute to the location decision behaviour of highly educated and creative workers. The perspective of the supply side is evident to investigate in which way a shift can occur in the willingness and commitment of participation of the stakeholders. This shift entails and requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties (Pen, 2014). The perspective of the stakeholders is focused in which way new the changing demand requirements can be implemented to initiate new office developments. Besides this, within the interview there is emphasis on what building and location determinants are considered important, therefore to contribute substantially to the insights in the imbalance between the demand and supply side. Therefore, through a quantitative analysis, that consists of a number of interviews more insights will be gathered about the most important building and location determinants and furthermore more insights will be gathered about the barriers and development opportunities in the office market. Through the comparison of the building and location determinants that influence the location decision behaviour of both the demand and supply side, the most suitable and ideal set of characteristics can be determined in order to compose a development strategy for future office developments. Through a number of propositions and composed development strategies this will be implemented in providing insights in the location decision behaviour of highly educated and creative workers, to overcome the existing imbalance in the office market. This will contribute to cities, planners and policy makers in developing initiatives and strategies to strengthen or retain their competiveness by attracting people who work in creative and knowledge-intensive sectors (Akcomak, I.S.; Borghans, L.; ter Weel, 2011).

6.3.1 Stakeholders

In order to identify the most important building and location determinants that influence the location decision behaviour from the supply side, several interviews with the most important stakeholders were conducted. For the scope of this research, the deliberate chose was made to interview two stakeholders, both on a national and local level, from each expertise. A small description of the different stakeholders is shown below. For the scope of the

Figure 55 The interviews on national and local level

research and the sensitivity of conflict of interest among the stakeholders, the choice was made, in collaboration with the stakeholders, to not integrate the elaborated interviews as a part of this research. The most important findings are discussed below.

Perspective 1 – Investor

Thijs Peek – NSI N.V.: Thijs Peek is Asset Manager at Nieuwe Steen Investments NV. NSI NV is a listed real-estate company with assets of € 1.1 billion. NSI invests primarily in offices and retail in high-quality locations in the Netherlands.

Toon de Koning – Interesting Vastgoed B.V.: Toon de Koning is in collaboration with Teun Stam, one of the founders of the company Stam & De Koning (SDK), which consists of multiple disciplines. At the beginning of 2000, SDK was sold to Volkerwessels. From that moment on, Toon de Koning participated with his expertise with Volkerwessels. Furthermore, Toon de Koning is founder and director of Interesting Vastgoed. And Interesting Vastgoed is a location-driven investor and an investor that develops. The company is active in the region Rotterdam, Breda, Tilburg, 's-Hertogenbosch, Eindhoven and extends to Belgium**.**

Perspective 2 – Project developer

SDK Vastgoed – multiple project developers: SDK real estate is a operating company with their focus on the region Eindhoven. SDK Real Estate is active in the Southern Netherlands and operates as an independent developer. SDK Real Estate is part of the VolkerWessels group and develops at its own expense and risk, on behalf of municipalities and corporations or in cooperation with various parties. SDK Real Estate is active in a wide diversity of projects in both new construction as redevelopment that differ from living, working and leisure.

Jan-Hein Lakeman – OVG: Jan-Hein Lakeman is director at OVG Real Estate. OVG is is an independent property developer and investor and one of the largest real estate technology companies in The Netherlands. The company has a strong foothold in Germany and is growing internationally. The aim of OVG consists of the development of sustainable and energy-neutral buildings.

Perspective 3 – Municipality

Alwin Beernink – Municipality Eindhoven / Park Strijp Beheer: At the municipality of Eindhoven, Alwin Beernink is involved in a dual function. On the one side there is the role of programmer for the municipality. And on the other side, Alwin Beernink is director of Park Strijp Beheer that consists of a collaboration between the municipality of Eindhoven and Volkerwessels.

Fred Geers – Municipality Eindhoven: Fred Geers is Policy Employee / Account Manager Offices at the municipality of Eindhoven. At the municipality of Eindhoven his responsibilities consist of a high involvement in the policy of offices and the acquisition and housing of service companies and institutions.

Perspective 4 – Broker

Roberts Peters – DTZ Zadelhoff: Robert Peters is director of DTZ Zadelhoff. DTZ has been nearly 50 years a leader in commercial real estate and realizes integrated solutions for real estate owners, users, investors and financiers.

Ted Rooijakkers – Van Stekelenburg Rooijakkers: Ted Rooijakkers is director of Van Stekelenburg Rooijakkers. Van Stekelenburg Rooijakkers is as a broker a specialist in commercial real estate: for rent, (to) buy, investment or valuation. The portfolio consists of a wide range of projects; offices, construction sites, commercial buildings and shops.

6.3.2 Structure interviews

In order to derive the building and location determinants that affect the office development from the perspective of the supply side, an overall structure of the interviews was composed. The main topics of the interviews and a small description are elaborated below.

General

The first part consisted of the market forces and dynamics, how the existing imbalance between the supply and demand side can be overcome, what the future entails of the so-called C-locations. Furthermore, new investment opportunities or development strategies are discussed.

Stakeholders

The second part consisted about the collaboration between the most important stakeholders. Besides this, in which way the conflicting interest among the stakeholders could be overcome, which stakeholder should initiate new developments and furthermore in which way the risk evaluation is contributing to the willingness and commitment of the stakeholders.

Small and medium businesses

The third part consisted about the emerging and exponential growth of the small and medium businesses, more specifically what the building and location determinants are of highly educated and creative workers who work in these businesses. Furthermore, what the influence of several location and building determinants is on their location and how this will evolve in the future.

The 'new' office

To conclude, trends such as the new way of working and concepts as HNK are described and what their future entails. Furthermore, the future perspective of the increasing individualization of highly educated and creative workers, the deceasing required floor area and the importance of networks are discussed.

6.3.3 Building and location determinants from the supply side

From the conducted interviews with the different stakeholders from the supply side, various building and location determinants were derived that have influence on the decision-making process of the (re)location of highly educated and creative workers. The

location determinants are shown in Figure 56. In Appendix E in Table 37, the comparison between the different stakeholders is composed.

Location determinants supply side

Determinant	Frequency	Percentage
Other determinants	0	0%
Dynamic environment	8	23%
Accessibility of public transport (proximity station	6	18%
Access to the highway network	3	9%
Parking possibilities	3	9%
Image of the area	6	17%
Proximity to amenities	0	0%
Proximity to the inner city or urban center	4	12%
Corporate identity	4	12%
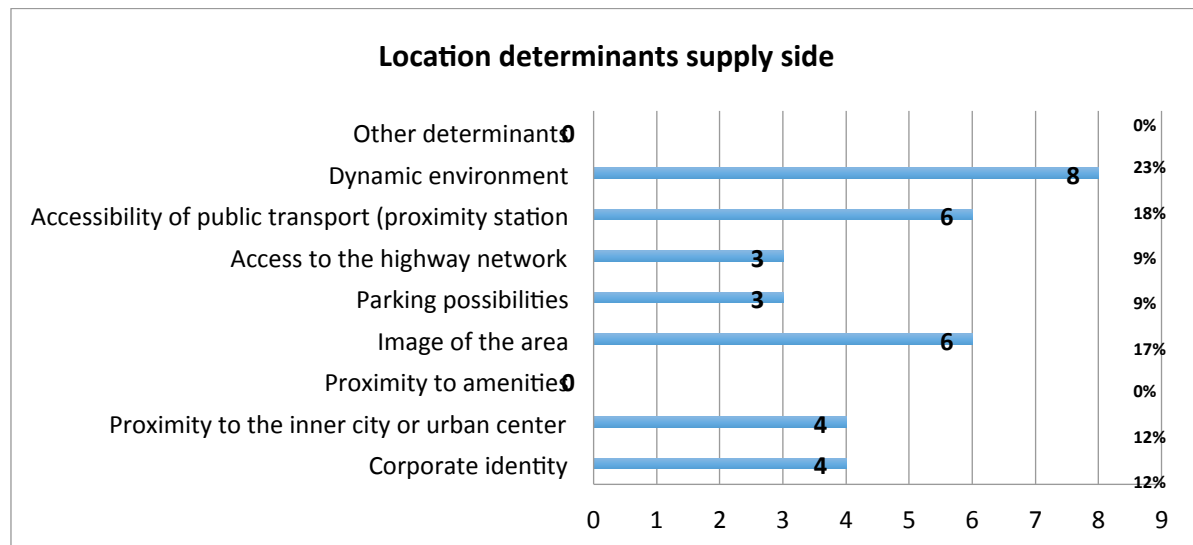
Figure 56 The location determinants of the supply side (frequency)

By reviewing Figure 56, it becomes clear that the most important location determinants are; (i) dynamic environment (23%), (ii) accessibility of public transport (18%) and (iii) the image of the area (18%). However, it should be stated that if the total accessibility would be taken into account, this would become the most important location determinant (18% + 9% = 27%). Even though there is a high interest in the accessibility, the parking possibilities are less important. In total it could be stated that the diversity of the area, the place identification within this area in combination with the accessibility are the most important. The dynamic environment would consist of a synergy of living, working and recreating. The importance of an area that consists of this diversity is emphasized by a research that was conducted by DTZ (2016b), that concluded that offices that are located at railway stations perform better. Furthermore, director Frank van der Sluys refers to this as 'the dynamics chain'. More specifically, the location decision behaviour of companies is affected by the attractiviness of the area, in order to appeal the most to the employees.

The derived building determinants are shown in Figure 57 and in Appendix E in Table 38 the comparison between the different stakeholders is composed. By reviewing Figure 57, it becomes clear that the most important building determinants consist of; (i) multifunctional (9%), flexibility (layout/ work spaces) (9%) and services (9%), (ii) (flexibility) rental prices (8%) and contract type vs. contract duration (8%) and (iii) connectivity (8%). Furthermore, the following determinants are also important; (iv) personal branding/concept/business case (7%) (v) layout (6%), (vi) smart technologies (6%) and (vii) network (6%). The determinants that are interrelated with the building characteristics are less important (aesthetic appearance (2%), diversity of users (2%), social hart (1%) and historic features (0%)). Especially, the determinant extension possibilities differs from the derived results of the changing demand requirements. The determinants that stand out the most consist of; (i) services, (ii) flexibility, (iii) connectivity, (iv) personal branding/concept/ business case, (v) network, (vi) smart technologies and (vii) hospitality. In an interview that was conducted with Tom van Putten, (DTZ, 2016a) the changing demand requirements consist of an inspiring building that is easy accessible in which there is emphasis on collaboration and

integration. An office building that consists of high tech systems that are incorporated and a high level of sustainability. The building should consist of a certain degree of hospitality in which an employee is able to perform in a wide variety of spaces that have a diversity of interaction both formal and informal. Therefore, employees are able to network and collaborate. The office is becoming a space that is intertwined with working from home. Furthermore, it is emphasized by Van Putten, with "The Internet of Things", that the incorporation of smart technologies in the built environment is becoming more and more evident.

Building determinants supply side

Determinant	Frequency	Percentage
Other determinants	0	0%
Diversity users	2	2%
Social hart	1	1%
Connectivity (social interactions)	7	8%
24/7 dynamics	5	6%
Multifunctional	8	9%
Possible future transformation (alternative use)	5	6%
Personal branding/concept / business case	6	7%
Layout building (grid)	5	6%
Hospitality	3	3%
Smart technologies	5	6%
Aesthetic appearance	2	2%
Historic features	0	0%
Flexibility	8	9%
Accessibility (open / recognizability)	3	3%
Services (presence of facilities)	8	9%
(Flexibility) rental price	7	8%
Contract type vs. contract duration	7	8%
Sustainability	3	3%
Network (industrial clusters)	5	6%
The possibility of extension	0	0%

Figure 57 The building determinants of the supply side (frequency)

6.3.4 Barriers in the office development

Although it is important to create a dynamic environment to steer economic activity in order to attract highly educated and creative workers and a wide number of benefits can be identified (Boterman & Sleutjes, 2014b; DTZ, 2016a; Korteweg, 2002b; Niedomysl & Hansen, 2010; Vos, 2013), in understanding the building and location determinants of the supply side, it is important to understand the identified constrains from the supply side to initiate new office developments. Therefore, within this paragraph the most distinguishable barriers in the office development and interrelated determinants are discussed. This is shown in Figure 58. In Appendix E in Table 39 the comparison between the different stakeholders is composed.

Throughout the interviews there was consensus among most of the stakeholders that an important barrier is the multidisciplinary environment (9%). This is created as a result of the lack of consensus amongst key stakeholders (Glumac, Han, & Schaefer, 2013). A decisive stakeholder within this environment is the municipality (Zuidema & Van Elp,

2010b). As a result of the economic crisis, the changes in the labour market, lessons learned, the positioning of the municipality in the allocation of land, a shift occurred in the core activities. The role and participation of the municipality is retracting in comparison with the situation before the economic crisis. The shift consisted from an active stakeholder, with a steering role, to allocate land and to attract businesses, in a more restrained role that is mainly focused on facilitating role. The municipality emphasises that in order to initiate the so-called 'place-making' it is becoming more and more dependable on the participation of the market. And for the market to restore itself it is evident that new types of partnerships are established, a new type of governance is suggested (6%). This is also supported by literature, as suggested by Pen (2014), that a shift is required and that this entails and requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties. Furthermore, as stated by Louw & Bontekoning (2007), by taken into account the changing demand requirements this could contribute to the collaboration of public and private development organizations. There is consensus among the stakeholders that it is evident to create more transparency among the conflict of interest of the stakeholders, which is also supported by literature (DNB, 2016). From the perspective of the other stakeholders the facilitating role should consist of a communicating role in the allocation of opportunities. This is necessary to react on the changes in the demand requirements from a quantitative need for a qualitative need.

In line with the multidisciplinary environment, another shift occurred in the risk evaluation of investors (10%). Especially, there is an increasing interest of international investors in the real estate office market (6%). Furthermore, within the Dutch investor market a shift occurred in office market (DTZ, 2015); (Vastgoedjournaal, 2016a). As a result of an increasing migration to city centres, the present oversupply, the substantial growth of one person households, the exponential growth of the logistics market and the low return rate, there is a much higher interest in the investment in the logistics and residential market (CBS, 2009; CBS, 2015). This is also directly related with two other important constrains, namely (i) the market dynamics of the office market that resulted in a withdrawal of office building through transformation (Vastgoedjournaal, 2016b). That is also influenced by a high demand for student housing and short stay living. Furthermore, for investors the (ii) acquisition costs of incourant office buildings are considerable lower than in comparison with the building costs of new office buildings (7% + 4% = 11%). As a result of the changing demand preferences and the exponential growth of small and medium businesses, the risk evaluation of investors is also affected. More specifically, the changing demand requirements result in more flexibility in short-term contracts and therefore more uncertainties in the revenues for investors (7%). As literature suggests, as a result of the increase of small and medium businesses and therefore the preference for flexible rental contracts, the uncertainty for the supply side increases substantially because of decreasing revenues (Huisman & Roodhof, 2015). Besides this, it is difficult to validate the value of small and medium businesses (6%).

From the conducted interviews, there was also consensus about another important barrier in the location decision process of companies, namely the decision process of companies to relocate is highly dependable on the rental price and the contract type vs. the contract duration (4% + 7% = 11 %). Currently, through the decreasing amount of required floor space of the corporates, the amount of transformations and the exponential growth of small and medium businesses, the rent in existing building is considerable lower than in

new constructed office building. Therefore, this is also strongly correlated with the risk evaluation of stakeholders. However, from the conducted interviews it was emphasized that through the growing importance of services/facilities, the demand side is willing to pay a higher rent if the services/facilities are integrated. Furthermore, a barrier that is closely related to the risk evaluation is that of the occupancy rate in buildings. Within existing buildings, the occupancy rate is less decisive in making it financial feasible (4%).
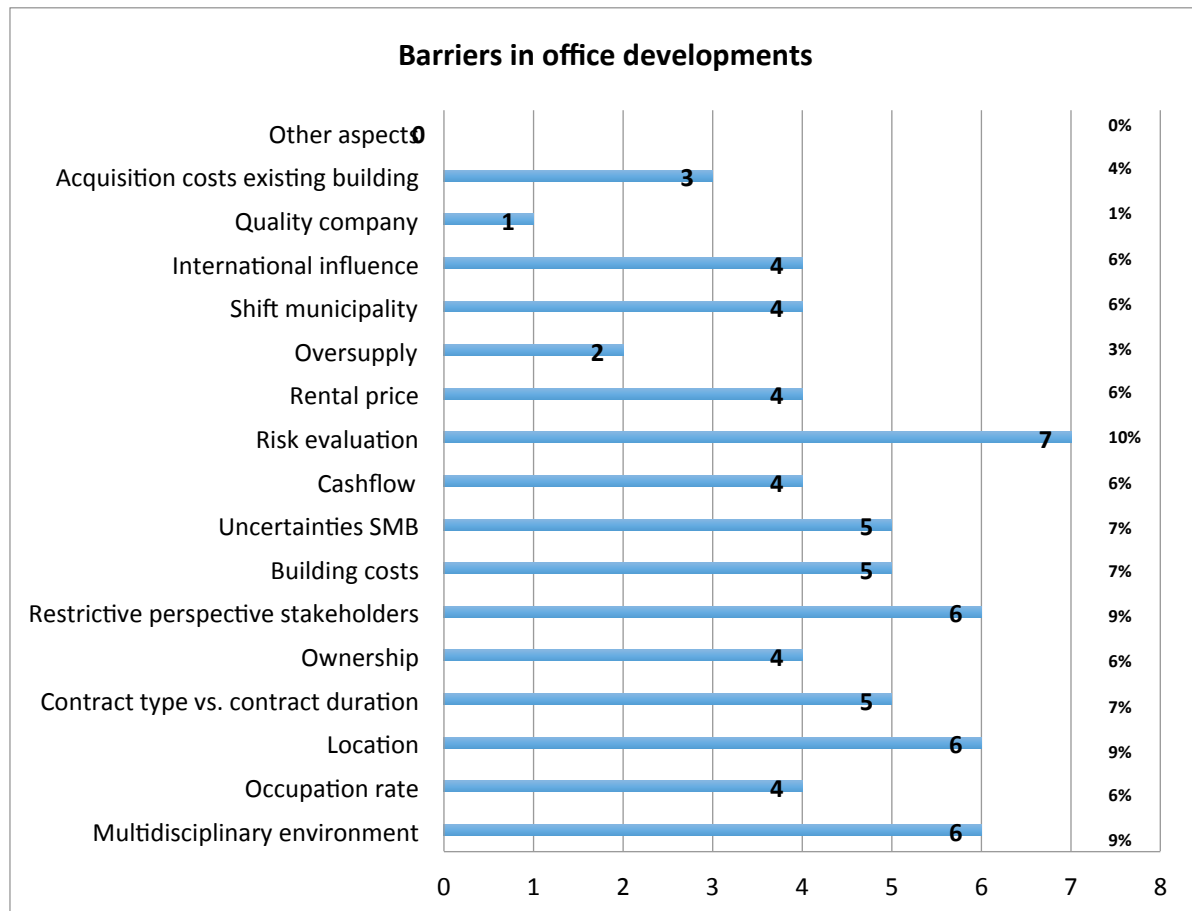

Figure 58 The barriers in the development of new offices and the changing demand requirements (frequency)

To conclude, by reviewing Figure 58, it becomes clear that another important barrier is the location (9%). The location, and therefore the environment, is evident to attract highly educated and creative workers. The environment should consist of a high quality cyclical economy in which there is a synergy between the social and cultural environment. The success of the construction of a new office development is highly dependable on the uniqueness of the project, the diversity of companies and the location in combination with the amenities and services/facilities. Furthermore, the stakeholders emphasize that a building can be easily adopted or designed according to the changing demand requirements, however a location is much more fixed and therefore one of the most important barriers. From the interviews and in literature this is underlined as the motto; *Location, location, location* (Dynamis, 2015; NVM, 2016b).

After clarifying the most important barriers and building and location determinants that influence the development of new offices and the location decision behaviour of highly educated and creative workers it can be stated that the influence of the multidisciplinary

environment is one of the most distinguishable barriers in office developments. Therefore, within the next paragraph a more explicit exploration of this environment is described.

6.3.5 Multidisciplinary environment

The office market and the participating stakeholders are operating mostly in a more restrictive traditional way. Within the process of office development, the initiative phase is the one of the most important phases and within this phase the collaboration between the investor and project developer is evident. The portfolio of the investor consists of a wide range of projects and because of the financing structures and the interrelated aspects; the investor is restrained in his financial possibilities. Besides this, the project developer operates from the allocation of land and the developing possibilities and the investor operates mostly with the future perspective of existing real estate and to increase his financial positioning. Because investors are restrained due to their large portfolio, there is emphasises on retaining the building and to delay the devaluation as much as possible. Therefore, the process to withdraw the incourant amount of office buildings is highly complex and time consuming. Currently, the amount of office stock that is extracted from the market is less than the amount of new office stock that is added to the market. This is also visible in Table 9 (Bak, 2014; Stijnenbosch, 2015).

Even though there is a recognition of the stakeholders of the changing demand requirements of highly educated and creative workers, changes in the labour market and that the corporates are decreasing their required floor space, their risk evaluation and the interrelated aspects have not evolved sufficiently to adopt these changes. The risk evaluation is too much depending on the initial return, long-term rental contracts and single tenants. Besides this, the location and the economic climate also influence the risk evaluation of the investor. For example, the international business district Zuidas is very attractive to invest, because of the more appealing risk evaluation (Driessen & Dam, 2015). The decisiveness of an investor is influencing decision-making process in taking the necessary steps to overcome the imbalance between supply and demand (Zuidema & Van Elp, 2010b; van Swam, 2014). Therefore, the changes in the demand requirements should be taken into account by the investors and project developers should convince the investors of the develop opportunities that are interrelated with the evolving labour market. Therefore it is proposed that there should be an emphasis to create a value of the small and medium businesses. This value should not represent the building as an investment, however should represent the community. Moreover, this should eventually result in modified financing models. The investors should become more aware of the importance of the changing demand requirements and the relation to the social and cultural climate. This is apparent in taking into account the exponential growth in the migration to city centres, the increasing individualization, the place identification, the strengthening of the networks and keeping in mind the expectation that in the nearby future, buildings will become multifunctional in which there will be a synergy between the functions working, living and recreating (Rocco, 2008a; Vos, 2013; Boterman & Sleutjes, 2014b; DTZ, 2016a). Therefore, it is evident that the awareness of investors is changed to become much more pro-active in the creation of an attractive economic environment. From the above-described transition or a shift in the awareness and commitment of investors the following proposition is composed:

Proposition 1; increasing the awareness of investors in the changed demand requirements

However, currently the initiation phase of office developments, it is too much stipulating from the willingness and commitment of the investor. Parallel to this, is the role of the project developer that consists traditionally of the development of a building, the search for a tenant and then after completion of the building to sell the building to an investor. This is mostly focused on the short-term duration. Therefore, it is proposed that there should also be a shift in the awareness of the changes in the demand requirements from the perspective of the project developers. The increasing individualization, the place identification and corporate identity of companies are becoming more and more evident in order to initiate new office developments. Therefore the concept and story telling is important in the 'place making'. Within this, the project developer can play an substantial role in the translation of the changing demand requirements in a multifunctional building that consists of a diversity of functions and services (Rocco, 2008b; DTZ, 2016a). Furthermore, it is proposed that a possible solution for this could be the intensification of the collaboration between the investor and the project developer with a long-term commitment. From the above-described intensification of the collaboration the following proposition is composed:

Proposition 2; intensifying the collaboration between the investor and project developer

Besides this, the policy shift of municipalities was emphasized by a number of stakeholders. At the moment there is the focus at the so-called priority locations. Within these locations the municipality has a shared risk evaluation with the other stakeholders (StecGroep, 2011; Ministerie, 2013). This is contributing substantially to the willingness and commitment of the municipality. However, for other locations the municipality is much more restrained in the involvement, more specifically in the willingness and commitment to facilitate or to stimulate new office developments. Especially the municipality has an active role in contributing to the creation of fertile ground for economic conditions. The creation of an attractive economic environment is not only important for the labour market, but also for the stimulation of the social and cultural climate. Through a highly a more active role in the creation of an attractive economic environment, this then becomes a catalyst for the establishment of new companies (Niedomysl & Hansen, 2010; Boterman & Sleutjes, 2014b). Eventually this could result in the establishment of spin-offs, the small and medium businesses, that have a positive impact on the stimulation of local initiatives / amenities. And the presence of amenities, such as concerts, theatre and restaurants are highly correlated with the attractiveness of an area. As literature suggests, the presence of amenities or agglomeration effects are evident for the dynamics of an environment (Timmermans, 1986). This is also emphasized by Sleutjes (2013), that states that there is a strong relation to highly educated inhabitants and the presence of urban amenities. The interaction between people is contributing in a major way to the economic growth and the dynamic society. Therefore it is proposed that the municipalities should increase their awareness of the changes in the labour market and take a more pro-active role by developing policies and granting subsidies that stimulate new office developments. Through a higher initiating participation and communication role of the municipality, more investors will be stimulated for new office developments. From the above-described transition or a shift in the awareness and commitment of municipalities the following proposition is composed:

Proposition 3; shift of the municipality in the awareness of the changes in the labour market

To conclude, it can be stated that a shift in the awareness of the stakeholders is evident to steer new office developments and the implementation of the changes in the demand requirements of highly educated and creative workers to create a metropolitan area that consists of an attractive environment. The first initiatives of this shift and more collaboration is becoming more visible through a number of agreements with the ministers Schultz, Kamp and Plasterk and regional economic drivers (Cobouw, 2016). The composed propositions and the shift of the most important stakeholders is illustrated in Figure 59.
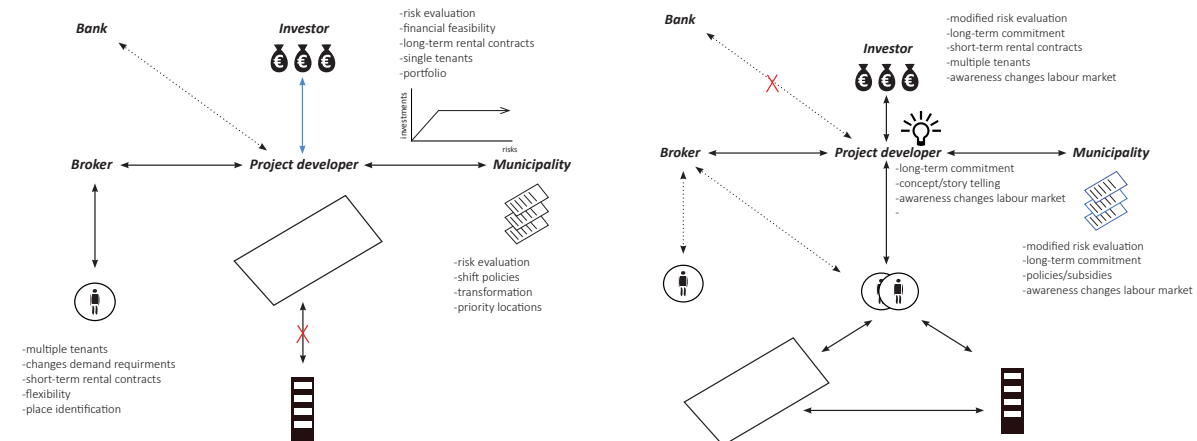

Figure 58 The changes in the multidisciplinary environment

6.4   Comparison supply vs. demand

After identifying the most important building and location determinants of both demand and supply side, it is interesting to investigate the differences that occur in order to determine in which way the existing imbalance can be overcome. By reviewing Table 40, it becomes clear that there are similarities between the importance of the location determinants of both demand and supply side. The first similarity is that both sides categorize the *Accessibility* as the most evident location determinant. This is also supported by the findings of the DCM experiment. Therefore, it can be stated that the outcome of the research is supporting the importance of accessibility in the location decision behaviour of highly educated and creative workers. The importance of the accessibility is supported by literature as one of the most evident pull factors (Louw, 1996; Srour et al., 2002; Timmermans, 1986). Furthermore, both sides also categorize the following location determinants as important; (i) dynamic environment and (ii) the image of the area. The strengthening of the networks is directly related to an increase in the business opportunities and therefore resulting in a stronger perception of the environment. Eventually this is contributing in a higher place identification and a higher preference for a dynamic environment and the image of the area. The relation between the accessibility and the networks and place identification is emphasized by Rocco, that refers to connectivity as the 'transferability' between different urban networks, *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). Furthermore, in the locational evaluation of the demand side (DTZ, 2016a) there is a higher interest to relocate in an environment in which there is a high degree of dynamism.

The most important difference between the demand and supply perspective, consists of the importance between the *Parking possibilities* (20% vs. 9%), the *Presence of amenities*

(9% vs. 0%), *the Corporate identity* (5% vs. 9%) and the *Proximity to an urban centre* (3% + 4% vs. 12%). The presence of amenities in relation to the location decision behaviour of the demand is also supported by the findings of the DCM experiment. Even though, as suggested by literature, that the presence of amenities is interrelated with the dynamics of environment (Timmermans, 1986), and that stakeholders (such as cities) are trying to implement development plans through a diversity of cultural amenities and high-standard public services in order to attract highly skilled labour that will eventually attract investments (Niedomysl & Hansen, 2010), from the findings of the conducted interviews it can be stated that there is a discrepancy in the importance to facilitate amenities. This is not supported by literature, in which Niedomysl & Hansen (2010) stated that the presence of amenities should not be considered as demands and that their influence in less in the location decision behaviour. From the comparison it can be stated that the presence of amenities is influencing the location decision behaviour of highly educated and creative workers. The evolvement of the companies that established themselves at Strijp-S, the increasing importance of individualization and the densification of the networks contributed substantially to the increasing importance of parking possibilities in the location decision behaviour of the demand side. This is closely related to the accessibility and therefore also supported by the findings of the DCM experiment. However, from the perspective of the supply side there is less incentive about the importance of parking possibilities in the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. It could be argued that the reasoning for can be traced back to a number of aspects, such as; the lacking knowledge of the supply side in the changes in de demand requirements, the conflicting interest among the stakeholders and the exponential increase in the importance of mobility. Furthermore, from the perspective of the supply side it can be stated that through the increasing awareness of place identification and the intensification of migration to city centres is contributing to a higher preference for corporate identity and the proximity to urban centres. This is also supported by literature in by a research that was conducted by DTZ (2016b), that concluded that offices that are located at railway stations perform substantially better. However, by reviewing the importance demand perspective in relation to the proximity to urban centres there is much less incentive because there is a strong place identification at Strijp-S (KuiperCompagnons, 2007; Mak & Roodbol, 2014). As suggested by literature, an environment that consists of the equilibrium of synergy between living, working and recreation, is ensuring the emotional and cultural context and identity of the city. Therefore, it could be stated that this is providing a sustainable environment in who people want to life, work or recreate (Remøy, 2010; Vos, 2013). To conclude, by reviewing the demand requirements, it becomes clear that the location determinants have changed over time and are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S and there is discrepancy in the importance of the determinants between the demand and supply.

By reviewing the building determinants of both demand and supply side, it can be stated that a more distinctive difference can be identified in comparison with the location determinants. Both sides identify the importance of the *Contract type vs. Contract duration* (17%/13% vs. 9%), (flexibility) of the *Rental prices* (15%/13% vs. 8%), the *Networks* (15%/11% vs. 6%) and the *Flexibility* (14% demand side). Especially, the importance of the (flexibility) of the rental price, networks and the flexibility from the demand side is

supported by the findings of the DCM experiment and therefore have the most impact in location decision behaviour of the highly educated and creative workers who work in small and medium businesses at Strijp-S. The findings of both the demand and supply side in relation to the importance of networks in the location decision behaviour is also supported by literature. Rocco (2008b) states that companies still have a high willingness and commitment to accommodate themselves within clusters. This is contributing to the place identification and eventually influencing the location decision behaviour in a positive way through a longer residency and furthermore as a catalyst to attract more companies (Boterman & Sleutjes, 2014a). Furthermore, the findings of the importance of the rental price from the conducted DCM experiment in relation to the location decision behaviour, is supporting the assumption of the supply side. More specifically, that the location decision behaviour of highly educated and creative workers is highly dependable on the financial positioning, through the importance of both the contract type vs. contract duration (17/13%) and the (flexibility) of the rental price (15%/13%). As stated before, from findings of the DCM experiment the determinant flexibility is influencing the location decision behaviour. This is supported by literature, that as a result of the increasing and complexity of the environment in which offices are active there is a higher need for flexibility to be better able to respond on cyclical economic conditions and adapt their organization (Lizieri, 2009; Mooij, 2002). The higher need for flexibility is directly related to the offering of services/facilities and as stated by Thijs van Dieren, that through the offering of services/facilities networks are strengthened (Mak & Roodbol, 2014).

Comparison demand vs. supply building and location determinants							
Moment of establishing		DCM		Future		Supply	
Location	*Building*	*Location*	*Building*	*Location*	*Building*	*Location*	*Building*
Dynamic environment (28%)	Contract type vs. contract duration (17%)	Accessibility	Type of Building	Accessibility (21%)	Contract type vs. contract duration (13%)	Accessibility (27%)	Flexibility (layout / workspaces) services / Multifunctional(9%)
Image of the area (27%)	(Flexibility) rental price (15%)	Exisiting Amenities	Rental price	Parking possibilities (20%)	(Flexibility) rental price (13%)	Dynamic environment (23%)	(Flexibility) rental prices / contract type vs. contract duration / connectivity (8%)
Parking possibilities (16%)	Network (15%)		Office Space	Dynamic environment (18%)	Accessibility (12%)	Image of the area (18%)	Personal branding / concept / business case (7%)
Accessibility (15%)	Flexibility (14%)		Network	Image of the area (15%)	Network (11%)	Corporate identity & proximity urban centre (12%)	Layout building, / smart technologies / network / 24/7 dynamics / possible future transformation(6%)
Corporate identity (5%)	**Accessibility (10%)**		Flexibility	Amenities (9%)	Services (10%)	Parking possibilities (9%)	

Table 40 Comparison demand vs. supply in relation to the location and building determinants

The most distinctive difference between the demand and supply side is noticeable in the influence of the *Type of Building* (characteristics of the building) in relation to the location decision behaviour of highly educated and creative workers. From the conducted DCM experiment it becomes clear that the Type of Building, with a preference for an industrial building, is influencing the location decision behaviour. However, from the derived results of the conducted interviews there is less emphasis on the Type of Building, more on the flexibility and the multi-functionality. From the comparison it can be stated, that even as it is suggested by literature that that employees/individuals are becoming less dependant on the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010), from the conducted

DCM experiment it can be stated that the determinants Type of Building and the Office Space are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. However, there is a discrepancy in perspective of both the demand and supply side and the importance of the building characteristics varies considerably.

To conclude, by the investigation of the building and location determinants of both demand and supply side, it can be stated that in overall the building and location determinants of highly educated and creative workers are changing. The derived results are supporting that the individualization, place identification and the emergence of networks are contributing substantially to the changes in the location decision behaviour. There are substantial differences in the importance of building and location determinants from both demand and supply that influence the location decision-making process of highly educated and creative workers who work in small and medium businesses at Strijp-S. Therefore, it is evident that in future office developments the changing demand preferences are taken into account in overcoming the existing imbalance between the demand and supply side. These insights can be implemented in the creation of new development opportunities and strategies, which are discussed in the next paragraph.

6.5   Development opportunities and strategies

6.5.1 Introduction

In order to overcome the existing imbalance between the demand and supply side, by taken into account the changes that occurred in the demand requirements and create more willingness and commitment to initiate new office developments, it is important that new opportunities are identified. Within these new opportunities, the challenge consists of sustainable urbanization, to retain or shrink the business climate or to create a new and attractive business climate. This shift requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties (Pen, 2014). The first step to overcome the existing imbalance, as proposed in paragraph 4.5, is the decision location model by Gibson and Lizieri (1999), that consists of high degree of flexibility. However, from the conducted research about the building and location determinants of both the demand and supply side, it can be stated that the office market consists of comprehensive complex environment. Therefore, within this paragraph the composed propositions and the derived results from the comparison are implemented to define development opportunities and strategies that further elaborate on the model of Gibson and Lizieri (1999). With these opportunities and strategies the aim is to construct recommendations that could contribute in taking the first initiative, in the traditionally oriented multidisciplinary environment, to align the decision-making process between the collaboration of the different stakeholders and to implement the changing demand requirements.

6.5.2 Development strategies

An important aspect that was emphasized in the interviews is that there is an expectation that in the nearby future, the migration towards city centres that consists of a highly dynamic environment, the so-called multi-global junctions, will increase discernably. Within this environment, there is the expectation that the future 'work' building will become much more multifunctional with the vertical layering of functions that consist of living,

working and recreating (DTZ, 2016a). There should be a synergy between these functions. And in order to attract or retain people who work in creative and knowledge-intensive sectors and to create a metropolitan area that is characterized with 24/7 dynamism, it is necessary to create densification. Therefore, companies will cluster and share activities/facilities and services. What eventually will create a higher intensification of the networks. From the conducted interviews it became clear that in the building, to steer the increasing importance of collaboration of the highly educated and creative workers, it is important that the building should consist of a social hart in which people can meet and interact. The use of the facilities and services should consist of the so-called pay-per-use principle. Together this will create a diversity of companies and attractive work environment.

In order to react on the exponential growth of small and medium businesses and the large amount of highly educated and creative people who work here, and to decrease the risk evaluation of stakeholders, the collaboration between the investor and the project developer should be intensified. This would contribute to the initiation of new office developments. This is resulting in a development strategy that should consist of a top-down approach. Therefore, the following assumption is adopted, if a project developer has developed a building, the project developer should establish a property company. To decrease the risk evaluation of the investor, the property company would establish a long-term commitment with the investor. For example, for a rental period of 10 years. The property company initiates the founding of an exploitation company, that divides the risks among the small and medium businesses with short-term lease contracts. This increases the flexibility for the companies. Furthermore, through a diversification of small and medium businesses, differences in the duration of lease contracts and the size of companies, a more dynamic environment is created and the risk evaluation also decreases. This is shown in Figure 60. Therefore, the following development strategy is defined:

Figure 60 The top-down development strategy

Development strategy (1); Top down approach in which there is a shared risk evaluation between investor and project developer and a diversity of companies and rental contracts.

From the conducted interviews there is the expectation that the emerging concepts such as the new way of working, HNK or the importance of flexibility will further increase in the future. Through the individualization of people, the increasing importance of collaboration and interaction and the integration of smart technologies within the work environment,

work will become more independent on location and time. However, the explicit definition of the 'new' work typology is not that straightforward to define, because it is interrelated wide continuously changing office market and a large number of aspects.

Through the changes in de demand preferences, there is a higher preference for the exchange of knowledge and the face-to-face contact. This is also supported by literature, in which Rocco (2008) states that *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). The expectation is that the building will become more and more a meeting place (DTZ, 2016a). This shift in the labour market also entails some aspects that create a high complexity. For example, the individualization of highly educated and creative workers is contributing to the fact that companies have more difficulties in retaining or monitoring their culture and corporate identity. Therefore, the assumption is adopted that it is evident for future office developments to initiate or develop with a theme or concept. An example is the SX-Building that is located at Strijp-S. This concept consists of the collaboration of companies that are specialized in sports, marketing and media. Therefore, this increases the collaboration and connectivity between individuals. Within this type of development the changing demand preferences should be actively and even more in an early stage be involved in future office developments. This will contribute in the total awareness and the perception of the office development. Especially, the perception, so-called storytelling, is becoming more and more important within the future. Therefore, it is proposed that another development strategy should consist of a bottom-up approach. More specifically, through market research and with a high participation and commitment of the project developer, new concepts should be developed in collaboration with the highly educated and creative workers. This will result in a building that is tailor-made for a diversity of small and medium businesses. With the diversity of businesses, it is possible that the demand preferences differ among the businesses. Therefore, the assumption is adopted that within this development strategy it is evident that through differences in occupation rates and functional spaces, the knowledge sharing and collaboration is stimulated and facilitated. The difference of spaces should consist of a variation in flexibility to take the uniqueness of companies in account. The
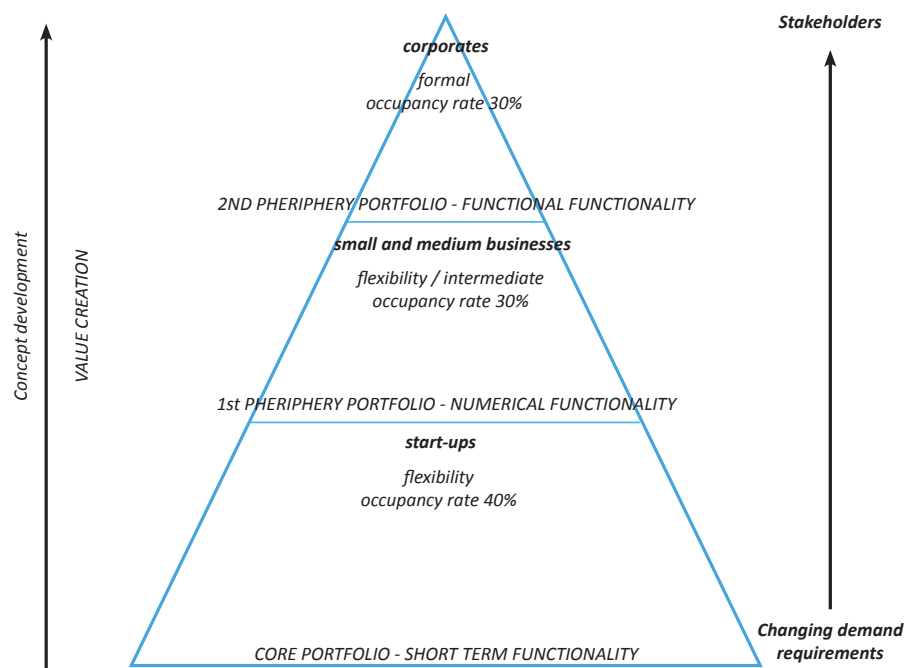
Figure 61 The bottom-up development strategy

variation in the occupancy rate is decreasing the risk evaluation to initiate new office developments from the perspective of the stakeholders. The expectation is that as a result of deviation in the occupancy rate, for example corporates (30%) – small and medium businesses (30%) – start-ups (40%), the change/ transferability between networks is substantially increased. In total this contributes to a dynamic environment that intensifies the increasing importance of networks. This is shown in Figure 61. Therefore, the following development strategy is defined:

Development strategy (2); Bottom-up approach in which the changing demand preferences are taken into account through concept development and a diversity of functionality.

A development strategy that entails a more future perspective of the office market is that the traditional way of thinking and planning should be abandoned. The occurring difference in the labour market and the shift in the demand preferences are resulting in a discrepancy between the quantitative amount of offices and the qualitative amount of offices. Therefore, the assumption is adopted that this imbalance could be overcome by assigning a value to a company. It is proposed that the before originating revenues are not generated from the building, in stead from the financial positioning of the companies. Furthermore, this then facilitates the value to the location. Furthermore, it is proposed that with the introduction of a service level agreement, the companies are able to adjust their specific preferences according to the required services and facilities. This service level agreement can be seen as a subscription to the 'new' working building. Subsequently, this is underlying the increasing importance of individualization and flexibility. Besides this, from the conducted interviews there was emphasis on the integration of smart technologies in the built environment. By incorporating the determinant sustainability and smart technologies in an early stage together with the changing demand requirements, in total this is could eventually contribute to the further optimization of the labour market by creating an optimal healthy working environment area (Remøy, 2010; Vos, 2013). In the terms of rental prices and to steer new office developments the assumption is adopted that it is evident that adjustments are implemented in the rental prices. If more sustainable offices are developed, the construction costs would decrease and this should be taken into account to attract highly educated and creative workers. Therefore, it is proposed that rental prices of 130 -140 €/sqm should be implemented. Therefore, the following development strategy is defined:

Development strategy (3); assigning a value to the companies and implementing the changes in the labour market by the implementation of smart technologies and a service level agreement.

By combining the proposed development strategies in one model, both the building and location determinants and barriers between the demand and supply side are taken into account. The existing imbalance between the demand and supply side, the changes in the labour market and the multidisciplinary environment can only be overcome if the development strategies are combined. Therefore, it is important that the changing demand preferences are integrated with adjustments in the risk evaluation of the stakeholders. The total model is shown in Figure 62.
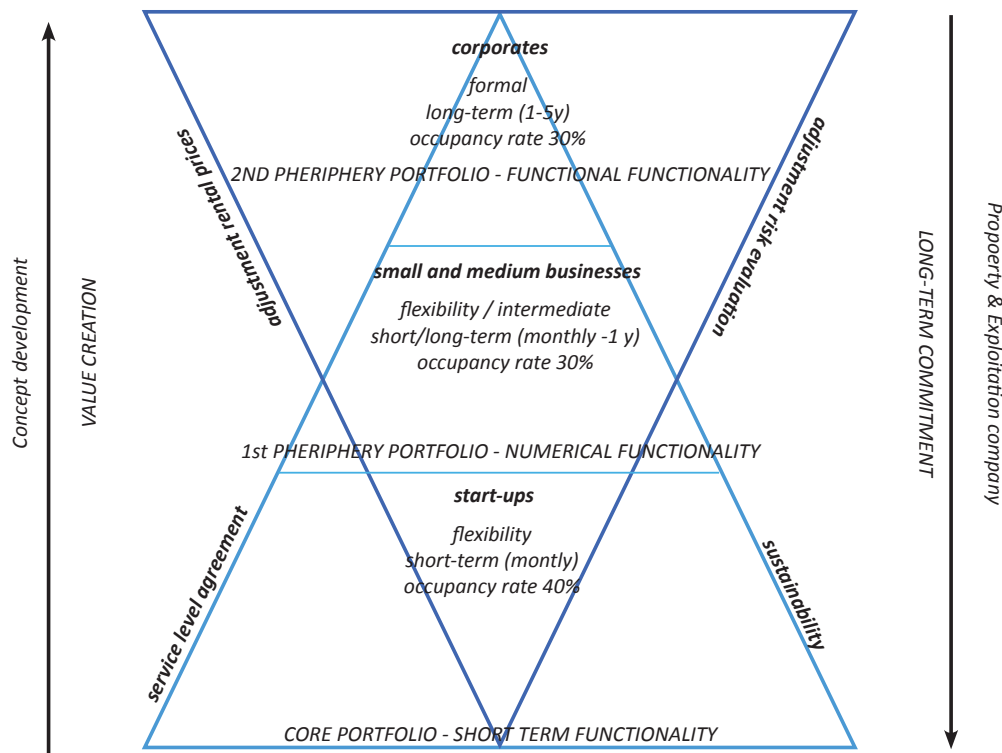
Figure 62 The total development strategy

6.5.3 Opportunities

In the conducted interviews some opportunities were proposed that could stimulate new office developments. The first opportunity entailed a shift from the office market. This shift consists of the current main orientation of the rental market into that of a buyer's market. More specifically, that of the Collective Business Entrepreneurship (CBE) (dutch; (CZO) collectief zakelijk ondernemerschap). This initiative is derived from the Collective Private Entrepreneurship (CPE) (dutch; (CPO) collectief paticulier ondernemerschap). Within CPE a group of individuals acquires a building site and develops in collaboration with each other a non-profit building project. Within CBE a network of businesses are given the opportunity to develop their own customized office building. This concept decreases the risk evaluation, increases the commitment of the businesses and provides a number of tax and financial benefits.

In line with this, there is opportunity that is gaining more awareness because of the restrained financial real estate market, namely that of crowdfunding. As a result of the economic crisis, the market forces and dynamics and a shift in the risk evaluation, stakeholders such as the banks and investors became reluctant in investing in the office market. Subsequently, project developers have tremendous difficulties to find participating stakeholders for the financing of new construction projects. Therefore, there is a high awareness and commitment in the identification of 'new' co-financing structures as reaction the changing demand requirements. Through crowdfunding [2], with on-line platforms, more awareness and participation is created for individuals. This is contributing to the initiative phase of new projects, decreases the risk evaluation of investors and an

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[2] Crowdfunding is an open application through the internet and any other media to an undefined network of people (crowd) for a financial contribution to the initiative. In return, the crowd receives a future product or other tangible or intangible contribution (Hol, 2013).

additional benefit is that it enlarges the trust among participants to successfully complete the project (Hol, 2013). By incorporating the changing demand requirements in an early stage, more transparency is created among both investors and the demand side. Furthermore, for a municipality crowdfunding contributes as an effective indicator for future developments. Even though, the concept of crowdfunding is more visible in the residential and social property market; there is a high expectation that this 'new' type of development strategy will increase considerably in the nearby future. The first successful project in the office market consisted of the redevelopment of the former OPG building into multiple work spaces and facilities for young creative individuals (Hol, 2012; IJsselmuiden, 2016).

To conclude, the current traditionally oriented supply side should make a transition in which the changing demand preferences are taken into account in an early stage in the office development. There should be emphasis on collaboration and interaction between the most important stakeholders.

6.6   Conclusion and discussion
Within this paragraph the sub questions as defined in the first chapter are discussed. This research study provides an answer to the following questions:

Demand perspective

- *What are the most important attributes that determine the location decision behaviour for highly educated people / creative workers who work in small and medium businesses?*
- *What is the significance of these attributes and what is their relation?*
- *What is the importance of the emerging networks (communities) in relation to the emerging working concepts and how will this influence the new typology of the office?*

Supply perspective

- *What are the most important attributes/determinants and their interrelated relation from the perspective of the supply side?*
- *What current development strategies are implemented and what are the most important variables?*
- *In which way can the conflict of interest between the independent stakeholders be overcome to create more transparency and to stimulate office developments?*

Development strategy

- *From the derived results of the demand and supply side is it possible to design a development making strategy for the development of a (new) office?*
- *How could this development strategy be implemented within the current market to overcome to complex processes that are involved between the demand and supply side?*
- *In which way will the developed strategy create an added value to the processes that are involved in office development for networks?*

What are the most important attributes that determine the location decision behaviour for highly educated people / creative workers who work in small and medium businesses?

From the literature review a wide range of building and locations determinants were identified that influenced the location decision behaviour of highly educated and creative workers. Therefore a distinction was proposed that explored the following components; socio-demographic, building and location (Louw, 1996). Which are shown in Table 16. The building determinants consisted of a wide range of aspects, such as; (i) flexibility, (ii) accessibility, (iii) facilities/services and (iv) costs. The identified location determinants consisted of the following aspects; (i) environment, (ii) amenities and (iii) networks. From this analysis the most important building and location determinants and their relations were investigated through a questionnaire.

What is the significance of these attributes and what is their relation?

The location and building determinants were derived from the literature review. From the analysis of the location determinants the parking possibilities and the accessibility have increased substantially. This is shown in Table 35 and 36. The importance of accessibility is also supported by literature, as being one of the most evident pull factors (Timmermans, 1986; Louw, 1996; Srour et al., 2002). This is also supported by the findings of the DCM experiment. Furthermore, the determinants dynamic environment and the image of the area are also evident, however have decreased in importance. The importance of both the dynamic environment and the image of area are supported by literature in relation to the perception of the environment/location, the so-called place identification. Subsequently this is related to the intensification of the networks. The relation between the accessibility and the networks and place identification is emphasized by Rocco, that refers to connectivity as the 'transferability' between different urban networks, *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). Furthermore, from the conducted DCM experiment the presence of existing amenities is also influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. This is also supported by literature, as stated by Timmermans (1986), that the presence of amenities or agglomeration effects are evident for the dynamics of an environment. Furthermore, as stated by Sleutjes (2013), there is strong relation between the location decision behaviour of highly educated inhabitants and the presence of urban amenities. Subsequently, it can be stated that the location determinants of highly educated and creative workers have changed at that the combination of these determinants are contributing to a more dynamic environment and a higher perception of the image of the area (Remøy, 2010; Vos, 2013). Through the intensification of the clustering of companies, there is an increasing preference for a dynamic metropolitan area that consists of high diversity of functions.

From the analysis of the building determinants of the highly educated and creative workers, which is shown in Table 35 and 36, the differences are less distinctive. The determinant that increased the most is the presence of services. The other determinants that are important consist of; (i) contract type vs. contract duration, (ii) (flexibility) rental price, (iii) and networks. This is also supported by the findings of the DCM experiment. Through an increase of the network, the clustering of companies and more collaboration, there is a higher need for services. This is supported by literature by an interview in an interview by

with Tom van Putten (DTZ, 2016a) that emphasises the importance of services and an interview with Thijs van Dieren that states that through the offering of services/facilities networks are strengthened (Mak & Roodbol, 2014). Furthermore, from the analysis of the building determinants, there is a difference in the importance of the building characteristics. For example, in the comparison with the moment of establishing and that of the future there is a lower interest in the possibility for extension of the required floor area. However, from the derived results from the DCM experiment the future extension possibilities are significant. From the derived DCM experiment there is a higher preference for an industrial building/ office space and flexibility. This is also supported by importance of the derived results of the building determinants of the future location; (i) aesthetic appearance, (ii) historic features and (iii) accessibility. This is supporting the increasing importance of the presence of networks (DTZ, 2016a). Besides this, even though, literature is suggesting that employees/individuals are becoming less dependant on the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010), from the conducted DCM experiment and the future location and building determinants it can be stated that the determinants Type of Building and the Office Space are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. Furthermore, there is a change in demand requirements noticeable in the increase of the determinant sustainability. As stated by Tom van Putten (DTZ, 2016a), individuals are seeking more and more an experience that covers the determinants; (i) flexibility, (ii) concept, the services and (iii) the sustainability.

What is the importance of the emerging networks (communities) in relation to the emerging working concepts and how will this influence the new typology of the office?

The increasing importance of networks and their change in demand requirements, which consists of the more flexibility, interaction and collaboration, are influencing the office market in a major way. As a result of the economic crisis, the increasing importance of individualization, the place identification, flexibility, new working concepts emerged and individuals/companies are clustering their activities, to interact and connect, to form so-called networks (Louw, 1996; Rocco, 2008a; Boterman & Sleutjes, 2014b). At Strijp-S as a result of the offered services/facilities, the individuals and companies are forming networks (Mak & Roodbol, 2014), therefore resulting in a diversity of individuals, and as a result are able to increase the businesses opportunities, to share risks, resources and to combine their expertise ("Members-S magazine," 2014). This is also shown in Figure 47 and 48. This is resulting in a densification of the networks. The networks that are located at Strijp-S consist of a diversity of companies and expertise. An example of the clustering of the expertise is shown in Figure 35 and 37, in which it is noticeable that a large amount of the businesses are focused on the creative sector. This is also emphasized by Rocco, that states *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). The importance of networks is also supported by the findings of the DCM experiment. A theory that is closely related to the socio-spatial outcome of creative cluster development is that of creative gentrification. This theory consists of several phases; (i) creative pioneers establishing, (ii) influx of higher valued companies and (iii) attraction of investors to regenerate the specific area. By reviewing this theory on the development of Strijp-S it becomes clear that through the strengthening of the networks, the place identification and image of the area substantially improved. Subsequently, this

contributed to the attractiveness of the area. Eventually, resulting in an increase in the importance of amenities, which are evident for the dynamics of an area (Remøy, 2010; Vos, 2013). This is also supported by the findings of the DCM experiment and in locational evaluation of the highly educated and creative workers who work in small and medium businesses at Strijp-S there is a higher preference to relocate in an environment in which there is a high degree of dynamism.

Therefore, there is an increasing market pressure to initiate or develop new concepts in which the above-described aspects are integrated. Therefore, new working concepts such as HNK or WeWork are emerging exponentially. A comparison of the different working concepts and the most important aspects is shown in Appendix A Table 10. From this comparison, it can be stated that WeWork was one of the first working concepts that were able to translate the attractiveness of a network and the correlating aspects into a financial feasible project, through a multibillion-dollar valuation for the network. Even though the financial feasibility of small and medium businesses is a complex process, due to their insecure financial positioning and preference for short-term lease contracts, it is providing the first evidence in the shifts and the opportunities that are occurring in the office market (WSJ, 2015); (Ratti & Claudel, 2016).

Furthermore, through the growing importance of smart technologies in the built environment, there is the expectation that in the nearby future buildings will become multifunctional and will consist of a synergy of working, living and recreating (DTZ, 2016a). This was also emphasized in the conducted interviews. The first initiatives are arising in Copenhagen (The Nest) and in London (The Collective), in which both living and working are combined in so-called co-working spaces or co-living spaces (Homes&Property, 2016). Even in Amsterdam the first concept of both living and working is initiated (Telegraaf, 2016). To conclude, from the investigation of the demand side, the exponential growth of new working concepts such as WeWork, the importance of networks, it can be stated that the office market is changing rapidly. In addition, the examples are emphasising the importance to initiate or develop strategies that explore new opportunities in the office market to adapt the changing demand requirements. However, in the search for the 'new' typology of the office it is a comprehensive process to predict how this will evolve in the future. One could argue that throughout the changes in office market the importance of individualization, services/facilities, corporate identity, collaboration, interaction and flexibility will increase in the future. In which way the 'future' office will evolve is found in the latter.

What are the most important attributes/determinants that influence the location development process and their interrelated relation from the perspective of the supply side?

In literature, there is the lack of information from the perspective of the supply side, about the building and location determinants that influence the location decision behaviour of highly educated and creative workers. Moreover, the contribution and significance for design and planning professionals in implementing this research is constrained (Amole, 2009). Therefore, through a number of conducted interviews, with the most important stakeholders that are active in the office market, the determinants were investigated. The stakeholders consisted of investors, project developers, municipality and brokers, were interviewed on both a local and national scale. The determinants are shown in Figure 56 and Figure 57. From the literature review the processes were investigated that are in the

development of new office buildings. From this investigated it becomes clear that the following aspects are contributing to the development of new office buildings: (i) risk evaluation, (ii) multidisciplinary environment, (iii) development process and (iv) development strategies.

By reviewing the location determinants in Figure 56, it can be stated that the most important determinants consist of; (i) accessibility, (ii) dynamic environment and (iii) the image of the area. The importance of these determinants were also supported by literature, in an interview with director Frank van der Sluys, that describes the combination of these determinants as 'the dynamics chain' (DTZ, 2016a, 2016c). However, it should be stated that from the conducted interviews the location entails a high level of complexity to initiate new office developments or it is an important constrain of the demand side. This is shown in Figure 58. From the perspective of the supply side, the location, that should consist of a diversity of companies, social and cultural environment, is a predetermined fixed environment that can not be easily adopted or transformed (Dynamis, 2015; NVM, 2016b). From the perspective of the demand side, the environment, and the correlated factors; amenities, social network and etc., also could become a constrain in the influence on the decision-making process. If a company has a certain place identification with their environment and a network of customers or suppliers, there is less incentive to relocate. This is directly related to the accessibility. As suggested in literature, individuals have a higher value what they already have. More specifically, as stated by Gourville (2006) individuals *"value what they own, but may have to give up, much more than they value what they don't own but could obtain"* (Gourville, 2006, p. 101)*. This is the so-called endowment effect.

By reviewing the building determinants that are shown in Figure 57, the most important determinants consist of; (i) multifunctional (9%), flexibility (layout/ work spaces) (9%) and services (9%), (ii) (flexibility) rental prices (8%) and contract type vs. contract duration (8%) and (iii) connectivity (8%). Furthermore, the following determinants are also important; (iv) personal branding/concept/business case (7%) (v) layout (6%), (vi) smart technologies (6%) and (vii) network (6%). From the conducted interviews there is emphasis that the determinants (flexibility) rental prices and contract type vs. contract duration are also an important constrain in the office development. These determinants are contributing to the uncertainties of the development process. The determinants that are interrelated with the building characteristics are less important. Especially, the determinant extension possibilities differs from the derived results of the changing demand requirements. This is resulting in a discrepancy between the demand and supply side. As stated before, from the analysis of the demand side it becomes clear that the Building Type, office space and flexibility are influencing the location decision behaviour of the highly educated and creative workers who work in small and medium businesses at Strijp-S.

To conclude, from the perspective of the supply side Therefore, it can be stated that there is awareness from the supply side of the increasing importance of individualization, networks and place identification. In an interview that was conducted with Tom van Putten, (DTZ, 2016a) the changing demand requirements consist of an inspiring building that is easy accessible in which there is emphasis on collaboration and integration. An office building that consists of high tech systems that are incorporated and a high level of sustainability. The building should consist of a certain degree of hospitality in which an employee is able to perform in a wide variety of spaces that have a diversity of interaction

both formal and informal. Therefore, employees are able to network and collaborate. The office is becoming a space that is intertwined with working from home (DTZ, 2016a). This is also supported by literature, that within the search for the future office, it is evident to steer creativity through the quantitative search for human interactions and how to connect this to defining workspaces with a flexible working environment (Ratti & Claudel, 2016).

What current development strategies are implemented and what are the most important variables?

From the conducted literature review a distinction was determined between the supply and demand driven development strategies. The main difference between the strategies consists of that of a top-down approach and a bottom-up approach. This is shown in Table 17. However, the development strategies are traditionally oriented and are not able to adapt to the changes in the demand requirements. Besides this, as a result of the continuously changing market dynamics a shift occurred in the risk evaluation, willingness and commitment of the most important stakeholders that are involved in the development process. As a result of an increasing migration to city centres, the present oversupply, the substantial growth of one person households, the exponential growth of the logistics market and the low return rate, there is a much higher interest in the investment in the logistics and residential market (CBS, 2009; CBS, 2015); (Vastgoedjournaal, 2016a). This resulted in a restrained positioning for the initiation of new office developments. More specifically, the risk evaluation and the correlating barriers are determining the willingness and commitment of the stakeholders. From the conducted interviews the most important barriers consist of; (i) multidisciplinary environment, (ii) rental price vs. duration rental contract and (iii) the location. Which are shown in Figure 58. The conflict of interest among stakeholders is contributing substantially to the decision-making process of companies and the initiate the construction of new office developments. An example is that decisiveness and flexibility of the investor to respond on the market dynamics and forces is influencing the office market. More specifically, that the investor is able to reduce the vacancy. Therefore, the decisiveness of an investor is influencing decision-making process in taking the necessary steps to overcome the imbalance between supply and demand (Zuidema & Van Elp, 2010b; van Swam, 2014).

Another important stakeholder within this process is the shift of the municipality from an active stakeholder, with a steering role, to allocate land and to attract businesses, in a more restrained role that is mainly focused on facilitating role. From the conducted interviews, the municipality emphasizes that it is becoming more and more dependable on the participation of the market, to initiate the 'place-making'. This is highly depending on the collaboration with the other stakeholders. To conclude, in order to determine in which way the risk evaluation and attitude of the most important stakeholders can be overcome, to implement the changes in the demand requirements, it is evident to compose new development opportunities and strategies, that substantially could contribute to create more transparency among the conflict of interest of the stakeholders, to break through the scattered built environment. This could contribute to the collaboration of public and private development organizations (Louw & Bontekoning, 2007; Pen, 2014; DNB, 2016).

In which way can the conflict of interest between the independent stakeholders be overcome to create more transparency and to stimulate office developments?

As described before, through a shift in the risk evaluation of the most important stakeholders, stagnation occurred in the initiation of new office developments. This is shown in the power and interest grid in Figure 27. In order to overcome the conflicts of interest among the most important stakeholders, and to steer 'new' office developments, several propositions are composed:

- *Proposition 1; increasing the awareness of investors in the changed demand requirements;*
- *Proposition 2; intensifying the collaboration between the investor and project developer;*
- *Proposition 3; shift of the municipality in the awareness of the changes in the labour market.*

The first proposition is focused on the importance of creating awareness and commitment of the investors in the changes that are occurring in the demand preferences of highly educated and creative workers and the emergence of networks. This will contribute in a shift of their risk evaluation and the stimulation and initiation of new office developments. The second proposition consists of the intensification of the collaboration of the investor and the project developer through a long-term commitment. As a result of the increasing individualization, the place identification and corporate identity of individuals/companies are becoming more and more evident, therefore the concept and story telling is important in the 'place making'. Within this, the project developer can play an substantial role in the translation of the changing demand requirements in a multifunctional building that consists of a diversity of functions and services (Rocco, 2008b; DTZ, 2016a). To conclude, the last proposition emphasizes the importance of a shift of the municipality in a more active communicative and participation role. The shift of the risk evaluation, awareness and commitment of the above-described stakeholders is evident in overcoming the imbalance between the demand and supply side, to steer new office developments and the implementation of the changes in the demand requirements of highly educated and creative workers to create a metropolitan area that consists of an attractive environment. The first initiatives of this shift and more collaboration is becoming more visible through a number of agreements with the ministers Schultz, Kamp and Plasterk and regional economic drivers (Cobouw, 2016)

From the derived results of the demand and supply side is it possible to design a development strategy for the development of a (new) office?

As stated before, the initiation and stimulation of new office development is highly dependable on the collaboration and a shift in the risk evaluation of the independent stakeholders. This shift requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties (Pen, 2014). From the analysis of the location and building from both the demand and supply side, it can be stated that there is discrepancy in the importance of the determinants that influence the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. Besides this, the substantial increase in small and medium businesses, exponential growth of new working concepts are enhancing comprehensive complex

environment of the office market. Therefore, as a result of the traditionally oriented development strategies, the conflict of interest among the interdependent stakeholders and the discrepancy of between the demand and supply side, the first attempt is proposed, that further elaborates on the model of Gibson and Lizieri. (1999), to align the decision-making process between the collaboration of the different stakeholders and to implement to changing demand requirements. This attempt is composed in a development strategy that consists of the combination of a top-down and bottom-up approach. In order to implement the development strategy it is evident that the current 'traditional' development strategies have to be transformed and adapted to the changing demand requirements. For the successful implementation of the development strategy, the strategy is composed of a combination of both a supply and demand driven development strategy, namely the tenant and concept development. From the perspective of the supply side, it is important that more awareness and commitment is created through an intensification of the collaboration between the most important stakeholders that consist of the investor, project developer and the municipality. The expectation is that is will eventually decrease the risk evaluation and increase the initiation phase. From the perspective of the demand side, the following aspects are important; flexibility, diversity of companies, differences in lease contracts through a service level agreement and concept development. A possibility that should be investigated in the future is to assign a value to the companies. However, it should be stated that this development strategy is the first initiative to adapt or extent the traditional development strategies, therefore not scientifically supported, with the core focus on recommendations, to overcome the existing imbalance between the demand and supply side.

How could this development strategy be implemented within the current market to overcome to complex processes that are involved between the demand and supply side?

The imbalance between the demand and supply side is interrelated with the large oversupply, the changing demand requirements, the search between the quantitative and qualitative buildings, the increasing individualization and the slow response of the office market to economic fluctuations. Besides this, the barriers in office developments are contributing negatively to the increase of the imbalance between both sides. However, the increasing importance of sustainable urbanization, to create a new attractive business climate and the relevance of networks are creating a discrepancy. This discrepancy can be overcome by on the one hand the gathered insights that were derived from the investigation of the differences and changes in the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. On the other hand, by the investigation of the building and location determinants that were derived from the conducted interviews with the supply side. From the comparison it is apparent that the awareness and commitment of the supply side is increased, by adjusting their risk evaluation on the changes in demand requirements. As a result new opportunities and developed strategies can be initiated. Furthermore, by the integration of the determinants such as; accessibility, amenities, type of building, flexibility, services/facilities, hospitality and the emphasis on the collaboration and interaction of the highly educated and creative workers, the networks are strengthened (Timmermans, 1986; Srour et al., 2002; Rocco, 2008b; Niedomysl & Hansen, 2010; Sleutjes, 2013; Boterman & Sleutjes, 2014b; Mak & Roodbol, 2014; DTZ, 2016a). In total this will contribute to attract, highly skilled labour and future investments. On a macro level the economic positioning of

a city is strengthened and on a micro level this is contributing to a dynamic environment in which living, working and recreating are intertwined. To conclude, this contributes to the creation of a healthy dynamic attractive economic metropolitan environment (Remøy, 2010; Vos, 2013; DTZ, 2016a, 2016c).

Even though, by the investigation of the building and location determinants of both the demand and supply side, new insights were gathered about the differences and changes in the location decision behaviour of highly educated and creative workers, the proposed propositions and development strategy are highly dependable on a number of evident aspects. These aspects consist of; transitions in the decisiveness from the perspective of the supply side, the uniqueness of the concept/location, the incentives to relocate and the so-called endowment effect. Especially the shift of the supply side is a comprehensive complex process that is closely related to the slow market fluctuations. However, the increasing importance from the demand side for a new type of typology that will create a future workspace that consists of a synergy between connection, interaction and collaboration is contributing to the discrepancy. Subsequently, the aspect that employees are becoming less dependant of the office building/space (Brounen & Eichholtz, 2004); (Remøy, 2010), is contradicted from the derived results of the comparison of the demand requirements and the supply side, therefore increasing the complexity in the search for a new typology and in which way the 'future' office will evolve is found in the latter.

Part IV   Conclusion & Discussion

7.   Conclusion

7.1   Scientific relevance

Within this paragraph the main research question, that is described in the first chapter, will be discussed and elaborated:

In which way can the imbalance in the office real estate market be overcome, between the supply and demand side, by investigating the building and location determinants for highly educated and creative workers, to reduce the discrepancy and initiate new office developments?

By investigating the building and location determinants of both demand and supply side, it becomes clear that throughout the establishment of the companies at Strijp-S changes occurred in the preferences of the highly educated and creative workers. This is shown in Table 35 and 36. The determinants parking possibilities, network and services increased substantially. From the conducted DCM experiment the determinants accessibility, amenities, type of building, rental price and flexibility have substantial influence on the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. This is shown in Table 33. By comparing the building and location determinants in future office developments both sides categorize the determinant accessibility as the most important. This is shown in Table 40. The accessibility and the presence of amenities is also supported by literature, that these determinants are evident in the dynamics of an environment (Timmermans, 1986; Louw, 1996; Srour et al., 2002). This is resulting in the strengthening of the networks and is directly related to an increase in the business opportunities and therefore resulting in a stronger perception of the environment. Furthermore, both sides also categorize the following building and location determinants as important; dynamic environment, the image of the area, contract type vs. contract duration, and the (flexibility) of the rental prices. An important distinction between both sides can be recognized in the influence of the building and interrelated characteristics and the amenities. Even though, as it is suggested by literature that employees/individuals are becoming less dependant on the office building/space (Brounen & Eichholtz, 2004; Remøy, 2010), from the conducted DCM experiment it can be stated that the determinants Type of Building and the Office Space are influencing the location decision behaviour of highly educated and creative workers who work in small and medium businesses at Strijp-S. Furthermore, there is a discrepancy noticeable between the demand and supply, as it becomes clear that from the derived results of the conducted interviews there is more emphasis on the flexibility and the multi-functionality. Although, as suggested by literature, that the presence of amenities is interrelated with the dynamics of the environment (Timmermans, 1986), and that stakeholders (such as cities) are trying to implement development plans through a diversity of cultural amenities and high-standard public services in order to attract highly skilled labour that will eventually attract investments (Niedomysl & Hansen, 2010). From the findings of the conducted interviews it can be stated that there is a discrepancy in the importance to facilitate amenities. The importance of the determinants (flexibility) of the rental price, networks and the flexibility of the demand side, which are supported by the findings of the DCM experiment, are also supporting the assumption of the supply side that these determinants are influencing the location decision behaviour. The findings of both the demand and supply side in relation to

the importance of networks in the location decision behaviour are also supported by literature. Rocco (2008b) states that companies still have a high willingness and commitment to accommodate themselves within clusters, which is contributing to the place identification and acting as a catalyst to attract more companies (Boterman & Sleutjes, 2014a). The importance of flexibility is resulting from the aspect that there is a higher need for flexibility to be better able to respond on cyclical economic conditions and adapt their organization (Lizieri, 2009; Mooij, 2002).

To conclude, by the investigation of the building and location determinants of both demand and supply side, it can be stated that in overall the building and location determinants of highly educated and creative workers are changing. The derived results are supporting that the individualization, place identification and the emergence of networks are contributing substantially to the changes in the location decision behaviour. There is more emphasis on the sharing of knowledge and interaction through the presence of networks in a dynamic attractive metropolitan environment (Boterman & Sleutjes, 2014b; DTZ, 2016a). In order to answer the main research question it is evident to discuss the last sub question:

In which way will the developed strategy create an added value to the processes that are involved in office development for networks?

The imbalance is highly related with a large number of aspects; the large oversupply, the changing demand requirements, the search between the quantitative and qualitative buildings, the increasing individualization and the slow response of the office market to economic fluctuations. Besides this, the barriers in office developments are contributing negatively to the increase of the imbalance between both sides. The imbalance can be overcome, to initiate sustainable urbanization, to reduce the discrepancy, by on the one hand through the creation of awareness and commitment of the stakeholders that consist of the investor, project developer and the municipality. This is also supported by literature, as suggested by Pen (2014), that a shift is required and that this entails and requires the entry of new entrants on the market and a more transparent cooperation of the traditional parties. Furthermore, by adjusting their risk evaluation on the changes in demand requirements, in addition by intensifying the collaboration, new opportunities and developed strategies can be initiated. As stated by Louw & Bontekoning (2007), by taken into account the changing demand requirements this could contribute to the collaboration of public and private development organizations. There is consensus among the stakeholders that it is evident to create more transparency among the conflict of interest of the stakeholders, which is also supported by literature (DNB, 2016).

On the other hand, by the integration of the determinants such as; flexibility, services/facilities, hospitality, diversity of companies, (flexible) rental contracts and the emphasis on the collaboration and interaction of the highly educated and creative workers, the networks are strengthened. This contributes to the importance to steer creativity through the quantitative search for human interactions and how to connect this to defining workspaces with a flexible working environment (Ratti & Claudel, 2016). In total this will contribute in the facilitation, stimulation and development of a dynamic environment that attracts more people and businesses and acts as a catalyst, the so-called circular causation, for the concentration of activities and skilled labour with an area. Subsequently, it is expected that is contributing to the exponential growth of the economic activities, which is

evident in the knowledge economy for cities, urban planners and policy makers to create an attractive healthy dynamic environment and to initiate new office developments.

This master thesis is contributing scientifically by the identification of the changes that are occurring in the building and location determinants, of highly educated and creative workers, the emerging networks at Strijp-S. Therefore, insights are gathered about the determinants that influence the location decision-making process of both the demand and supply side. As a result, a development strategy is proposed that further elaborates on the model of Gibson and Lizieri (1999), that combines a higher awareness and commitment of the stakeholders with the changes in the demand requirements. The aim of the development strategy, is to take the first initiative, in the traditionally oriented multidisciplinary environment, in aligning the decision-making process between the collaboration of the different stakeholders and contribute to municipalities and policy makers in developing a dynamic metropolitan area that attracts highly educated and creative workers (DTZ Zadelhoff, 2010;Boterman & Sleutjes, 2014b; DTZ, 2016a).

7.2   Social relevance

Throughout the continuously shifting market dynamics and forces in the office market, the economic crisis, the changes in the labour market, the expected migration to city centres, the population growth and the importance of individualization, an imbalance occurred between the demand and supply side in the office market. From the demand side there is an increasing shift in the location decision behaviour. And from the supply side a shift can be recognized in the risk evaluation and the willingness to initiate new office developments. Furthermore, as a result of the increasing individualization and the place identification of the demand side, new working concepts started to emerge and resulted in a substantial increase of the highly educated and creative workers, who work in small and medium businesses. Together these individuals started to cluster and form so-called networks in which the aspects interaction and collaboration are becoming more and more important (Rocco, 2008a; Boterman & Sleutjes, 2014b). Through this imbalance and importance of networks, there is an increasing market pressure in creating an attractive dynamic metropolitan area. As a result of this phenomenon and the changes that are occurring in the office market, there is the continuously search of cities, urban planners and policy makers to compose or define initiatives and strategies in which cities are trying to improve their competiveness. More specifically, to attract or retain people who work in creative and knowledge-intensive sectors that result in the creation of a healthy economic environment (Niedomysl & Hansen, 2010); (Akcomak, I.S.; Borghans, L.; ter Weel, 2011). On a macro level, through the attractiveness of highly educated and creative workers, the economic positioning of a city is strengthened. On a micro level, this is contributing to a dynamic environment in which living, working and recreating are intertwined (DTZ, 2016a, 2016c).

Even though, there is recognition of the most important stakeholders about the transitions that are occurring in the office market, their positioning to initiate or stimulate new office developments is becoming more restrained. Through the identification of both the most important building and location determinants of the demand and supply side, new insights were gathered about the importance of networks and their location decision behaviour. As stated by Rocco (2008) that *"the most favourable locations for new corporate centralities are places where the possibility of change/ transferability between several networks (or several scales) is higher (...)"* (Rocco, 2008a, p. 134). With the composed development

strategy, more insights in the emergence of networks, their location preferences and the willingness and commitment of other stakeholders, will contribute to the decision-making process between the collaboration of the different stakeholders.

8. Discussion & recommendations

This study provides insights in the imbalance between the demand and supply side in the office market through the investigation of changes in the location decision behaviour of highly educated and creative workers who work in the exponential growth of small and medium businesses at Strijp-S. The investigation consisted of the comparison in the building and location determinants form the moment of establishing the company at Strijp-S and with that of the location decision behaviour in a future office development. However, through the conducted research some limitations emerged and thereby new opportunities were identified for future research.

The first aspect consists of the investigation of both residential and work location decision behaviour. Through the increasing importance of the involvement of smart technologies within the daily live, there is a high expectation that the functions working, living and recreating will be combined in future buildings. Therefore, the location decision behaviour will become more and more affected by both the residential and work location decision behaviour. By combining both the building and locations determinants with residential determinants, of highly educated and creative workers, new insights can be gathered that could contribute to the development of future multifunctional buildings.

Through the implementation of DCM experiment and the difficulties that were experienced by obtaining responses, even though there was a high response rate and there was emphasis on retaining feedback, the respondents indicated that the DCM methodology consisted of a high complexity, because of the large amount of attributes and levels. Therefore, their willingness to participate was restrained. Furthermore, by reviewing literature, it becomes clear that other Discrete Choice Modeling experiments have (i) a larger amount of respondents, (ii) the time that is needed for completing the questionnaire, (iii) the amount of attributes and interrelated amount of levels and (iv) the combination of the choice for the respondents between no-alternative and three alternatives. Especially the large number of attributes and the related levels increased the complexity of the questionnaire. As a result, the situation occurred that there was correlation between the attributes and the level of significance was increased. Therefore, it can be stated that within future research it should be investigated if this research methodology is suitable for the highly educated and creative workers who work in small and medium businesses at Strijp-S. Furthermore, by enlarging the amount of respondents and by taken into account their characteristics this could be overcome.

Within the imbalance of the demand and supply there is still lacking knowledge of the importance of the multidisciplinary environment for future office developments. The derived building and location determinants from the supply should be investigated through quantitative research. Furthermore, a shift occurred in the commitment and willingness of the most important stakeholders. The stakeholders consist of the investor, project developer and the municipality. Therefore, the proposition is made that both the determined building and location determinants and the first initiative in defining a development strategy are combined in the development of a decision support tool. The tool should be tested in a case study. Within this tool not only the conflicting interests and the interrelated variables of the stakeholders should be taken into account but also the preferences of future users' as well. This could contribute to overcoming the conflict of

interest and optimize the decision-making process between the most important stakeholders.

Together with investors, municipalities should take a more active role through the development of policies that recognize the importance of the emerging networks, the exponential growth of small and medium businesses, the changes that are occurring in their location decision process and the influence in the built environment. Through a more facilitating and stimulating position, with the development of policies, the future office development could be initiated much more.

Within the office real estate market, through the changes in the labour force, the increasing individualization, the migration towards city centres, a higher need for flexibility, there is an increasing market pressure to develop initiatives and strategies in which cities are trying to increase their competiveness by attracting or retaining people who work in creative and knowledge-intensive sectors (Akcomak, I.S.; Borghans, L.; ter Weel, 2011). Even though, the perspective of the municipalities consists currently on policies and governmental processes that decrease the imbalance between the supply and demand side, through renovation or transformation, there should be emphasizes on the importance and relevance to initiate or stimulate of new office developments. In order to attract highly skilled labour and create a dynamic environment it is evident that new opportunities are identified and initiated from the perspective of the municipality in a more pro-active and communicative role. More specifically, to develop instruments that contribute to the collaboration and commitment of the stakeholders that actively involved in the office development and to steer the 'place making'.

To conclude, through the densification of small and medium businesses and the emerging networks, in line with this research, another important aspect that could be investigated in future research is the theory of creative gentrification. This theory explores the relations and socio-spatial outcomes of creative cluster developments.

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Appendices

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E

Appendix A

The Dutch office stock

Figure 11 The imbalance between the supply and demand side & the supply side ranked to building type (derived from (Bak, 2014))


Figure 12 The imbalance between the supply and demand side & the supply side ranked to building type (derived from (Bak, 2014))

Small and medium businesses

Amount of small and medium businesses		
Type	Amount of employees	Numbers
Self-employed	68.69 %	928.614
2 – 9 employees	26.16 %	353.655
10 – 49 employees	4.36 %	58.942
50 – 99 employees	0.44 %	5.948
100 – 240 employees	0.25 %	3.380
>250 employees	0.11 %	1.487
Total	100.0 %	1.351.891

Table 1 The amount of small and medium businesses in the Netherland in 2015 (derived (MKB, 2015))

The office stock in Eindhoven

	2010 m²	2011	2012	2013	2014		2010 m²	2011	2012	2013	2014
Groningen	20.000	42.500	16.500	12.000	10.000	Groningen	120.000	121.000	119.000	138.500	151.000
Friesland	23.500	10.500	6.000	4.500	11.000	Friesland	89.500	102.000	118.500	130.000	121.500
Drenthe	7.500	2.500	1.500	9.500	3.500	Drenthe	77.000	82.000	107.500	108.000	96.500
Overijssel	72.000	40.500	54.000	75.000	37.000	Overijssel	331.500	333.500	356.000	390.000	434.000
Gelderland	107.000	116.000	62.000	47.000	67.000	Gelderland	504.000	524.500	566.500	647.500	692.000
Utrecht	153.000	130.000	119.500	152.000	123.000	Utrecht	912.000	973.500	1.095.000	1.106.500	1.176.000
Flevoland	14.500	11.000	4.000	15.000	9.500	Flevoland	182.000	204.500	213.000	197.000	232.000
Noord-Holland	326.500	276.000	314.500	292.000	251.000	Noord-Holland	1.978.500	1.966.000	2.067.000	2.152.000	2.191.000
Zuid-Holland	351.000	291.000	243.500	297.500	302.000	Zuid-Holland	1.832.000	2.011.000	2.238.500	2.430.500	2.460.000
Zeeland	3.000	1.000	500	2.500	4.500	Zeeland	9.000	13.000	21.500	31.500	39.000
Noord-Brabant	147.000	132.000	84.000	110.000	118.500	Noord-Brabant	537.500	646.500	717.000	755.500	777.000
Limburg	33.000	62.000	42.000	64.000	30.000	Limburg	197.000	208.500	250.500	265.000	288.000
Nederland	1.258.000	1.115.000	948.000	1.081.000	967.000	Nederland	6.770.000	7.186.000	7.870.000	8.352.000	8.658.000

Figure 13 The comparison between the demand vs. supply side on the level of Provinces (derived from)

	2010 m²	2011	2012	2013	2014		2010 m²	2011	2012	2013	2014
Noord-Nederland						**Noord-Nederland**					
Groningen	16.500	38.500	13.000	10.000	9.500	Groningen	107.000	111.000	105.000	118.000	134.500
Leeuwarden	11.000	500	1.500	1.000	9.500	Leeuwarden	53.500	62.500	76.500	89.000	88.500
Assen	4.000	2.500	–	8.500	3.500	Assen	31.000	30.000	49.000	51.000	49.500
Oost-Nederland						**Oost-Nederland**					
Apeldoorn	19.500	43.000	9.500	5.000	12.000	Apeldoorn	117.000	105.000	116.000	158.500	172.500
Arnhem	20.000	12.000	21.000	12.500	24.000	Arnhem	169.000	187.500	190.500	210.000	209.500
Enschede	14.000	8.500	17.500	16.000	8.500	Enschede	62.000	80.500	66.000	71.500	82.500
Hengelo	9.500	–	11.500	1.500	1.000	Hengelo	35.000	32.000	31.000	33.500	51.000
Nijmegen	20.000	4.500	8.500	14.000	12.000	Nijmegen	51.000	45.500	54.000	54.500	64.000
Zwolle	32.000	9.000	14.000	12.000	14.000	Zwolle	122.000	115.000	134.000	147.000	147.000
Midden-Nederland						**Midden-Nederland**					
Amersfoort	15.000	26.500	14.500	18.000	18.000	Amersfoort	142.500	148.000	167.500	195.500	207.500
Utrecht	84.000	58.000	68.500	77.000	71.000	Utrecht	300.500	329.500	402.000	408.500	446.500
Almere	14.000	8.000	3.500	10.500	9.500	Almere	154.500	170.000	177.500	165.500	201.000
West-Nederland						**West-Nederland**					
Amsterdam	184.500	185.000	217.000	196.000	187.000	Amsterdam	1.094.000	1.065.000	1.100.500	1.137.000	1.180.000
Den Haag	83.000	44.500	64.500	115.000	96.000	Den Haag	446.000	462.000	521.500	591.500	560.000
Rotterdam	137.000	118.500	59.000	68.500	52.500	Rotterdam	498.000	576.000	640.500	724.500	727.500
Haarlemmermeer	39.500	42.500	37.500	40.000	27.000	Haarlemmermeer	324.000	279.500	315.500	321.000	325.500
Zuid-Nederland						**Zuid-Nederland**					
Breda	28.000	21.500	6.000	13.500	26.500	Breda	69.000	100.000	116.000	121.500	125.500
Tilburg	7.500	13.500	13.000	3.000	8.500	Den Bosch	80.500	98.000	115.000	133.500	139.500
Den Bosch	39.000	21.000	25.000	18.000	19.000	Tilburg	55.000	54.500	58.000	60.500	62.000
Eindhoven	30.500	47.500	22.000	57.000	27.000	Eindhoven	172.000	210.000	215.500	212.500	232.500
Heerlen	1.500	9.000	13.000	6.000	10.500	Heerlen	28.500	24.500	35.500	46.500	58.000
Maastricht	3.000	28.000	6.000	6.000	6.500	Maastricht	71.000	79.000	82.000	80.500	92.500

Figure 14 The comparison between the demand vs. supply side on the level of cities (derived from)

Most substantial office transactions in Eindhoven			
City	**Location**	**Tenant / buyer**	**Metrage**
Eindhoven	Kennedy Business District	HERE Europe	5.600
	Boschdijktunnel	National Police	3.350
	Strijp - S	Diversity of tentants	2.650
	Limburglaan	Altran/NSPYRE	2.550
	Flight Forum	SPIE Netherlands	2.250
Total			16.400

Table 2 The most substantial office transactions in Eindhoven (derived from(DTZ Zadelhoff, 2016a))

The rental prices of office spaces in Eindhoven					
		2014		**2015**	
Place	**Location**	From	Until	From	Until
Eindhoven	Centre / Station area / Stadionkwartier	100	165	100	160
	Ring	110	135	100	130
	Kennedy Business District	130	160	130	160
	Strijp-S	65	100	54	100
	Poort van Metz	100	135	100	130
	Flight Forum/Eindhoven Airport	100	135	95	125
	De Hurk/ Croy	80	130	80	125

Table 3 The rental prices of office spaces in Eindhoven (derived from(DTZ Zadelhoff, 2016a)

Future office requirements

Classification of the total office stock				
	2010	2040 19,5 m2 vvo p.p.	2040 23 m2 vvo p.p.	2040 16 m2 vvo p.p.
		Min m2 vvo		
Realization	41,7			
Expectation decreasing number of floor area per employee		33,0	38,9	27,1

Table 6 The expectation of the decrease of square meters per workspace in the Netherlands (derived from (CPB, 2012))

Classification office stock

Classification of the total office stock			
Type	Amount	Aspects	Examples
1. Promising	+/- 1 milion m2, 18% of the total office stock	(1)Presence of amenities (2)Limited competitiveness supply (3)Rents are structurally under pressure (4)Attractive architecture (5)Adequate parking spaces	Amsterdam Zuidas and Centre, Utrecht stationsgebied, Den Bosch Paleiskwartier, Groningen Centrumgebied
2. Opportunities	+/- 14 milion m2, 54% of the total office stock	(1)Good locations within neighboring municipalities or core cities (2)Competitiveness supply (3)Rents are structurally under pressure (4)Physical appearance provide opportunities for transformation	Utrecht Rijnsweerd, Amsterdam Bijlmer ArenA, Rotterdam Brainpark, Stadshart Zoetermeer, Utrechtseweg Zeist
3. No-opportunities	+/- 2 milion m2, 28% of the total office stock	(1) Structural vacant > 3 years (ore more) (2) Designed with rigid grid (3) Unilateral adaptability location (4)From construction period 1980-2000 (5)Large volumes (6) Rents are under pressure, rent reduction does not lead to increased user interest	

*Table 7 Categories total office stock (derived from (DTZ Zadelhoff, 2012))*
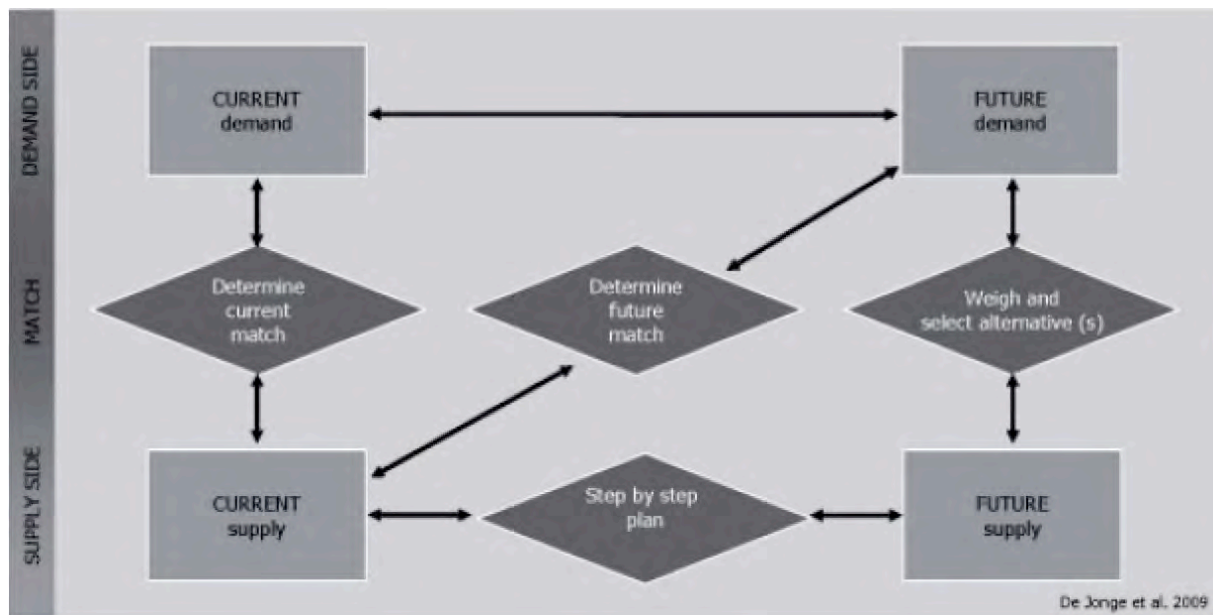
Figure 17 Designing the accomodation strategy (derived from (Remøy, 2010) *cited from*

Withdrawing strategies obsolete office stock	
Strategy	*Explanation*
1. Renovation	A part of the office stock that is obsolete does not meet the current building standards. If a building is renovated the building is suitable according the current standards and norms (for example; the building needs to be thermally insulated according to contemporary standards). This is the most feasible solution, due to the less complicated change in functionality and the minimal financial feasibility ((Korteweg, 2002b);(Remoy & van der Voordt, 2014)).
2. Transformation	It is estimated that only 4 – 10% of the total office stock is eligible for transformation (Van der Voordt et al., 2007). According to Remøy & Wilkinson (2012) the main drivers for transformation may be *"social, environmental and/or economic as well as functional obsolescence"*. (Remøy & Wilkinson, 2012, p. 229)
3. Demolition	In order to restore the current imbalance and to reduce the vacancy rate, the most suitable solution would be demolition. However, the current vacant building stock is representing a book value that is proportionate in relation to the rental income. In addition, with the demolishing of a building more costs are involved. The amount of offices that have been withdrawn from the market remains limited. From an initiative between public and private parties there is however an intention to intitiate a fund that is related to the involved demolishing costs among stakeholders (CPB, 2012); (Rijksoverheid, 2012).

Table 8 Withdrawal strategies of the office stock

	Office jobs	Stock	Supply	Demand	Stock in use	Absorption	Withdrawl	Vacancy	Vacancy (%)	Building permits	Size realized office	New built	Existing	Small and medium businesses	Companies
2006		42895000	6177000		36718000		214000	5361875	12,5	299	976000	852000	5325000	962000	6135000
2007		44329000	6048000		38281000		199000	4743203	10,7	329	1022000	681000	5367000	1005000	6304000
2008	2300862	45496000	5746000		39750000		147500	5459520	12,0	391	1143000	746000	5000000	1038000	6462000
2009	2268650	45725000	5932000		39793000		162000	5944250	13,0	246	1120000	785000	5147000	1039000	6430000
2010	2268650	46008000	7046000	1258000	39750000	480000	242000	6119064	13,3	192	969000	717000	5541000	1049000	6341000
2011	2268650	46801000	7512000	1115000	39648000	1226000	228000	6505339	13,9	181	736000	450000		1077000	6315000
2012	2265500	48195000	7561000	948000	42223000	1341000	400500	6795000	14,1	118	533000	543750		1095000	6292000
2013	2274400	49129000	7932000	1081000	41965000	1180000	383000	7164000	14,6	69	421000	375000		1123000	6161000
2014	2280800	49384000	8322000	967000	41630000	1052000	443000	7754000	15,7			315000		1152000	6063000
2015	2271000	49585000	8310000		41275000	1064000	720000	7941000	16,0	78	189000			1.766.431	
2016	2236850	49533000	8152000		-	1206000	-	7805000	15,8	4	6000				

Table 9 The total office stock in numbers
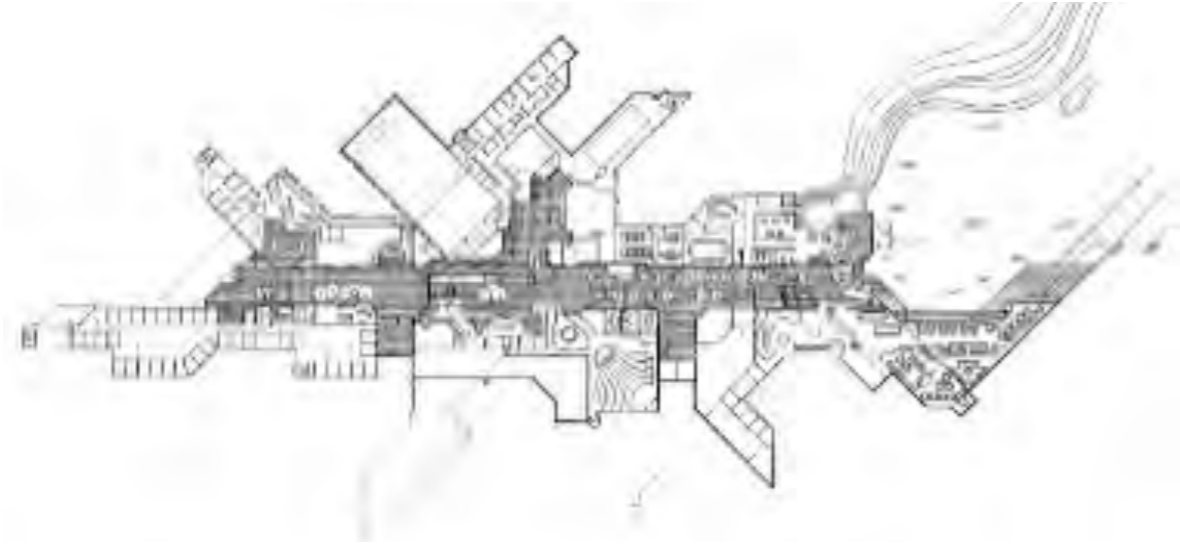
Figure 19 Niels Torp's Scandinavian Air Services (SAS) building in Stockholm (derived from (Ross, 2012))

Emerging office concepts

Office concepts							
Office concepts/ determinants	Sharing knownlegde	Community	Flexibility	Value	Short-term leases	Facilities/ services	Ownership
WeWork	X	X	X	X	X	X	X
Spaces	X		X		X	X	
Tribes	X		X		X		
HNK	X	X	X	X	X	X	X
SX	X	X	X		X	X	X

Table 10 The aspects of the office concepts

Co-working spaces Strijp-S

Types of co-working spaces Strijp-S	
Target group	Co-working space
Creative entrepreneurship	Seats2Meet, Strijp CS, Venturelab-S, Founded by all, Broeinest
A variety of entrepreneurs	S-clusive
Creative entrepreneurship and manufacturing industry	Broeinest
Meeting spaces and events	SX-building / Popei
Combination of above	Mircolab

Table 11 Types of co-working spaces Strijp-S

Facility	Co-working space								
	1	2	3	4	5	6	7	8	9
Free coffee corner	X		X	X			?		X
Cleaning possibilities	X		X	X		X	?		
Printing	X		X	X		X	?		
Location/community manager	X	X	X	X		X	?		
Furnished	X	X	X	X		?	?	X	
Pantry	X		X	X		X			
Glasvezel internet	X	X	X	X		?		X	
Lobby, lounge	X	X	X	X		X		X	
Spaces to work quiet	X		X	X					
Meeting rooms (flexible rrent)	X	X	X	X	X	X		X	
24/7 acces	X	/				/			
Kastruimte	X		X						
High end machines	X								
a. CNC-milling	X							X	
b. Laser cutter	X								
c. Wood workshop	X								
d. Metal workshop	X								
e. Ceramics workshop									
Servive point for mail	X			/		X			
Branding opportunities			X						

Table 12 The available facilities at Strijp-S

(1) Microlab / (2) Seats2Meet/ (3) S-clusive / (4) Strijp CS / (5) Popei / (6) Venturelab-S / (7) Founded by all / (8) SX / (9) Broeinest

Population; observation, forecast 2015 - 2016 and forecast 2014-2060
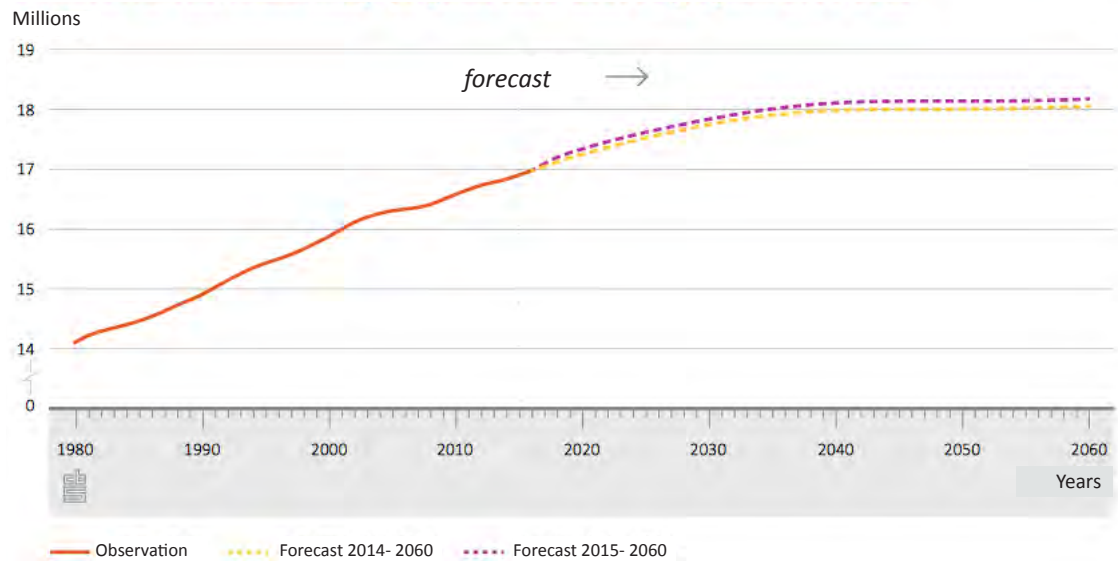
Figure 20 Estimation of the population in the Netherlands (derived from (CBS, 2015))

Appendix B

Location dimensions
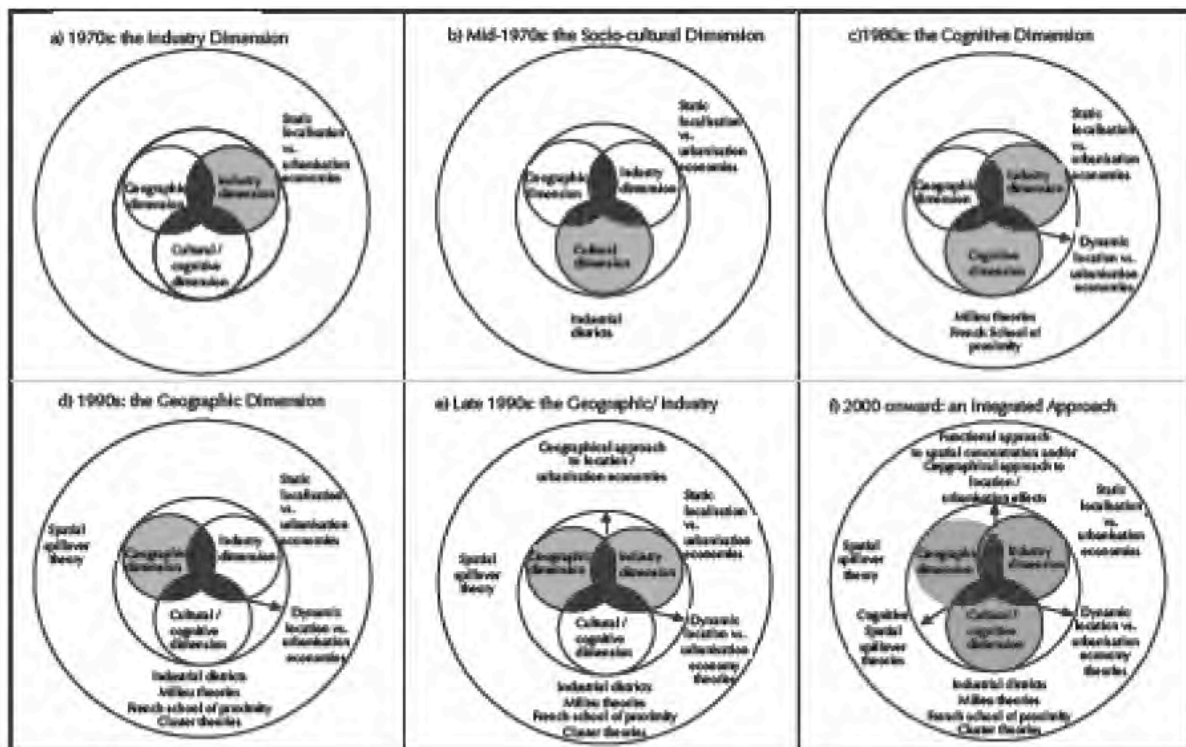
Figure 21 Capello's approaches to agglomeration economies (derived from (Capello, 2009))

Relationship location evaluation and location decision behavior process

Location factors	
Component	Variable
Location	Proximity services, customers
	Proximity to transport facilities
	Accessibility by car
	Parking
	Accessibility public transport
	Representativeness neighbourhood / place identification
	Nature of the neighbourhood
Building	
	Aesthetic quality
	Expansion possibilities
	Recognizability
	Representativeness
	Multifunctional or personal use
	Required office space
	Gross/net proportion
	Presence particular spaces
	Office layout concept
	Flexible office usage
	Sequence departments
	Facilities for automation
	Climate control
	Security
	Lightning

	Sound barrier
	(flexibility)Rent
	Purchase price
	Financing costs
	Service and energy costs
	Durability rental contract
	Specific conditions in the rental contract

Table 14 The location factors (derived from (Louw, 1996) cited from (OTB, 1995))

Ownership

Ownership			
Choice criteria	Buy	Rent	Operational lease
Flexibility	-	+	+
Alignment accommodation expenses	+	-	+
Realization demand preferences	+	-	+
Economic risk	_	+	+
Fiscal stimulus	+	-	0

Table 15 The choice criteria for ownership (derived from (Louw, 1996) cited from (Kohnstamm & Regterschot, 1994))

Networks highly educated and creative workers
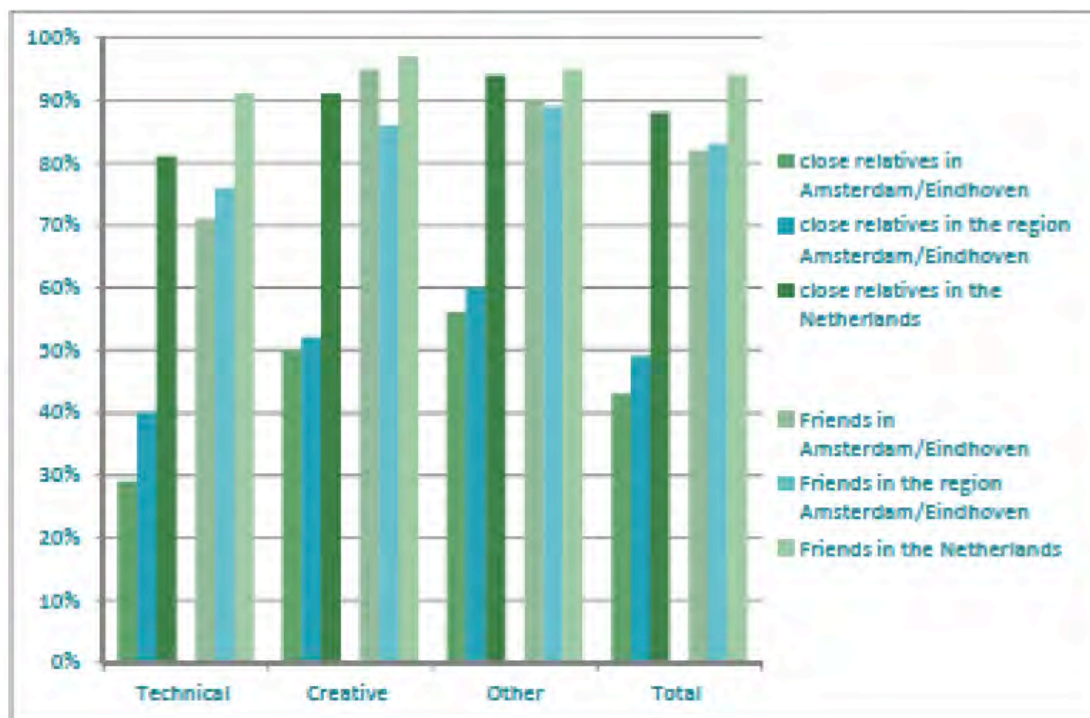
Figure 22 The importance of networks (derived from (Boterman & Sleutjes, 2014a))
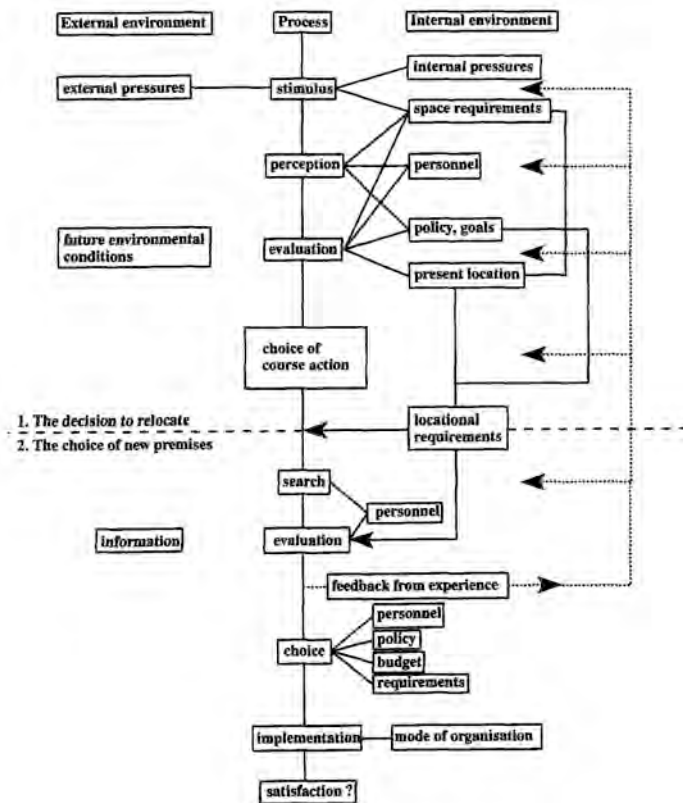
Figure 23 The location decision model (derived from (Louw, 1996) cited from (Edwards, 1983))
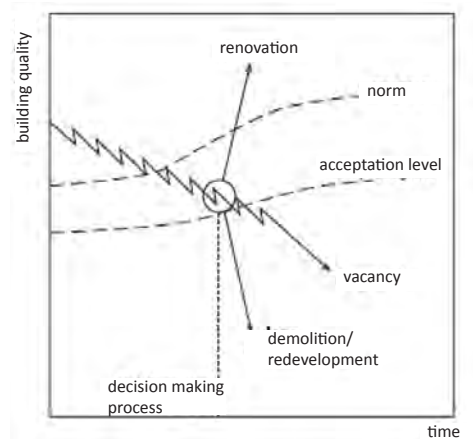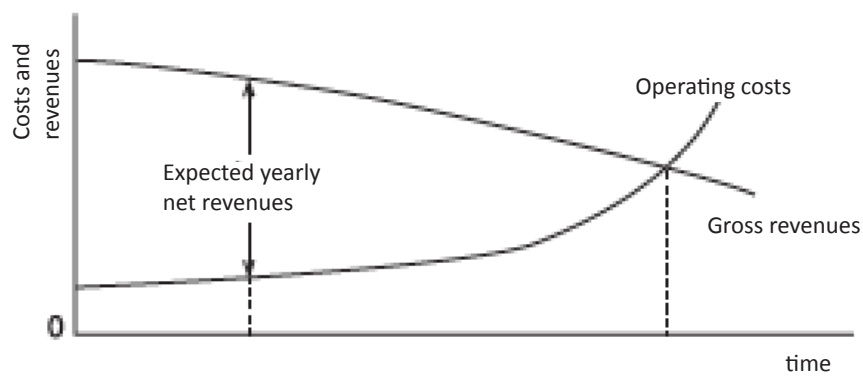
Figure 29 Revenues and operating costs of a real estate object in time (derived from (Korteweg, 2002a)

Appendix C

Buildings Strijp-S in which companies are clustered

Figure 34 The clustered buildings located at Strijp-S

Location factors

Major facility location factors	
Access to markets/distribution centres	Costs of serving markets / Trends in sales by areas / Ability to penetrate local market by plant presence
Access to suppliers/resources	Transportation costs / Trends in supplier by area
Community/government access	Ambience/Costs of living /co-operation with established local industry/ community pride/ housing/churches/ schools and colleges
Competitive considerations	Location of competitors / Likely reaction to new site
Environmental factors	Community attitude / state/ local governmental regulations
Labour	Prevailing wage rates / Extent and militancy of unions in the area / Productivity / Availability / Skill levels available
Taxes and financing	State income tax /local property and income taxes / Unemployment and compensation premiums / Tax incentive concessions / Industrial pollution control revenue bonds
Transportation	Trucking service / Rail service / Air freight service
Utility services	Quality and price of water and sewerage / Availability and price of electric and natural gas / Quality of police, fire and medical services

Table 19 The location factors (derived from (Yang & Lee, 1997))

Qualitative factors

A general ranking of location factors	
Pivotal	Worker productivity/ Receptivity to business and industry/ Market access / Skills/technical/professional workers
Vital	Living amenities / Market growth potential/Preference of company executive/Industrial building available/Water supply/ Unskilled/ semi-skilled workers
Important	Proximity to services / energy supplies/ attitude towards business and industry taxes / energy costs / ram materials/supplies accessibility/ waste water facilities
Secondary	Costs of property and construction / Personal income tax structure / Attitudes on environmental control/ Financial health of region/ Financial incentives / Proximity to other company facilities

Table 20 The qualitative factors (derived from (Yang & Lee, 1997))

Categories vs. criterion

Categories vs. criterion for location selection	
Category	**Criterion**
Transportation demand side	Access by all transportations / Proximity to railways / Proximity to major highways/ Proximity to piers
Total cost of investment	Cost of land and buildings / Construction costs / Site preparation costs/ Other recurring and non-recurring costs
Environmental consideration	Noise pollution around the site / Air pollution around the site/Proximity to support services
Potential continuous development	Continuous support of local residents/ Ability to expand or modify facilities / Competitors already exist nearby/ Potential competitors within the area in the future
Transportation supplier side	Access by all transportations / Proximity to railways / Proximity to major highways/ Proximity to piers
Investor's capability	Business experience in industry investment/Financial resource/Management competence
Benefits investment	Return on investment/Competitive advantage

Table 21 The location factors (derived from (Cheng et al., 2005))

Relocation factors

Relocation factors	
Factors	**Explanation**
Differences in costs	They are an essential factor in selecting a location. A location is analysed according to how efficient performs a particular function in coordination with functions located elsewhere.
Search for valuable assets	Workforce qualification or the availability of talented people
Clustering	The closeness and access to knowledge remains an important factor for competitiveness (such as the concentration of R&D activities).
The growth potential of markets	For example emerging countries with large populations.
Other factors	Existence of a relatively developed infrastructure which creates an increased efficiency from start / Quality and cost of public utilities/ Availability of building land/ Institutional incentives offered by central and local authorities/ Laws in the field of financial and economic activities and labour / Aspects related to the quality of life.

Table 22 The relocation factors (derived from(Mărgulescu & Mărgulescu, 2013))

Criteria for low transformation potential

Criteria for low transformation potential	
Aspect	**Criterion**
Location	
Urban situation	Office on remote industrial zone Office in the middle of an office park Office in area defined as priotiry area for offices
Land property	Land rent
Vacancy	Vacant more than a year Vacancy of surrounding buildings
Character of urban situation	Location on or near city edge, ring roads Desolated area No greenery in the neighbourhood Pollution; smell, noise, view
Distance and quality of services	Shop for daily errands > 1 km Meeting place (café, snack bar and etc.) > 5 km Sport facilities (fitness, swimming pool and etc) > 2 km Educational facilities (nursery, school and etc) > 2 km
Accessibility by public transport	Distance to station > 2 km Distance to bus, metro, tram stop > 1 km
Accessibility by car, parking	Many obstacles, limitations, poor flow Distance to parking place > 250 m

	<1 parking place/100m2 dwelling realisable
Building	
Year of construction	*Building was built or renovated recently (three years)*
Character of the building	*Unrecognizable, non-eloquent* *Poor maintenance*
Extensibility	*Not extensible horizontally* *Not extensible vertically*
Structure	*Structure in technically bad condition* *Dense structural grid < 3,6 m*
Dimensions	*Net storey height < 2,6 m*
Facade	*Façade openings not adaptable* *Impossible to create windows which can be opened manually* *Daylight entry<10 percent of the living area*
Entrance	*Impossible to create a socially secure entrance* *Impossible to realise elevator in the building (of more than four floors)* *Distance from dwelling to stairs/elevator > 50 m* *Impossible to realise escape stairs according to escape demands*
Installations	*No or insufficient conditions realisable*
Environment	*Noise level at the façade >50 m* *Sufficient isolation between dwelliings impossible* *Sufficient isolation of façade impossible* *Presence of dangerous materials in construction* *No or litte sunlight*

Table 23 The relocation factors (derived from (Van der Voordt et al., 2007))

Clustering businesses

Figure 35 The mirco patterns of the establishment of the small and medium businesses per sector

The differentation of small and medium businesses
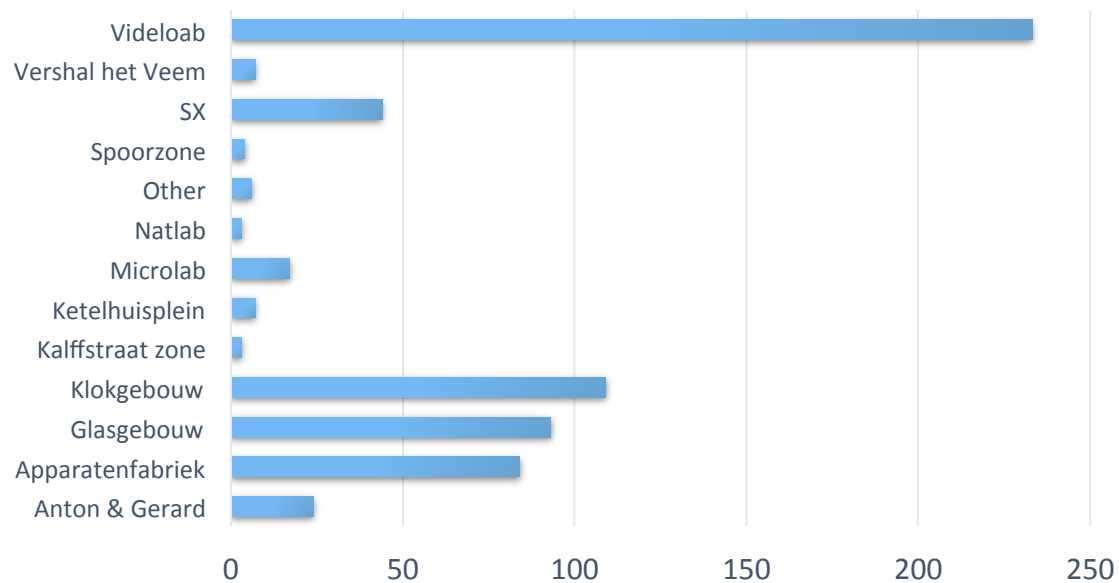
Figure 36 The differentiation of companies

The different sectors of companies located at Strijp-S
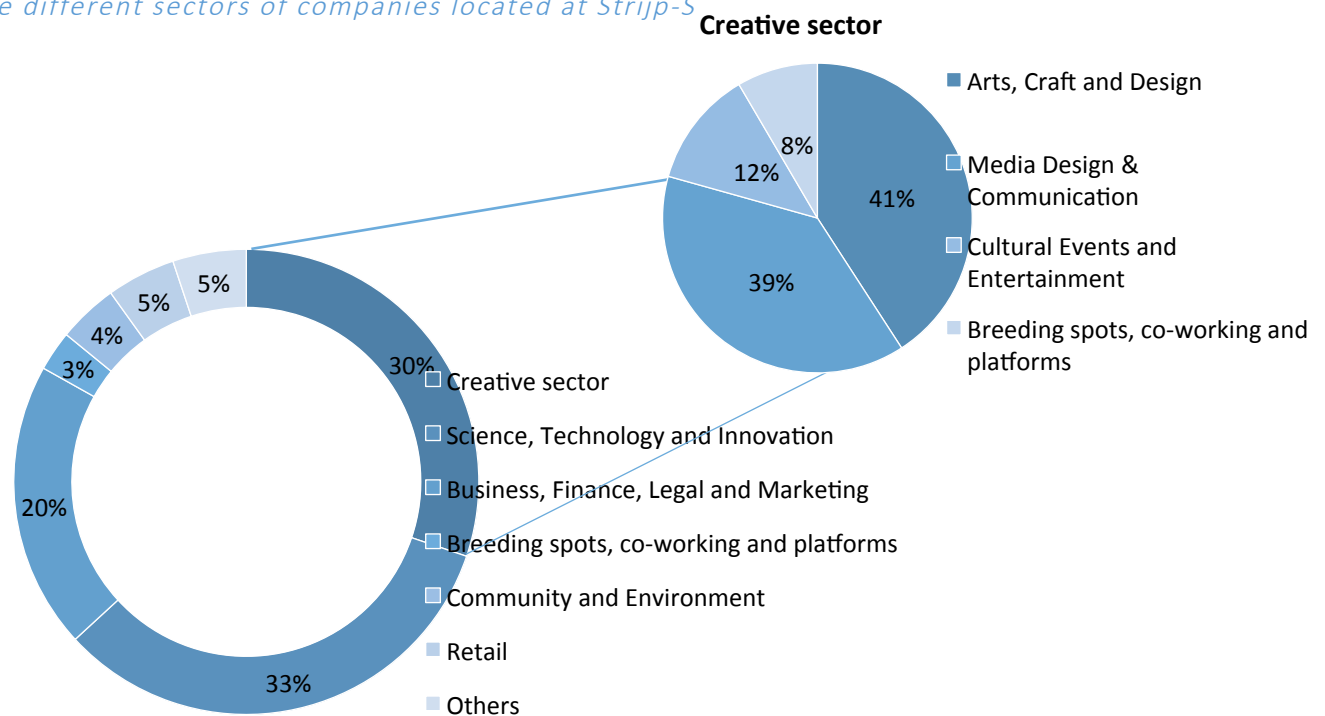
Figure 37 The differentiation of sectors located at Strijp-S and specifically the creative industries

Appendix D

Designing the questionnaire

```
/* Suggesting design size*/
/* ex) two-level = 4, three-level = 3, six-level = 2 */
%mktruns(3 ** 8)

/* Generating Efficient Design */
/* As the result of mktruns: n=36 */
%mktex(3 ** 8, n=27, seed=1984)

/* Output (Print) */
proc print; run;

/* Evaluation of design */
%mkteval(data=randomized)

/* Generating Efficient Design - blocking */
%mktblock(data=randomized, nblocks=3, seed=1984)

/* Output (Print) */
proc print; run;
```

Figure 41 The variables in SAS software

	Tb	Fa	Ac	Pr	Ne	En	Os	Fl
Tb	1	0	0	0	0	0	0	0
Fa	0	1	0	0	0	0	0	0
Ac	0	0	1	0	0	0	0	0
Pr	0	0	0	1	0	0	0	0
Ne	0	0	0	0	1	0	0	0
En	0	0	0	0	0	1	0	0
Os	0	0	0	0	0	0	1	0
Fl	0	0	0	0	0	0	0	1

Table 25 The canonical correlations between the attributes (there are 0 canonical correlations greater than 0.316)

Treatment combinations	Design matrix							
	Tb	Fa	Ac	Pr	Ne	En	Os	Fl
1	0	0	0	0	0	0	0	0
2	0	0	0	1	1	1	2	2
3	0	0	0	2	2	2	3	3
4	0	1	3	0	1	2	0	1
5	0	1	2	1	2	0	2	0
6	0	1	2	2	0	1	1	2
7	0	2	1	0	2	1	0	2
8	0	2	1	1	0	2	2	1
9	0	2	1	2	1	0	1	0

10	1	0	2	0	2	1	2	1
11	1	0	2	1	0	2	1	0
12	1	0	2	2	1	0	0	2
13	1	1	1	0	0	0	2	2
14	1	1	1	1	1	1	1	1
15	1	1	1	2	2	2	0	0
16	1	2	0	0	1	2	2	0
17	1	2	0	1	2	0	1	2
18	1	2	0	2	0	1	0	1
19	2	0	1	0	1	2	1	2
20	2	0	1	1	2	0	0	1
21	2	0	1	2	0	1	2	0
22	2	1	0	0	2	1	1	0
23	2	1	0	1	0	2	0	2
24	2	1	0	2	1	0	2	1
25	2	2	2	0	0	0	1	1
26	2	2	2	1	1	1	0	0
27	2	2	2	2	2	2	2	2

Table 27 Design matrix transformed in Excel for DCM experiment

Block 1	1_Tb	1_Fa	1_Ac	1_Pr	1_Ne	1_En	1_Os	1_Fl
Treatment combinations								
1	0	2	2	2	2	0	2	0
2	2	0	2	2	0	1	1	0
3	1	0	0	0	1	1	1	2
4	1	1	2	2	1	2	0	0
5	1	2	1	1	1	0	2	1
6	0	1	0	0	2	2	0	2
7	0	0	1	1	2	1	1	1
8	2	2	0	0	0	0	2	2
9	2	1	1	1	0	2	0	1

Table 29a Generated choice sets for block 1

Block 2	2_Tb	2_Fa	2_Ac	2_Pr	2_Ne	2_En	2_Os	2_Fl
Treatment combinations								
1	2	1	1	0	1	1	2	0
2	0	2	2	0	1	1	0	1
3	1	0	0	1	0	2	2	0
4	0	0	1	0	0	0	0	0
5	2	2	0	2	1	2	1	1
6	0	2	2	1	0	2	1	2
7	1	0	0	2	2	0	0	1
8	2	1	1	2	2	0	1	2
9	1	1	2	1	2	1	2	2

Table 29b Generated choice sets for block 2

Treatment combinations	3_Tb	3_Fa	3_Ac	3_Pr	3_Ne	3_En	3_Os	3_Fl
1	2	0	2	0	2	2	2	1
2	1	2	1	0	2	2	1	0
3	0	1	0	2	0	1	2	1
4	0	1	0	1	1	0	1	0
5	1	2	1	2	0	1	0	2
6	2	0	2	1	1	0	0	2
7	0	1	1	2	1	2	2	2
8	1	2	2	0	0	0	1	1
9	2	0	0	1	2	1	0	0

Table 29c Generated choice sets for block 3

```
        |      tb       fa       ac       pr       ne       en       os
--------+---------------------------------------------------------------
     tb |   1.0000
     fa |  -0.1667   1.0000
     ac |   0.0000   0.1667   1.0000
     pr |   0.0000   0.0000   0.0000   1.0000
     ne |   0.0000  -0.1667   0.0000   0.0000   1.0000
     en |   0.0000   0.0000   0.0000   0.0000   0.0000   1.0000
     os |   0.0000   0.1667   0.0000   0.0000   0.0000   0.0000   1.0000
     fl |   0.0000   0.1667   0.0000   0.0000   0.0000   0.0000   0.0000
```

Table X The correlation matrix

The detailed version of the choice sets

Generated choice sets	Attribute levels for Alternative 1								Attribute levels for Alternative 2								Attribute levels for Alternative 3							
Choice set	1_Tb	1_Fa	1_Ac	1_Pr	1_Ne	1_En	1_Os	1_Fl	2_Tb	2_Fa	2_Ac	2_Pr	2_Ne	2_En	2_Os	2_Fl	3_Tb	3_Fa	3_Ac	3_Pr	3_Ne	3_En	3_Os	3_Fl
1	0	2	2	2	2	0	2	0	2	1	1	0	1	1	2	0	2	0	2	0	2	2	2	1
2	2	0	2	2	0	1	1	0	0	2	2	0	1	1	0	1	1	2	1	0	2	2	1	0
3	1	0	0	0	1	1	1	2	1	0	0	1	0	2	2	0	0	1	0	2	0	1	2	1
4	1	1	2	2	1	2	0	0	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0
5	1	2	1	1	1	0	2	1	2	2	0	2	1	2	1	1	1	2	1	2	0	1	0	2
6	0	1	0	0	2	2	0	2	0	2	2	1	0	2	1	2	2	0	2	1	1	0	0	2
7	0	0	1	1	2	1	1	1	1	0	0	2	2	0	0	1	0	1	1	2	1	2	2	2
8	2	2	0	0	0	0	2	2	2	1	1	2	2	0	1	2	1	2	2	0	0	0	1	1
9	2	1	1	1	0	2	0	1	1	1	2	1	2	1	2	2	2	0	0	1	2	1	0	0

Table 26 The detailed version of the choice sets

Location factors small and medium businesses new

Page: Introductie

Introductie

Geachte heer/mevrouw,

Mijn naam is Tim Maier en ik studeer aan de Technische Universiteit Eindhoven. Dit onderzoek is deel van mijn afstudeerscriptie over de het identificeren van vestigingsfactoren van het klein- en middenbedrijf. Het doel van het onderzoek is het in kaart brengen van gebruikers voorkeuren in relatie tot hun huisvestingsaspecten.

Graag nodig ik u uit om deel te nemen aan het onderzoek. Het onderzoek is opgebouwd uit twee delen en zal slechts 10 minuten van uw tijd in beslag nemen.
Het eerste deel betreft enkele algemene vragen omtrent uw bedrijf (branche/ grootte bedrijf / opleidingsniveau /reden voor huisvesten op Strijp-S).
Het tweede gedeelte bestaat uit 9 vergelijkingen van verschillende alternatieven. Hierbij wil ik u vriendelijk vragen om het desbetreffende alternatief te selecteren dat het meest aansluit op uw wensen.

Het resultaat van deze enquete moet de ontwikkelaars van Strijp-S helpen een nieuwbouw strategie te vormen voor de ontwikkeling van een kantoorgebouw voor het MKB wat zich op Strijp-S heeft gehuisvest.

Mocht u vragen of opmerkingen hebben dan kunt u altijd contact met mij opnemen via: t.f.c.maier@student.tue.nl.

Door uw deelname helpt u mij om het in beeld van de vestigingsfactoren die een belangrijk deel uit maken van het bedrijfsklimaat dat Strijp-S tot een bijzondere en unieke locatie maakt.

Daarvoor wil ik u alvast hartelijk danken!

Uw gegevens zillen niet gepubliceerd worden of voor commerciele doeleinden gebruikt worden. De gegevens worden vertrouwelijk en anoniem worden verwerkt en enkel voor dit afstudeeronderzoek worden gebruikt.

Volgende

Location factors small and medium businesses new

Kies de kenmerken die bij u van toepassing zijn.

Wat is uw geslacht?

☑ Man

○ Vrouw

Wat is uw leeftijd?

○ Jonger dan 20 jaar

○ 20 - 24 jaar

○ 25 - 29 jaar

○ 30 - 34 jaar

○ Ouder dan 34 jaar

Wat is het hoogste opleidingsniveau dat u hebt voltooid?

○ Lager beroepsonderwijs

○ Voortgezet onderwijs

○ Middelbaar beroepsonderwijs - MBO

○ Hoger beroepsonderwijs - HBO

○ Wetenschappelijk onderwijs - WO

○ Wetenschappelijke promotie - PhD

Heeft u een onderneming op Strijp-S?

◉ Ja

○ Nee

Hoeveel medewerkers heeft u bedrijf/ organisatie in dienst?

○ ZZP'er

○ Minder dan 5 werknemers

○ Tussen de 5 – 10 werknemers

○ Tussen de 11 – 50 werknemers

○ Meer dan 50 werknemers

Ben je een student?

○ Ja

◉ Nee

| Vorige | Volgende |

Location factors small and medium businesses new

Kies de kenmerken die bij u van toepassing zijn.

Welke redenen waren het belangrijkst voor het vestigen van uw bedrijf/onderneming op Strijp-S?

- ☑ Het imago van de omgeving (industrieel karakter/historie)
- ☐ De bereikbaarheid/ligging van Strijp-S
- ☐ De aanwezigheid van voorzieningen
- ☐ De aanwezigheid van het ondernemersklimaat (clustering van bedrijven)
- ☐ De (marktconforme) huurprijs
- ☐ De verhouding contractvorm vs. contractduur
- ☐ De mogelijkheid tot netwerkvorming

Anders, namelijk:

Welke locatiekenmerken zijn het belangrijkste voor uw keuze om zich te vestigen op Strijp S?

- ☐ Dynamische omgeving
- ☐ Bereikbaarheid van het openbaar vervoer (Nabijheid Station Strijp S/ Busverbinding)
- ☐ Bereikbaarheid van het snelwegennet
- ☐ Parkeergelegenheden
- ☐ Imago van de omgeving
- ☐ Nabijheid van voorzieningen
- ☐ Nabijheid van de binnenstad of stedelijk centrum
- ☐ Corporate identity

Op welke manier heeft uw bedrijf/onderming zich ontwikkeld door het huisvesten op Strijp-S?

- ☐ Groei van de omzet
- ☐ Toename van het aantal werknemers
- ☐ Toename in de ruimte behoefte
- ☐ Vergroting van de opdrachten portefeuille
- ☐ Vergroting van het kantooroppervlak

Anders, namelijk:

In welke mate heeft de aanwezigheid van het bestaande ondernemers klimaat een bijdrage gehad aan het ontwikkelen van uw organisatie/ vergroten van uw netwerk?

- ☐ Het delen/vergroten van de expertise/kennis
- ☐ Het vergroten van de opdrachten portefeuille
- ☐ Het vergroten/versterken van de businessmogelijkheden
- ☐ Het verkleinen van de risico's (het kunnen terugvallen op de kracht van de community)
- ☐ Het spreiden van de risico's

Anders, namelijk:

[Vorige] [Volgende]

Location factors small and medium businesses new

Scenario

Het volgende gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt er van u verwacht dat u het alternatief selecteert dat het meest aanlsuit bij uw wensen.

Binnen de alternatieven die aanbod komen zijn er een aantal *constante aspecten* waarmee in uw achterhoofd rekening moet houden voor het maken van uw keuze. Het betreft de volgende aspecten:

1) Uw organisatie/bedrijf maakt deel uit van het klein- en middenbedrijf (ZZP-er);

2) U bevindt zich in de huurdersmarkt. Alle alternatieven bevatten gehuurde getransformeerde kantoorruimten;

3) U bent met uw bedrijf/onderneming op Strijp-S gevestigd ;

4) De kantoren zijn getransformeerd naar het kwaliteitsniveau 2. Dit bestaat uit energie label C/D.

| Vorige | Volgende |

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u een _voorbeeldvraag_.

Welk huisvesting alternatief heeft uw voorkeur?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	_Het huidige getransformeerde kantoorgebouw_	_Een kantoorgebouw met een voormalige industriele functie_	_Een nieuwbouw kantoorgebouw_	
Faciliteiten/services	_Geen faciliteiten/services_	_Gedeelde faciliteiten/services_	_Geen faciliteiten/services_	
Bereikbaarheid	_Afstand <= 500 m_	_500 <= Afstand <= 1,5 km_	_500 <= Afstand <= 1,5 km_	
Prijs (euro/m2)	_100 <= Huurprijs <= 155 €/m2_	_155 <= Huurprijs <= 200 €/m2_	_100 <= Huurprijs <= 155 €/m2_	
Netwerk	_Geen netwerk/clustering van bedrijven/organisaties_	_Het bestaande netwerk/clustering van bedrijven/organisaties_	_Een nieuw netwerk/clustering van bedrijven/organisaties_	
Omgeving	_Geen ondersteunende functies/voorzieningen_	_De bestaande ondersteunende functies/voorzieningen_	_Meer ondersteunende functies/voorzieningen_	
Kantooroppervlak	_50 <= Kantooroppervlak <= 100 m2_	_101 <= Kantooroppervlak <= 150 m2_	_Kantooroppervlak ≥ 151 m2_	
Flexibiliteit	_Geen flexibiliteit/vergroting kantooroppervlak_	_De huidige flexibiliteit / kantooroppervlak behouden_	_De huidige flexibiliteit / kantooroppervlak behouden_	
UW KEUZE:	O	X	O	O

Uitleg van de mogelijkheden:

Het _Gebouwtype_: heeft betrekking op de voormalige gebruiksfunctie van het gebouw.
* Het huidige getransformeerde kantoorgebouw
* Een kantoorgebouw met een voormalige industriele functie
* Een nieuwbouw kantoorgebouw

De _Faciliteiten_: dit heeft betrekking op faciliteiten/services die aangeboden worden in het gebouw waar u bent gevestigd.
* Geen faciliteiten/services
* Gedeelde faciliteiten/services (koffieruimte / lunchruimte/ postkantoor)
* Een totaal faciliteiten/services pakket (vergaderruimtes / sportcapaciteiten etc.)

De _Bereikbaarheid_: dit heeft betrekking op de bereikbaarheid van het bedrijf/organisatie. De bereikbaarheid met betrekking tot de afstand van het gebouw tot het centrum of een gelijkwaardige omgeving.
* Afstand <= 500
* 500 <= Afstand <= 1,5 km
* Afstand ≥ 1,5 km

De _Prijs (€/m²)_: dit heeft betrekking op de verdeling van (markconforme) huurprijzen, _inclusief servicekosten en inrichtingskosten_. In de prijs zijn de kale huur, service kosten en dienstverleningskosten opgenomen.
* 100 <= Huurprijs <= 155 €/m2
* 155 <= Huurprijs <= 200 €/m2
* Huurprijs ≥ 201 €/m2

Het _Netwerk_: dit heeft betrekking op de aanwezigheid van een netwerk/clustering van bedrijven/organisaties.
* Geen netwerk/clustering van bedrijven/organisaties
* Het bestaande netwerk/clustering van bedrijven/organisaties
* Een nieuw netwerk/clustering van bedrijven/organisaties

De _Omgeving_: dit heeft betrekking op de aanwezigheid van ondersteunende functies/voorzieningen in de directe nabijheid van uw bedrijf/organisatie.
* Geen ondersteunende functies/voorzieningen
* De bestaande ondersteunende functies/voorzieningen
* Meer ondersteunende functies/voorzieningen

Het _Kantooroppervlak_: dit heeft betrekking op de grootte van het (huidige/toekomstig) kantooroppervlak.
* 50 <= Kantooroppervlak <= 100 m2
* 101 <= Kantooroppervlak <= 150 m2
* Kantooroppervlak ≥ 151 m2

De _Flexibiliteit_: dit heeft betrekking op de mogelijkheid op uw behoefte om het vergroten/flexibel indelen van uw kantoor.
* Geen
* Huidig
* Vergroting

Er volgen nu 9 keuze mogelijkheden.

Vorige   Volgende

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de _keuzemogelijkheden_.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Nieuwbouw kantoor	Huidig	Voormalig industrieel	
Faciliteiten/Services	Geen	Totaal pakket	Totaal pakket	
Bereikbaarheid	Afstand > 1.5 km	Afstand > 1.5 km	500 < Afstand < 1.5 km	
Prijs (€/m²)	Huurprijs > 201 €/m2	100 < Huurprijs < 155 €/m2	100 < Huurprijs < 155 €/m2	
Netwerk	Geen	Huidig	Nieuw	
Omgeving	Bestaand	Bestaand	Meer	
Kantooroppervlak	101 < kantooroppervlak < 150 m2	50 < kantooroppervlak < 100 m2	101 < kantooroppervlak < 150 m2	
Flexibiliteit	Geen	Huidig	Geen	
UW KEUZE:	○	◉	○	○

Vorige Volgende

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de *keuzemogelijkheden*.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Huidig	Huidig	Nieuwbouw kantoor	
Faciliteiten/Services	Gedeeld	Totaal pakket	Geen	
Bereikbaarheid	Afstand < 500 m	Afstand > 1.5 km	Afstand > 1.5 km	
Prijs (€/m²)	100 < Huurprijs < 155 €/m2	155 < Huurprijs < 200 €/m2	155 < Huurprijs < 200 €/m2	
Netwerk	Nieuw	Geen	Huidig	
Omgeving	Meer	Meer	Geen	
Kantooroppervlak	50 < kantooroppervlak < 100 m2	101 < kantooroppervlak < 150 m2	50 < kantooroppervlak < 100 m2	
Flexibiliteit	Vergroting	Vergroting	Vergroting	
UW KEUZE:	○	◉	○	○

Vorige   Volgende

Vestigingsfactoren
klein- en middenbedrijf

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de *keuzemogelijkheden*.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Voormalig industrieel	Voormalig industrieel	Huidig	
Faciliteiten/Services	Geen	Geen	Gedeeld	
Bereikbaarheid	Afstand < 500 m	Afstand < 500 m	Afstand < 500 m	
Prijs (€/m²)	100 < Huurprijs < 155 €/m2	155 < Huurprijs < 200 €/m2	Huurprijs > 201 €/m2	
Netwerk	Huidig	Geen	Geen	
Omgeving	Bestaand	Meer	Bestaand	
Kantooroppervlak	101 < kantooroppervlak < 150 m2	Kantooroppervlak > 150 m2	Kantooroppervlak > 150 m2	
Flexibiliteit	Vergroting	Geen	Huidig	
UW KEUZE:	○	◉	○	○

Vorige   Volgende

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de _keuzemogelijkheden_.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Nieuwbouw kantoor	Voormalig industrieel	Nieuwbouw kantoor	
Faciliteiten/Services	Gedeeld	Gedeeld	Geen	
Bereikbaarheid	500 < Afstand < 1.5 km	Afstand > 1.5 km	Afstand < 500 m	
Prijs (€/m²)	155 < Huurprijs < 200 €/m2	155 < Huurprijs < 200 €/m2	155 < Huurprijs < 200 €/m2	
Netwerk	Geen	Nieuw	Nieuw	
Omgeving	Meer	Bestaand	Bestaand	
Kantooroppervlak	50 < kantooroppervlak < 100 m2	Kantooroppervlak > 150 m2	50 < kantooroppervlak < 100 m2	
Flexibiliteit	Huidig	Vergroting	Geen	
UW KEUZE:	◉	○	○	○

Vorige   Volgende

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de _keuzemogelijkheden_.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Voormalig industrieel	Nieuwbouw kantoor	Voormalig industrieel	
Faciliteiten/Services	Totaal pakket	Totaal pakket	Totaal pakket	
Bereikbaarheid	500 < Afstand < 1.5 km	Afstand < 500 m	500 < Afstand < 1.5 km	
Prijs (€/m²)	155 < Huurprijs < 200 €/m2	Huurprijs > 201 €/m2	Huurprijs > 201 €/m2	
Netwerk	Huidig	Huidig	Geen	
Omgeving	Geen	Meer	Bestaand	
Kantooroppervlak	Kantooroppervlak > 150 m2	101 < kantooroppervlak < 150 m2	50 < kantooroppervlak < 100 m2	
Flexibiliteit	Huidig	Huidig	Vergroting	
UW KEUZE:	○	☉	○	○

[Vorige] [**Volgende**]

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de *keuzemogelijkheden*.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Voormalig industrieel	Huidig	Huidig	
Faciliteiten/Services	Gedeeld	Geen	Gedeeld	
Bereikbaarheid	Afstand > 1.5 km	500 < Afstand < 1.5 km	Afstand < 500 m	
Prijs (€/m²)	Huurprijs > 201 €/m2	100 < Huurprijs < 155 €/m2	155 < Huurprijs < 200 €/m2	
Netwerk	Huidig	Geen	Huidig	
Omgeving	Meer	Geen	Geen	
Kantooroppervlak	50 < kantooroppervlak < 100 m2	50 < kantooroppervlak < 100 m2	101 < kantooroppervlak < 150 m2	
Flexibiliteit	Geen	Geen	Geen	
UW KEUZE:	○	⊙	○	○

Vorige   Volgende

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de *keuzemogelijkheden*.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Huidig	Nieuwbouw kantoor	Nieuwbouw kantoor	
Faciliteiten/Services	Totaal pakket	Gedeeld	Geen	
Bereikbaarheid	Afstand > 1.5 km	500 < Afstand < 1.5 km	Afstand > 1.5 km	
Prijs (€/m²)	Huurprijs > 201 €/m2	100 < Huurprijs < 155 €/m2	100 < Huurprijs < 155 €/m2	
Netwerk	Nieuw	Huidig	Nieuw	
Omgeving	Geen	Bestaand	Meer	
Kantooroppervlak	Kantooroppervlak > 150 m2	Kantooroppervlak > 150 m2	Kantooroppervlak > 150 m2	
Flexibiliteit	Geen	Geen	Huidig	
UW KEUZE:	○	○	◙	○

Vorige   Volgende

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de *keuzemogelijkheden*.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Huidig	Voormalig industrieel	Huidig	
Faciliteiten/Services	Geen	Geen	Gedeeld	
Bereikbaarheid	500 < Afstand < 1.5 km	Afstand < 500 m	500 < Afstand < 1.5 km	
Prijs (€/m²)	155 < Huurprijs < 200 €/m2	Huurprijs > 201 €/m2	Huurprijs > 201 €/m2	
Netwerk	Nieuw	Nieuw	Huidig	
Omgeving	Bestaand	Geen	Meer	
Kantooroppervlak	101 < kantooroppervlak < 150 m2	50 < kantooroppervlak < 100 m2	Kantooroppervlak > 150 m2	
Flexibiliteit	Huidig	Huidig	Vergroting	
UW KEUZE:	○	○	◉	○

Vorige   Volgende

Location factors small and medium businesses new

Selectie van alternatieven

Dit gedeelte bestaat uit 9 vergelijkingen van verschillende huisvesting alternatieven. Hierbij wordt verwacht dat u het alternatief selecteert dat het meest voldoet aan uw wensen. Als u geen voorkeur heeft kiest u voor de optie "Geen voorkeur".

Hieronder ziet u de *keuzemogelijkheden*.

Welk huisvesting alternatief voldoet het meest aan uw wensen?

Kenmerken	Alternatief 1	Alternatief 2	Alternatief 3	Geen voorkeur
Gebouwtype	Nieuwbouw kantoor	Nieuwbouw kantoor	Voormalig industrieel	
Faciliteiten/Services	Totaal pakket	Gedeeld	Totaal pakket	
Bereikbaarheid	Afstand < 500 m	500 < Afstand < 1.5 km	Afstand > 1.5 km	
Prijs (€/m²)	100 < Huurprijs < 155 €/m2	Huurprijs > 201 €/m2	100 < Huurprijs < 155 €/m2	
Netwerk	Geen	Nieuw	Geen	
Omgeving	Geen	Geen	Geen	
Kantooroppervlak	Kantooroppervlak > 150 m2	101 < kantooroppervlak < 150 m2	101 < kantooroppervlak < 150 m2	
Flexibiliteit	Vergroting	Vergroting	Huidig	
UW KEUZE:	○	○	⦿	○

Vorige   Volgende

Vestigingsfactoren
klein- en middenbedrijf

Location factors small and medium businesses new

Mocht uw huurperiode aflopen en u zou de mogelijkheid hebben om met een aantal andere klein- en middenondernemingen zich te vestigen op een nieuwe (nieuwbouw/ herbestemmings) lokatie.

Kies de kenmerken die bij u van toepassing zijn.

Naar welke lokatie aspecten gaat uw voorkeur uit?

- ☐ Dynamische omgeving
- ☐ Bereikbaarheid met het openbaar vervoer (Nabijheid Station Strijp S/ Busverbinding)
- ☐ Bereikbaarheid van het snelwegennet
- ☐ Parkeergelegenheden
- ☐ Nabijheid klanten en relaties (netwerk)
- ☐ Imago omgeving
- ☐ Nabijheid van voorzieningen
- ☐ Nabijheid binnenstad of stedelijk centrum
- ☐ Corporate identity

Anders, namelijk:

Naar welke gebouw kenmerken gaat uw voorkeur uit?

- ☐ Esthetische uitstraling
- ☐ Historische kenmerken
- ☐ Flexibiliteit (indeling / flex plekken)
- ☐ Toegankelijkheid (open/herkenbaarheid)
- ☐ Dienstverlening (aanwezigheid van faciliteiten/services)
- ☐ (Flexibiliteit) huurprijs
- ☐ Contractvorm vs. contractduur
- ☐ Energiebesparing (duurzaamheid)
- ☐ Netwerk (clustering van bedrijven)
- ☐ De mogelijkheid tot uitbreiding

Anders, namelijk:

Welke facilitaire voorzieningen (services) zijn dan voor u van belang?

- ☐ Sportfaciliteiten
- ☐ Flexplekken
- ☐ Multifunctionele ruimtes
- ☐ Vergaderruimtes
- ☐ Conferentieruimtes
- ☐ Ontspanningsruimte(n)
- ☐ Brainstormruimtes
- ☐ Studieruimtes (het aanbieden van cursussen / workshops)

Anders, namelijk:

Vorige   Volgende

Berg Enquête Systeem 2.2

Hierbij wil ik van de gelegenheid gebruik maken om u hartelijk te danken voor uw tijd.

Mocht u vragen hebben omtrent de resultaten van het onderzoek dan kunt u altijd contact met mij opnemen: t.f.c.maier@student.tue.nl

Met vriendelijke groet,

Tim Maier

Appendix E

Descriptive analysis

Statistics

		Gender	Age	Education
N	Valid	64	64	64
	Missing	0	0	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	48	75,0	75,0	75,0
	Female	16	25,0	25,0	100,0
	Total	64	100,0	100,0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 24 year	11	17,2	17,2	17,2
	25 - 29 year	7	10,9	10,9	28,1
	30 - 34 year	3	4,7	4,7	32,8
	> 34 year	43	67,2	67,2	100,0
	Total	64	100,0	100,0	

Company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	47	73,4	73,4	73,4
	No	17	26,6	26,6	100,0
	Total	64	100,0	100,0	

Correlations

		Gender	Age	Education
Gender	Pearson Correlation	**1**	-,136	,130
	Sig. (2-tailed)		,283	,307
	N	64	64	64
Age	Pearson Correlation	-,136	**1**	-,077
	Sig. (2-tailed)	,283		,547
	N	64	64	64
Education	Pearson Correlation	,130	-,077	**1**
	Sig. (2-tailed)	,307	,547	
	N	64	64	64

Count

		Voorkeur				
		Alternatief 1	Alternatief 2	Geen voorkeur	Alternatief 3	Total
parent_id	6987	3	3	2	1	9
	7061	4	3	2	0	9
	7116	5	2	2	0	9
	7128	1	2	0	6	9
	7164	0	0	0	9	9
	7175	0	0	0	9	9
	7185	2	3	1	3	9
	7213	0	0	0	9	9
	7234	1	4	2	2	9
	7244	3	4	2	0	9
	7254	5	3	1	0	9
	7265	1	2	0	6	9
	7276	1	0	1	7	9
	7300	4	2	3	0	9
	7402	1	5	3	0	9
	7888	3	5	1	0	9
	7898	1	2	1	5	9
	9453	4	4	1	0	9
	9544	4	3	2	0	9
	9956	3	3	3	0	9
	9968	5	1	3	0	9
	10236	4	2	3	0	9
	10347	5	4	0	0	9
	10418	3	3	3	0	9
	14127	6	2	1	0	9
	15263	2	4	3	0	9
	16151	5	2	2	0	9
	16339	5	1	3	0	9
	16587	1	4	4	0	9
	16646	4	2	3	0	9
	16721	6	2	1	0	9
	16733	3	3	3	0	9
	16735	4	1	4	0	9
	16739	4	2	3	0	9
	16919	3	3	3	0	9
	16930	5	3	1	0	9
	16931	3	3	3	0	9
	17026	4	3	2	0	9
	17134	3	1	0	5	9
	17173	4	3	2	0	9
	17195	2	4	1	2	9
	17196	4	2	3	0	9
	17218	3	3	2	1	9
	17583	2	6	1	0	9
	17717	0	0	4	5	9
	17921	5	2	2	0	9
	18031	5	2	1	1	9
	18041	5	3	1	0	9
	18042	3	2	4	0	9
	18061	4	2	3	0	9
	18110	5	2	2	0	9
	18296	4	3	2	0	9
	18369	0	1	2	6	9
	18373	2	3	4	0	9
	18402	3	3	3	0	9
	18415	6	3	0	0	9
	18425	0	0	0	9	9
	18435	3	1	5	0	9
	18452	2	3	2	2	9
	18895	4	5	0	0	9
	18975	0	0	0	9	9
	19064	0	1	0	8	9
	19116	1	0	2	6	9
	19220	4	2	3	0	9
Total		192	152	121	111	576

Figure 44 The respondents with ' no alternative'

The correlation matrix

Correlations

		prop.1_Tb	prop.1_Fa	prop.1_Ac	prop.1_Pr	prop.1_Ne	prop.1_En	prop.1_Os	prop.1_Fl	prop.2_Tb	prop.2_Fa	prop.2_Ac	prop.2_Pr	prop.2_Ne	prop.2_En	prop.2_Os	prop.2_Fl	prop.3_Tb	prop.3_Fa	prop.3_Ac	prop.3_Pr	prop.3_Ne	prop.3_En	prop.3_Os	prop.3_Fl	id_respond	Alternative
prop.1_Tb	Pearson Correlation	1	,000	,001	,004	-,998**	,003	,000	,000	,001	,166**	,333**	,000	,333**	-,167**	,000	,335**	-,003	,499**	-,332**	-,331**	,000	-,166**	-,334**	-,658**	,000	,000
	Sig. (2-tailed)		1,000	,966	,865	,000	,898	1,000	1,000	,966	,000	,000	1,000	,000	,000	1,000	,000	,898	,000	,000	,000	1,000	,000	,000	,000	1,000	1,000
	N	2196	2196	2196	2195	2196	2196	2196	2196	2195	2195	2196	2195	2196	2196	2196	2196	2196	2196	2196	2196	2196	2196	2194	2194	2196	2196

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 50 The correlation matric (the correlation is significant at 0.05 level (2-tailed))

MNL model

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	2621,291			
Final	136,664	2484,627	69	,000

Pseudo R-Square

Cox and Snell	,679
Nagelkerke	,724
McFadden	,410

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	136,664 [a]	,000	0	.
prop.1_Tb	136,664 [a]	,000	0	.
prop.1_Fa	136,664 [a]	,000	0	.
prop.1_Ac	138,349 [b]	1,685	3	,640
prop.1_Pr	136,664 [b]	,000	3	1,000
prop.1_Ne	138,894 [b]	2,231	3	,526
prop.1_En	136,664 [b]	,000	3	1,000
prop.1_Os	136,664 [a]	,000	0	.
prop.1_Fl	136,689 [b]	,026	3	,999
prop.2_Tb	141,150 [b]	4,486	3	,214
prop.2_Fa	136,664 [a]	,000	0	.
prop.2_Ac	136,664 [a]	,000	0	.
prop.2_Pr	136,664 [a]	,000	0	.
prop.2_Ne	136,664 [a]	,000	0	.
prop.2_En	136,664 [a]	,000	0	.
prop.2_Os	136,664 [a]	,000	0	.
prop.2_Fl	136,667 [b]	,003	6	1,000
prop.3_Tb	136,664 [b]	,000	3	1,000
prop.3_Fa	136,664 [a]	,000	0	.
prop.3_Ac	138,894 [b]	2,231	3	,526
prop.3_Pr	136,664 [b]	,000	3	1,000
prop.3_Ne	136,664 [a]	,000	0	.
prop.3_En	136,664 [a]	,000	0	.
prop.3_Os	136,664 [a]	,000	0	.
prop.3_Fl	144,945 [b]	8,282	6	,218

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

b. Unexpected singularities in the Hessian matrix are encountered. This indicates that either some predictor variables should be excluded or some categories should be merged.

Case Processing Summary

		N	Percent
Cases available in analysis	Event[a]	549	25,0%
	Censored	1646	75,0%
	Total	2195	100,0%
Cases dropped	Cases with missing values	1	0,0%
	Cases with negative time	0	0,0%
	Censored cases before the earliest event in a stratum	0	0,0%
	Total	1	0,0%
Total		2196	100,0%

a. Dependent Variable: time

Omnibus Tests of Model Coefficients

-2 Log Likelihood
3934,20

Block 1: Method = Enter

Omnibus Tests of Model Coefficients [a]

-2 Log Likelihood	Overall (score)			Change From Previous Step			Change From Previous Block		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
3875,30	56,789	16	,000	58,899	16	,000	58,899	16	,000

a. Beginning Block Number 1. Method = Enter

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
prop.1_Tb	-,183	,075	5,887	1	,015	,833
prop.1_Tb2	,115	,072	2,550	1	,110	1,121
prop.1_Fa	,013	,083	,023	1	,880	1,013
prop.1_Fa2	-,004	,084	,002	1	,963	,996
prop.1_Ac	-,164	,075	4,804	1	,028	,849
prop.1_Ac2	,066	,071	,843	1	,358	1,068
prop.1_Pr	-,357	,080	20,150	1	,000	,700
prop.1_Pr2	,059	,073	,666	1	,414	1,061
prop.1_Ne	,123	,072	2,959	1	,085	1,131
prop.1_Ne2	,070	,070	,993	1	,319	1,072
prop.1_En	-,099	,075	1,760	1	,185	,905
prop.1_En2	,110	,070	2,479	1	,115	1,116
prop.1_Os	,103	,073	1,973	1	,160	1,108
prop.1_Os2	-,145	,074	3,787	1	,052	,865
prop.1_Fl	,132	,072	3,394	1	,065	1,141
prop.1_Fl2	,056	,074	,573	1	,449	1,057

Future facilities/services

Facility/Service	Value
Sports facilities	5
Flex workstations	14
Multi-functional spaces	26
Meeting Rooms	40
Conference rooms	10
Recreation/relax room (s)	14
Brainstorm spaces	15
Study spaces (offering courses /)	10
Different	3
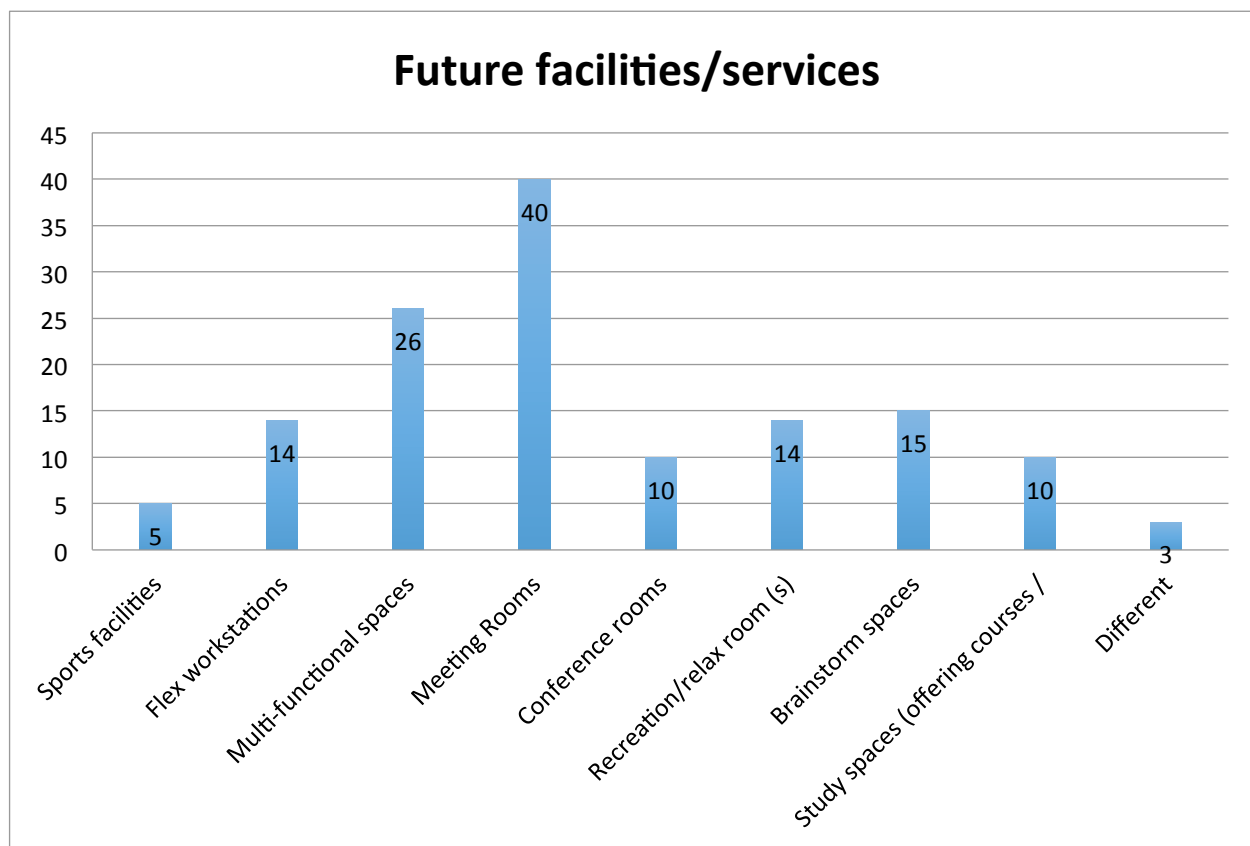
Figure 54 The facilities of the changing demand requirements

Supply side

Location determinants supply side								
Location factors / Stakeholders	Investor (NSI)	Investor (IV)	Project developer (OVG)	Project developer (SDK)	Municipality (Eindhoven AB)	Municipality (Eindhoven FG)	Broker (DTZ)	Broker (VRS)
Corporate identity			X	X			X	X
Proximity inner city	X				X	X		X
Proximity amenities								
Image of the area	X	X	X		X	X	X	
Parking possibilities		X				X		X
Accessibility (highway network)			X		X	X		
Accessibility (public transport)	X		X		X	X	X	X
Dynamic environment	X	X	X	X	X	X	X	X

Table 37 The location determinants from the perspective of the different stakeholders

Building determinants supply side								
Location factors / Stakeholders	Investor (NSI)	Investor (IV)	Project developer (OVG)	Project developer (SDK)	Municipality (Eindhoven AB)	Municipality (Eindhoven FG)	Broker (DTZ)	Broker (VRS)
The possibility of extension								
Network	X	X	X	X	X			
Sustainability		X	X					X
Contract type vs. contract duration	X	X		X	X	X	X	X
(Flexibility) rental price		X	X	X	X	X	X	X
Services	X	X	X	X	X	X	X	X
Accessibility	X		X			X		
Flexibility	X	X	X	X	X	X	X	X
Historic features								
Aesthetic appearance			X			X		
Smart technologies	X		X	X	X			X
Hospitality			X		X			X
Layout building (grid)	X		X		X	X	X	
Personal branding/ business case /concept	X		X	X	X		X	X
Possible future transformation (alternative uses)	X	X	X	X			X	
Multifunctional	X	X	X	X	X	X	X	X
24/7				X	X		X	X
Connectivity (social interaction)	X		X	X	X	X	X	X
Social hart	X							
Diversity users			X	X				

Table 38 The building determinants from the perspective of the different stakeholders

Barriers in office development								
Location factors / Stakeholders	Investor (NSI)	Investor (IV)	Project developer (OVG)	Project developer (SDK)	Municipality (Eindhoven AB)	Municipality (Eindhoven FG)	Broker (DTZ)	Broker (VRS)
Multidisciplinary character		X	X	X	X		X	X
Occupation rate	X	X	X	X				
Location	X		X	X		X	X	X
Contract type vs. contract duration	X		X		X	X		X
Ownership	X		X	X	X			
Restrictive perspective stakeholders		X	X	X	X	X		X
Building costs	X	X		X			X	X
Uncertainties small and medium businesses		X		X		X	X	X
Revenues	X	X			X		X	
Risk evaluation	X	X		X	X	X	X	X
Rental price		X	X	X				X
Oversupply				X		X		
Shift municipality	X			X	X		X	
International influence	X	X					X	X
Quality company		X						
Acquisition costs existing buildings	X	X					X	

Table 39 The barriers in office developments from the perspective of the different stakeholders

%