RESEARCH INTO HOUSING PREFERENCES OF STARTERS ON THE HOUSING MARKET

Determine the most suitable locations in the Randstad to redevelop vacant non-residential buildings into starter dwellings based on the preferences of the starters on the housing market

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Management summary

The current housing market in the Netherlands is booming. Because of the economic crisis which started in 2007, the production of new dwellings was very low. Although, the housing market is overcoming those financially difficult years, it has resulted in a situation where there is a lack of dwellings for the population in the present. Another factor for the lack of houses is the current low interest rates on mortgages which creates demand for dwellings in the market. So, besides the lack of supply, the demand for dwellings is currently high. Especially the four big cities (Amsterdam, Utrecht, The Hague and Rotterdam) are in the need for a lot more dwellings to meet the demand from the market due to the trend that people like to live in cities more often. The expectation is that the housing need in these big cities alone will rise to 700.000 until 2040. One specific group that suffers from this mismatch of supply and demand in the housing market is the starters.

On the other hand, in the Netherlands, there is a vast amount of vacant buildings which can be redesigned and reused for other purposes. One of the ways to solve the problem of housing shortage for the starters, is to redevelop current buildings which are vacant. There is a total of 71 million m^2 unused real estate located in the Netherlands with a non-residential purpose. This unused real estate could be redeveloped into starter dwelling. These dwellings however need to meet the housing preferences of the starters, in order to avoid the situation where the vacant real estate remains vacant because these starters wouldn't prefer living in these dwellings at all. With these issues taken into account, and with the biggest housing shortage in the Randstad, the main question for this research is as follows:

What are the most suitable locations to redevelop vacant non-residential buildings in the Randstad region of the Netherlands for starters at the housing market with taking in mind the housing preferences of these starters?

In order to determine the residential preferences of this starter group, a stated choice experiment has been designed and adapted into a survey. In total, 64 housing profiles were created based on dwelling and location attributes, which have been converted into 32 choice sets. These choice sets have been divided among 2 surveys (both containing 16 choice sets each). Besides the 16 choice sets, also socio demographic, economic and housing characteristics have been asked to the respondents to get a better insight who the respondents are. A total of 403 respondents filled in the survey, where finally the data of 322 respondents could be used. The descriptive statistics of the respondents have been compared with the statistics of the complete Dutch population group. The respondent group has more females, on average have a higher education level, comprises out of more students and on average as a lower income.

With the use of dummy coding the data has been prepared to analyze the most important attributes and attribute levels. The attribute levels with the highest utilities which also were statistically significant are the following:

- Price: <€700
- Surface: >90 m^2
- Dwelling amenity: Garden
- Location: City Center
- Train station location: Less than 1 km
- Highway location: Less than 3 km

These preferences have been included in a location analysis, with the use of a geographic information system (GIS). First, the locations have been determined based on the train station and highway preference. Secondly, the preferences for the location of the house have been filtered. At last, the price and surface attributes have been concluded in the analysis. In total three areas in de Randstad meet the preferences for price and surface (a dwelling of 90 m^2 for €700). These are areas in Den Haag (Laakkwartier en Spportwijk), Schiedam (Oost) and Rotterdam (IJsselmonde). In order to see if the preferences of the starters are in line with the reality, a business case have been conducted for the urban area of Rotterdam. From the business case, it can be concluded that not all the preferences of the starters can be met. In order to meet the preferences of the starters as good as possible and to create more feasible redevelopment areas, it is recommended to redevelop buildings into dwellings with a surface of 70 m^2 for a monthly price of €800. This increases the number of feasible areas from 3 to 25, where the preferences of the starters have been met as good as possible. The house location preference of living in the city center still can't be met, however there are areas within the 25 feasible areas which are located near the city center. In this way the house location preference is met as good as possible. Redeveloping buildings into dwellings with a surface of 70 m^2 with a monthly price of €800 will target the societal housing shortage problem in the Randstad. It is recommended for real estate developers and investors to look for building methods which are in line with the flex estate vision. In this way, dwellings can be adjusted easily in the future according to the needs of the tenants. This reduces the probability of vacancy of the dwellings over time.

Dutch management summary

De huidige huizenmarkt in Nederland is gespannen. Door de economische crisis die begon in 2007, was de bouwproductie van nieuwe huizen erg laag. De huidige huizenmarkt die weer aangetrokken is na de economische zware tijden resulteert in een situatie waarbij er een tekort is aan woningen voor de huidige Nederlandse populatie. Een andere factor voor het lage woningaanbod is de huidige lage rente op hypotheken, dat resulteert in een grotere vraag naar woningen in de markt. Dus naast het tekort van woningen, is de huidige vraag naar woningen ook hoog. Voornamelijk de vier grote steden (Amsterdam, Utrecht, The Hague and Rotterdam) hebben veel meer woningen nodig om aan de marktvraag te voldoen, mede door de trend van verstedelijking waarbij mensen vaker in de stad willen wonen. De verwachting is dat de woning behoefte in deze grote steden alleen al stijgt naar 700.000 woningen in 2040.

Een specifieke groep die last heeft van het verschil tussen vraag en aanbod in de huizenmarkt zijn de starters. Aan de andere kant is er in Nederland veel leegstaand vastgoed aanwezig wat op een andere manier gebruikt kan worden. Eén van de manieren om het woning tekort aan te pakken voor starters, is om huidige leegstaande gebouwen te transformeren naar starterwoningen. In totaal is er op dit moment een oppervlakte van 71 miljoen m^2 leegstaand vastgoed aanwezig in Nederland. Dit ongebruikte vastgoed zou gebruikt kunnen worden om starterwoningen te realiseren. Deze woningen moeten echter wel voldoen aan de wensen van de starters, om te voorkomen dat het huidige leegstaande vastgoed leeg blijft te staan na herontwikkeling omdat de starters niet willen wonen in de gerealiseerde woningen. De hoofdvraag die gerealiseerd is waarbij bovenstaande kwesties in acht genomen zijn is als volgt:

Wat zijn de meest passende locaties om leegstaande gebouwen te herontwikkeling in de Randstad voor starters op de woningmarkt waarbij de wensen van de starters in acht zijn genomen?

Een stated choice experiment is ontworpen en opgenomen in een enquête om de woning voorkeuren van deze starter groep vast te stellen. In totaal zijn er 64 huisprofielen gecreëerd gebaseed op woning en locatie attributing, die omgevormd zijn naar 32 keuze sets. Deze keuze sets zijn verdeeld over twee enquêtes (allebei met 16 keuze sets). Naast de 16 keuze sets zijn ook socio demografische, economische en woning karakteristieken gepeild bij de respondenten om een beter inzicht te krijgen wie de respondenten zijn. In totaal hebben 403 respondenten de enquête ingevuld, waarbij uiteindelijk de data van 322 respondenten gebruikt kon worden. De omschrijvende data van de respondenten is vergeleken met de statistieken van de Nederlandse bevolking in dezelfde leeftijdscategorie. De respondenten groep bestaat relatief uit meer vrouwen, heeft gemiddeld een hoger opleidingsniveau, bestaat uit meer studenten en heeft gemiddeld een lager inkomen.

De data is voorbereid met behulp van dummy codering om de meest belangrijke attributen en attributen levels te analyseren. De attributen levels met de hoogste waarden die ook statistisch significant zijn, zijn de volgende:

- Prijs: <€700
- Oppervlakte: > 90 m^2
- Woning voorziening: Tuin
- Woning locatie: Stadscentrum
- Trein station locatie: Minder dan 1 km
- Snelweg locatie: Minder dan 3 km

De voorkeuren zijn meegenomen in een locatie analyse, met behulp van een geografisch informatie systeem (GIS). De eerste stap was om de locaties vast te stellen gebaseerd op het trein station en de snelweg restricties. Daarna is de huis locatie restrictie toegepast op de locaties uit stap een. Ten slotte zijn de prijs en oppervlakte attributen meegenomen in de analyse. In totaal zijn er in theorie drie gebieden in de Ranstad die voldoen aan de voorkeuren voor prijs en oppervlakte (een woning van 90 m^2 voor €700). Dit is een gebied in Den Haag (Laakkwartier en Sportwijk), Schiedam (Oost) en Rotterdam (IJsselmonde). Een business case voor het stedelijk gebied van Rotterdam is uitgevoerd, om te zien of de voorkeuren van de starters in overeenstemming zijn met de realiteit. Het kan geconcludeerd worden dat niet alle voorkeuren van de starters opgenomen kunnen worden in een specifiek gebied. Om de voorkeuren zo goed mogelijk te benaderen, is aanbevolen om gebouwen te herontwikkelen in woningen van 70 m^2 voor een maandelijkse prijs van €800. Dit vergroot het aantal geschikte gebieden om gebouwen te herontwikkelen van 3 naar 25. De huis locatie voorkeur om in het stadscentrum te kunnen wonen kan nog steeds niet vervuld wordt in één van deze 25 gebieden. Wel liggen een aantal van de 25 gebieden erg dicht gelegen van het stadscentrum, waardoor er zo goed mogelijk wordt voldaan aan de huis locatie preferentie. Het herontwikkelen van gebouwen naar woningen van 70 m^2 voor een maandelijkse prijs van €800 helpen aan het verminderen van het huizen tekort in de Randstad. Het advies richting vastgoed- ontwikkelaars en investeerd om flexibele bouwmethoden te gebruiken die in lijn liggen met het flex estate principe. Op deze manier kunnen woningen in de toekomst gemakkeljik aangepast worden op basis van de voorkeuren van de bewoners. Dit verkleint de kans op leegstand van de woningen in de toekomst.

Abstract

The current housing market in the Netherlands is booming. There is a big housing shortage due to the low building production in the financial crisis and because of the high demand due to the low interest rate on mortgages. A lot more dwellings are needed, based on dwelling forecasts for the Netherlands, especially in the Randstad region. A big opportunity lays in the field of the transformation of vacant non-residential buildings to target this issue. Therefore, this research focuses on the housing preferences of starters on the housing market, in order to make good dwellings which suits the demand of the starters. For this purpose, a conjoint analysis has been designed where data has been collected with the use of an online survey. The data have been analyzed with the use of a multinomial logit model. The results show that price and surface are the most important attributes. Also, a location analysis has been carried out, in order to see where the buildings should be located in order to meet the preferences of the starters. These outcomes have been discussed in a business case, where the city or Rotterdam have been used as the example to conduct the case.

List of abbreviations

GIS = Geographic Information System
MNL = Multinomial Logit Model

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1. Introduction

The current housing market in the Netherlands is booming. At this moment, the Netherlands is in the top three countries in Europe where the housing prices are rising the fastest (Voogt S. , 2018). There are several reasons why the Netherlands is currently in this top three. A big reason is the lack of new buildings at the Dutch housing market. During the financial crisis started in 2007, the production of new dwellings was very low. The current situation at the Dutch housing market is that it is catching up the years where the production of new dwellings was low. ABF Research (2018) expects a housing need of 1 million additional dwellings in 2030 (Research, 2018).

The current financial circumstances in the Netherlands causing that the demand for dwellings is high. The low interest rate in combination with the mortgage interest deduction makes buying a house currently very attractive. The government states to decrease the favorable conditions in a fast pace in order to calm down the housing market (Voogt S. , 2018). However, currently, those measures reach the opposite effect. It gives the Dutch people the feeling of urgency of buying a house at this moment, because the favorable conditions will be gone in the near future (Voogt S. , 2018). Due to this effect, housing prices are rising fast. In 2013, an average Dutch house was worth €206.000, where the average price of a house rose to €276.000 in 2018 (Wegwijs, 2019). This is an average increase of 34% over five years, where prices are still rising. This makes buying a house for people more difficult than in the past.

Besides the changes in the economic state of the Netherlands, also another trend is going on. Currently the overall demography of the Netherlands is changing. The population of the Netherlands is growing every year. In 2000, the number of Dutch inhabitants was 15.863.950 and in 2017 this number raised to 17.081.507 inhabitants. This is a total increase of 7,7% over 17 years (CBS, CBS, 2018). ING Real Estate (2016) concluded that the number of households are growing faster than previously predicted, because of the trend that single person households are more in favor nowadays. This will also result in some side effects besides the need for more dwellings. An example is the expected increase of cars in the Netherlands between the 1,4 million to 5,3 million up to 2040, which will result in a bigger demand for parking places (Eck, 2013). According to Kooiman et al. (2016) the prediction for the period 2016-2040 is that large cities (especially Amsterdam, Utrecht, The Hague and Rotterdam) will have a big increase in inhabitants, where the inhabitants at the country sides will decrease. The housing need in the big cities will rise up to 700.000 extra houses until 2040.

From these facts, a conclusion can be drawn that currently there is a big shortage in reasonably priced houses, which is mostly the case in the “Randstad” region of the Netherlands. Besides the lack of reasonably priced houses, there is a substantial amount of vacant buildings in the Netherlands due to changes in the economy and the post industrialization. Post industrialization is the stage in the development of the society where the service sector generates more wealth than the manufacturing sector of the economy (Parboteeah, Cullen, & Paik, 2013). According to Lennartz and Kalf (2017) big opportunities lays in the field of redevelopment of vacant buildings into residential dwellings. Because the housing shortage problem primarily have to be targeted with the use of building and environment transformation. A total of 71 million m^2 unused real estate is located in the Netherlands when all the non-residential real estate has been taken into account (Beheer, 2018). In the calculation of vacancy, a building must be at least vacant for 25% for a minimal period of three years. A total of 2,1 to 2,5 million m^2 of office real estate is able to be transformed into residential dwellings, which could yield a total of 35.000 dwellings. The top three cities with the highest transformation possibilities are situated in the Randstad (Rijswijk, Almere and Utrecht). As can be seen at Figure 1, the areas situated in the Randstad have the highest percentage with regard to long and structural vacancy of office buildings.

Currently, 290.000 buildings in the Netherlands are vacant. Those are, among others, school- and retail buildings. Thus, opportunities lay in the field of vacant buildings for redevelopment and reuse.

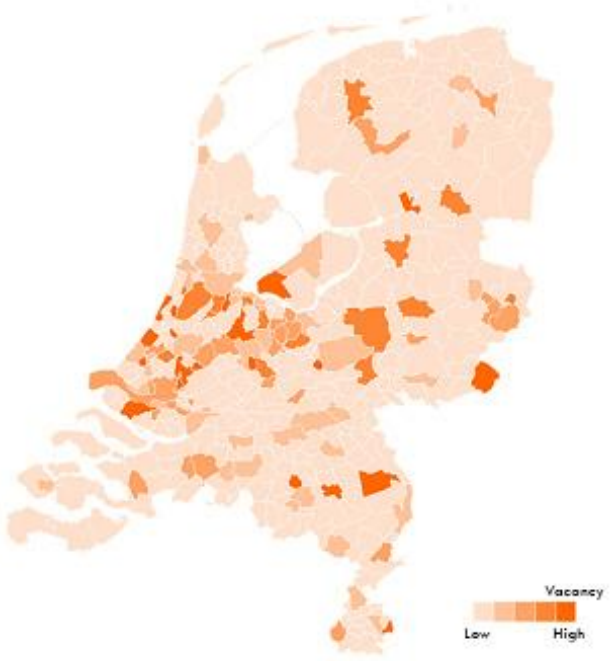

Figure 1: Office vacancy in the Netherlands *(Lennartz & Kalf, 2017)*

1.1 Problem definition

The trend of the changing economic environment in the Netherlands, the growing Dutch population and the lack of reasonable priced houses is a need for a detailed research. A large group that is suffering due to the shortage of dwellings with a reasonable price in the housing market, are the starters with a low to middle high income (Voogt S. d., 2018). Starters at the housing market can be defined as a person or family who are looking to buy a house for the first time, usually with a limited budget. The gross of the people that can be categorized as starters are in the age category of 25 to 34 years old (Woningmarktcijfers, 2018). According to Banken.nl (2018), starters on the housing market in the Netherlands need on average €39.000 of their own money to be able to buy a dwelling. In 2018, 10% less mortgages were closed compared to 2017. The Hypotheekshop (2018) (a Dutch mortgage advisor) summed up the twelve most common reasons why starters can't buy houses at this moment. The most common reason (88 of the 100 times) is that there is a lack of affordable dwellings. In the Randstad, this occurs even more (92 of the 100 times) (Hypotheekshop, 2018). The rise of students who are having a study debt (7 of the 10 students) is also one of the reasons why starters can't buy a house (NU, 2018). In the Netherlands, the average current study debt per student is €13.621. This is the amount which will be deducted from the maximal mortgage starters can get to buy a house, which also reduces their chance of buying a house. Besides the study debt, a certain amount of own equity is needed when buying a house, which starters at the beginning of their career usually don't have. This is also shown in the purchase development of dwellings. In 2012, 68% of all the buyers of dwellings were starters. In 2017, this percentage declined to 55% (Woningmarktcijfers, 2018).

For starters at the housing market, it is also challenging to build a new dwelling compared to buying an existing dwelling. Because building a new dwelling, compared to buying an existing building, is on average 11.2% more expensive compared to 2017, while existing buildings raised in value with 9% (Doodeman, 2018).

This is due to the rise of the prices of materials and the labor in the construction industry. Therefore, redevelopment of dwellings and buildings is a better solution than building new buildings (with regard to costs) to target the dwelling shortage. The need for reasonable priced dwellings for starters is big because currently there are just too little starter dwellings compared to the housing demand, especially in the Randstad (Pols, 2017).

Before real estate developers and investors are redeveloping buildings and dwellings for starters to target the dwelling shortage, it is necessary to get an insight in the housing needs of those starters. With information of these preferences, locations of redevelopment projects can be determined. However, redeveloping only on the basis of the preferences of the starters isn't a good starting point for redeveloping buildings. Therefore, the opinion of project developers and investors also need to be taken into account to be able to develop dwellings for now, but also for the future.

This research will aim at getting to know the housing preferences of starters and use these preferences to map the right places for project developers and investors to redevelop dwellings for starters. In this way, the project developers and investors get a clear insight where they have to build dwellings which suits the needs of the starters. This is good for the real estate developers and investors, as well as for the starters who want to have a dwelling.

1.2 Research questions

In order to be able to solve the mismatch between supply and demand of housing for starters, there is a need to investigate what the housing preferences of the starters in the Netherlands are and where the possible vacant buildings are situated. Based on that, a recommendation can be written for project developers and investors to redevelop dwellings at certain locations where the starters would like to live.

This will result in the following main research question:

What are the most suitable locations to redevelop vacant non-residential buildings in the Randstad region of the Netherlands for starters at the housing market with taking in mind the housing preferences of these starters?

In order to answer this research question, several sub questions need to be answered first to work towards the conclusion of the main research question:

- What is the current composition of vacant buildings in the Randstad?
- What aspects do project developers and real estate investors take into account when starting a redevelopment project?
- Which housing location attributes are important for starters in their decision-making process when they want to buy a house?
- Which housing attributes are most in favor for the target group starters?
- What are the outcomes of the location analysis when taking in mind the current building composition in the Randstad, the housing preferences of the starters and the project developers'/ real estate investors' redevelopment aspects?

1.3 Research design

In this section, the methodologies to answer the sub questions are split up in the tasks related to this methodology. The sequence to deal with the research can be seen in Figure 2. The different parts of the report are divided with specific sub tasks provided within these parts. The consecutive parts need to be completed in order to be able to continue the research.

The introduction states the research problem and the research question. From the research problem, different subjects are studied in the literature review. The importance of the location of real estate is determined to see whether the location of real estate is important and not, and what the factors are for good, qualitative locations. Housing attributes have been found in order to see which housing attributes have been used in former studies. Next, housing preferences among different generations have been stated to see differences among housing preferences over time. At last, redevelopment challenges and opportunities have been found. The methodology handles the methodologies used within this research to answer the research question. Both a stated preference design as an expert interview will be conducted. The outcomes of the methodologies are discussed in the results. First, the data is analyzed. From these outcomes, a location analysis has been conducted. At last, a case study has been conducted based on the outcomes of the location analysis. The overall outcomes are stated in the conclusion, where also limitations of this research and recommendations for future research has been stated.

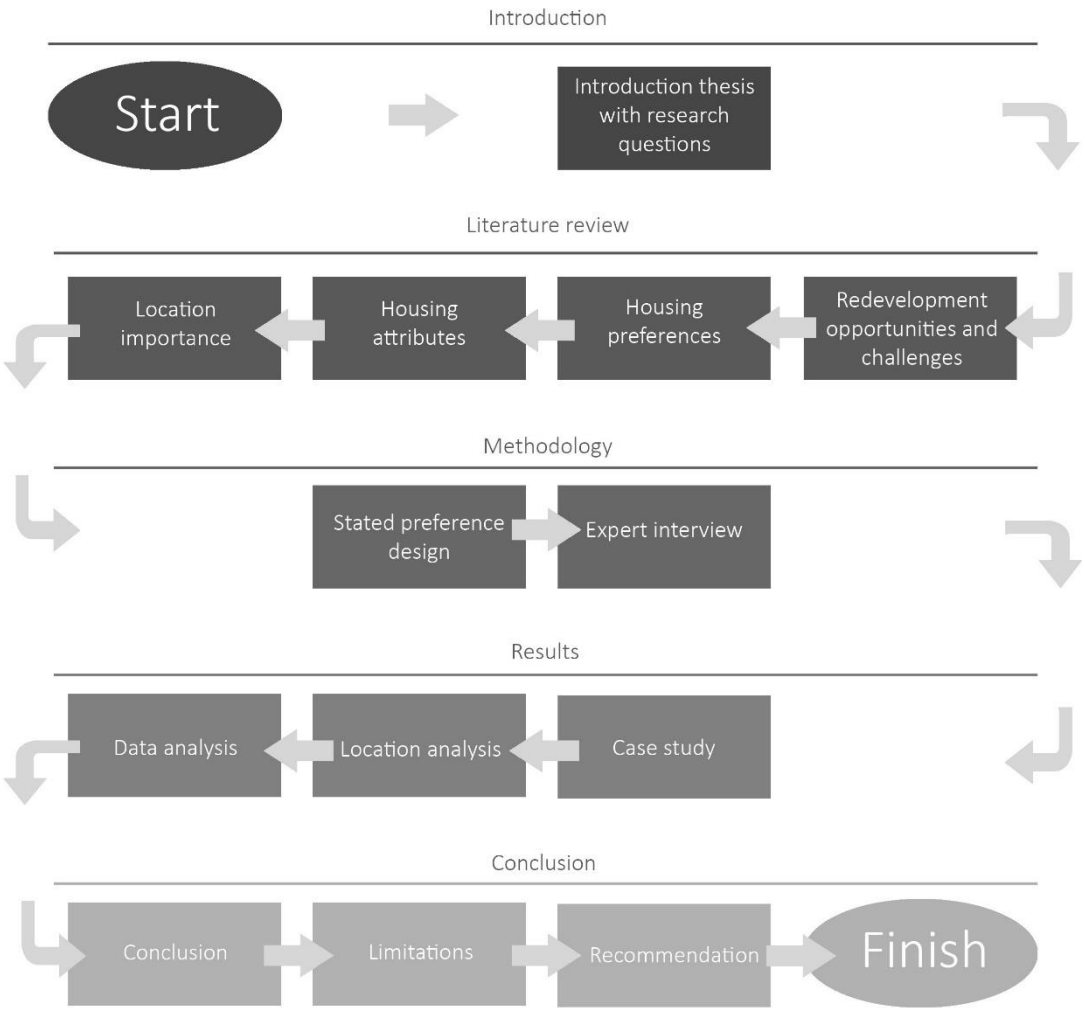

Figure 2: Research design

This research is be limited to the starters on the housing market. People between the age of 25 and 34 will be categorized as starters on the housing market. According to Woningmarktcijfers (2018) this is the age range where most starters are stated. The starters who will be questioned about their preferences are situated in the region "Randstad" in the Netherlands. This is the western part of the Netherlands, where the biggest cities are situated of the Netherlands. The Randstad will be taken as the research area because the need for starter dwellings in the Randstad is, compared to the rest of the Netherlands, the biggest. Besides the region limitation, no difference is made between preferences regarding rental and buy dwellings. There is a general housing shortage, with a lack of dwellings in both the rental sector as well as the buy sector. The literature review regarding housing preferences among different generations, can give an overview of the overall housing preference trend during the years. These outcomes can be taken into account when analyzing the results.

1.4 Relevance of the study

According to Capital Value (2018) it is important that construction is market-oriented and the housing needs are clear in order to get an accurate picture of the long term needs instead of just adding dwellings to the stock. This research investigates the housing needs of the starters that will help to develop dwellings for that suits the preferences of starters over a longer period of time. Currently, a lot of starters have problems of getting a house. According to De Hypotheekshop (2018) the main reason that starters aren't able to buy a dwelling is because of the lack of affordable starter dwellings in the Netherlands. This problem can't be solved by fast building new dwellings because of two reasons: The first reason is that building new buildings currently is more expensive than redeveloping current buildings which will increase the prices of the dwellings even more (Doodeman, 2018). The second reason is that redevelopment projects are completed way faster than new building projects. New building projects can take up to 10 years, where redevelopment projects maximally take 3 years to be completed (Hekhuis, Nijskens, & Heeringa, 2017). With this research the preferences of these starters can be determined, and the most suitable locations to redevelop buildings can be located. With these outcomes, future research can be done looking at what the best solution is to redevelop buildings with taking in mind the future demographic, economic and residential developments in the Netherlands.

1.5 Reading guide

Chapter 2 will represent the literature review. Theory about the Dutch housing market as well as important housing attributes will be stated in this chapter. Chapter 3 represents the methodology, which will give an insight in how the data will be gathered within this research. Chapter 4 will give the results of the analyses, stated in chapter 3. Also, a business case will be represented over here, to see whether the results are in line with the current housing market in the Netherlands. Finally, chapter 5 presents the conclusions and recommendations for this research. Also, limitations will be stated to have a critical view on the overall research.

2. Literature review

This chapter describes the literature needed for this research. First a brief statement is given about the importance of the location in real estate development choices in section 2.1. The vision on the location of real estate can be taken into account during the data analysis in this research. Section 2.2 handles the different housing attributes used in other studies. From these attributes, attributes are stated which are used in this research. Next, theory is stated about the housing preferences of different generations in section 2.3. If there is a certain trend in the housing preferences over the years, this trend can be taken into account when redeveloping vacant buildings. In this way, buildings which are built now have a high probability that they are still preferred in the future. At last, theory is stated about redevelopment in the Dutch housing market. Challenges as well as opportunities are stated to get an overview of important factors for redevelopment projects.

2.1 Importance of location in real estate

The importance of the location of a real estate property is big. The late Lord Harold Samuel (a real estate icon in Britain) once said there are three things that matter in property: location, location, location (Safire, 2009). You can change the design of the building, the interior of the building, and even the garden of the building if there is a garden. However, you can never move the building. But what does "location, location, location" actually mean? Someone who is buying a house, is not only buying a house but also a living environment. Visser and van Dam (2006) states that the living environment comprises out of different aspects: physical characteristics (amount of green in the neighborhood), social characteristics (state of the neighborhood) and functional characteristics (like the presence of amenities nearby the dwelling). So, valuing a dwelling is a combination of valuing the dwelling, the environment and the location of the dwelling.

According to Weintraub (2017) the best locations are those that are situated at the prime spots, which are locations located near for example top-rated schools, recreation, an economic stable area and near public transportation opportunities. Kryvobokov (2017) found in his study a list of location and environment attributes which were used the most in other studies when valuing real estate based on location characteristics, shown in Table 1. Important environment characteristics are for example the income level and demographic characteristics of a neighborhood. Important location characteristics are road- and central business district accessibility. However, it is still not easy to talk about good locations because this varies a lot over time due to housing preferences of people in different lifecycles. According to the literature, locations that are not preferred are easier to define such as industrial areas, areas near railroad tracks, freeways or under flight paths, high crime areas, hazard zones and economically depressed areas (Weintraub, 2017).

Table 1: Frequently used location and environment attributes in real estate location studies (Kryvobokov, 2017)

Most frequently used location attributes	
Location attributes	Environment attributes
• Accessibility to the CBD (Central Business District) • Water accessibility (ocean, sea, river, lake) • Green area accessibility • Commercial objects accessibility and characteristics • Road accessibility and characteristics	• Demographic characteristics of neighborhood • Income level of population and prestige in the neighborhood

2.2 Housing attributes

In this section literature is presented in order to identify the attributes which are of significant importance for starters when finding a dwelling. The main focus lays on the location of the dwelling. In real life, the location won't be the only decision factor a starter will take into account when buying a house. Therefore, besides location attributes, also housing attributes are taken into account. From the literature, two main categories can be used: location attributes and dwelling attributes.

2.2.1. Location attributes

Many studies using location attributes in their research. A home buying survey by Century 21 found that millennial homebuyers (those born after 1980) are twice as likely as baby boomers (born in 1946-1965) to rank location as their highest priority in choosing a home (Canada, 2013). These attributes can be divided into three groups: physical environment characteristics, social environment characteristics and functional environment characteristics.

Physical environment characteristics are characteristics such as amount of green in the area or the building density. Fennema (1995) investigated whether green or open water in Apeldoorn has a positive effect on the price of a dwelling. If the walking distance to a green area was less than 400 m, the price of the dwelling was on average 6% more worth in value than other dwellings. Building density don't have to be necessarily negative, as often indicated in studies (Dunse, Thanos, & Bramley, 2013). It depends on what kind of people value building density. People who live in cities are used to surroundings with buildings on a relative small amount of ground, where people at the country sides are used to a lot of space around them. Jansen (2008) asked 738 respondents for their preferred residential environment and their underlying motivation. A physical environment characteristic he used was whether the environment is good for raising (grand) children. Borth and Summers (2018) also found some interesting outcomes in their research towards the segmentation of homebuyers by location choice preferences. The investigated group were characterized by preferences for commuting by active transportation (walking and biking), access to trails and parks and convenient transportation options. Jabareen (2005) also took two important things into account, which aren't physical for the eye but certainly are there and could affect your well-being: urban pollution. He describes quality of the air and noise in the neighborhood as urban pollution variables.

Social environment characteristics are characteristics of the neighborhood, like the composition of the population in the neighborhood, the unemployment rate in a neighborhood and the average income per household. In general, these are hard characteristics because these characteristics are based upon feelings and opinions. One thinks an average income of €30.000 gross per year is very high, where others may think this is an average income. There are various studies using social environment characteristics. Wang and Li (2004) used a security attribute in their study with the values "good public order" and "poor public order". Jansen (2008) also used various social environment characteristics in his study. He for example used the following characteristics to measure the preferences: peace and quiet, the ambiance outside, sense of freedom and feeling safe/secure. Wilson et al (2004) did a study regarding residential relocation decisions. Variables he used were the amount of violent crime, population density, median household income, amount owning a housing unit and household size. Other social environment characteristics are the distance between the dwelling and friends and/or family (Lee, 2005).

Functional environment characteristics are for example the proximity to amenities in the neighborhood, infrastructure and the amount of job opportunities in the neighborhood. Many studies have incorporated functional environment characteristics. A study by the Demand Institute found that 20% of the respondents reported that the location of their home was more important than the home itself. Being closer to work was in 25% of the cases the main reason to relocate (Kam, Lim, Al-Obaidi, & Lim,

2018). The National Multifamily Housing Council (2015) have done a landmark research among 120.000 residents of apartments, with regard to their housing preferences. This research states that the distance from the dwelling to work, public transportation, the grocery store and restaurants are the most important factors in their decision. Iman et al (2012) also conducted a research among residential preferences with the use of a conjoint analysis in Malaysia. The location attributes used in this study are ranked as "near workplace", "near school" and "near city center". Boterman and Sleutjes (2014) concluded that urban locations are highly in favor at young, highly-educated and single people. It is very important for them to have various neighborhood amenities nearby, like a museum, restaurants and shops. They also favor to live nearby their work, to reduce their home-work travel time

2.2.2. Dwelling attributes

Boterman and Sleutjes (2014) found some interesting data in the Dutch housing market. Their research area was Amsterdam and Eindhoven, and included 2082 respondents in total. The respondents of the study have a high academic background. They filled in a survey which states a hypothetical situation where the respondent has to move to another house. The question was which house they would prefer, where they could choose between an apartment, a terraced house, a semi-detached house or a detached house. They also had the opportunity to fill in the option "I don't know". The young highly educated respondents didn't favor the semi-detached houses, but did favor an apartment. Boterman and Sleutjes (2014) also investigated the price range in which the respondents were thinking of buying a house. The most preferred price range was between €200,000 and €300,000. The second most preferred price was in the range of €300,000 and €400,000. The least preferred price range was the choice of "up to €200,000". Iman et al (2012) used the following main building amenities in their research regarding the housing preferences of young adults: price of the property, the type of the property (semi-detached house, clustered house and super-linked house), the surface of the house and smart-home features of the house.

2.3 Housing preferences of starters

Besides the different location and dwelling attributes which are used in many studies and influence housing preferences, the lifestyle of a person also influence the housing preferences of people. Beamish et al (2001) conducted a study regarding the effect of lifestyle influences on housing preferences. The outcomes were that lifestyle preferences in combination with housings norms are significant for the housing preferences of people. Jansen (2014) conducted a study regarding whether different lifestyle values also result in different housing preferences. The study provides an indication that house seekers do choose certain neighborhoods or locations because of their lifestyle.

It is therefore important to see what the lifestyle of the starters is, in order align the lifestyle with the location and dwelling attributes of a dwelling. However, buildings are not made for just a couple of years, and have to meet the housing preferences of different generations over time. Teenagers who are still living with their parents now, will be the housing starters within five to ten years. These future starters also have to like the dwellings which are made nowadays. Therefore, it is important to see the overall trend in housing preferences among different age groups, to anticipate to the future housing demand of starters.

A common way to compare differences among different target groups with regard to age, is to compare different generations. This because different values and behavioral preferences in general, also need a different way of housing. In general, there are four generations: the Babyboomers (1945 – 1960), Generation X (1961 – 1980), the Millennials (1981 – 1995) and the Generation Z (1995 – Now). Each generation has specific characteristics and needs, developed over time based on economic and technological developments.

The baby boomers prefer to have an own home, instead of a rental home. However, they are opting to sell their home when their children leave the house to seek for a rental home in a building complex situated close to restaurants, shopping and recreation amenities (Patel, 2018). The next generation is the Generation X. With regard to housing, this generation in general stay longer in the rental market than expected. The reason for this is that the high rental prices makes it hard to save for a down payment to own a house. At the other side, the generation also wants to have a faster and fancier lifestyle than the baby boomers. A survey has shown that one third of the respondents with the background of this generation would prefer a rental home if that means that they can be flexible to move and explore job opportunities at different places (Patel, 2018). The third generation (the Millennials) is the generation of the current housing starters. The home ownership rate of this generation group has fallen at a faster rate than any other age group. A survey stated that nearly half of the millennials would rather save money to spend on traveling than put it towards buying a dwelling. The survey also states that 47% would prefer renting a dwelling if that means they still can afford small luxuries like eating regularly in a restaurant. In 36% of the cases, the Generation X respondents gave this as a reason for renting instead of buying a dwelling. Baby boomers even rate this choice lower, where 25% of the baby boomers gave this as a reason not to buy but want to rent a dwelling. The generation that currently is born, is the Generation Z. Not a lot is known about this generation, but it is known that they very look like the Millennials, and they prefer more to share goods instead of having the goods. (Patel, 2018)

The overall trend to see is that over time the different generations value flexibility and freedom more, even if this means they have to pay more for their rental home instead paying a lower mortgage and owning a home. The current starters at the housing market prefer to have a luxury life where they like to eat in restaurants and have the financial freedom to travel. The future Generation Z shares the values of the Millennials regarding flexibility and freedom, and like to life in a shared economy. In such an economy, people share materials to use it instead of owning it. So, in order to meet the housing preferences of the current and future starters, dwellings need to be made at locations where they can have the lifestyle of luxury and freedom, like big cities with a lot of leisure amenities.

2.4 Redevelopment in the Dutch Housing market

The expectation for the Dutch housing market in the Randstad is that up to 2040, 700.000 additional dwellings are needed in order to meet the housing demand (Kooiman, Jong, Huisman, Duin, & Stoeldraijer, 2016). This demand can't be met only by building new buildings due to the lack of space. Building new buildings in general also is more expensive than redevelopment projects. Therefore, redevelopment is necessary in order to meet the current and future housing demand. According to Glumac, Vasilache and Lowies (2016) redevelopment of buildings has several advantages. Building reuse contributes to a sustainable environment. Redevelopment also has an economic benefit, because in general redevelopment is low-cost compared to developing new buildings. Redevelopment also has an environmental benefit because it is diminishing the urban sprawl by maximizing the use of inner-city resources, thus preserving green fields (Glumac, Vasilache, & Lowies, 2016). At last, it also has social benefits. If buildings are vacant, those buildings could be a source for criminality, which gives more social insecurity in the area. Vacancy of a building also contributes to the impoverishment of a neighborhood with regard to the street view in the neighborhood (Glumac, Vasilache, & Lowies, 2016).

Besides the fact that redevelopment of buildings has several advantages, also a lot of challenges are there in the field of redevelopment of buildings. Gerben van Dijk (2016) mentioned that it is needed to look more to the shift from real estate to flex estate. This because the function and use of a building change quicker than previously. Flex estate is a way of developing buildings where buildings can be transformed in another real estate function more easily compared to traditional building (Van Dijk, G., 2016).

With dismountable furniture and system walls, buildings like vacant churches can have a different function (like living). If over time the demand is decreasing, the system walls and dismountable furniture can be dismounted in no time to transform the building in another function. The one thing that stop this idea from happening is the destination plan in the Netherlands. Every building has a specific building destination (living, retail, office etc.). A more flexible system for the destination plan would lead to a better flex estate system. Real estate developers and municipalities therefore need to agree upon each other that reducing building vacancy and redevelop buildings are of bigger importance than sticking up to a certain destination plan. In order to do that, it is however important to make a clear distinction between buildings that are still suitable to redevelop in starter dwellings and buildings which are not. The buildings which aren't suitable, may suitable for other functions or have to be demolished where new buildings have to be built. Redeveloping isn't a good solution if the building isn't suitable for a redevelopment project with regard to the location and the building itself.

2.4.1. Locations of vacant buildings

A common method used in studies to check whether a certain location is suitable for specific housing or building purposes is to make a location analysis. Different aspects, like the building characteristics and locations are taken into account, to determine whether a certain location is suitable for the goals of a project.

A system which is used a lot in location analysis in order to determine locations based on certain restrictions is a geographic information system (GIS). GIS can be used in different ways and projects. Eppig and Brachman (2014) used GIS in order to see if certain vacant buildings in cities in the United States of America were suitable for redevelopment purposes, where the building has to be located towards certain amenities like for example the train station. Al Shalabi et al (2006) used a GIS in order to make a housing site suitability analysis. The model was used to evaluate the possible location of building sites and to support decision making in the location of additional housing areas. GIS was used based on a set of criteria derived from environment aspects, spatial aspects, housing policies and local and national physical plans. Martinez (2000) used GIS in order to analyze weaknesses and potentialities in the city Rosario (Argentina) for the municipality in order to see what the market needs are for newly decentralized districts, with taking in mind housing quality and access to physical and social infrastructure. Spatial inequity with regard to access to social infrastructure as well as expressed housing demand were calculated and compared with the demand in other districts.

Besides using GIS in order to look for opportunities and weaknesses in a region, GIS has also been used to see whether housing prices within a region are falling when the composition of an area will change with regard to changing building purposes (from office to residential for example). Song and Knaap (2004) composed a study measuring the effects of mixed land use on housing values. The results are that housing prices are increasing with their proximity to public parks or neighborhood commercial land use. Another result is that housing prices are higher in neighborhoods that are dominated by single family residential land use, where more service jobs are available and where non-residential land use is evenly distributed. Visser and van Dam (2006) also gave some interesting results in their research regarding the living environment and housing prices. With regard to physical characteristics in the living environment, recreational green areas in the neighborhood have positive influence on the housing prices, where industrial areas have negative effect on the housing prices. It is hard to estimate social characteristics, but a neighborhood with a low social status have a negative impact on the housing prices.

2.4.2 Redevelopment of vacant buildings

The type of redevelopment of vacant buildings and what needs to be done heavily depends on the type of building that needs to be redeveloped. An example regarding buildings with strict redevelopment requirements are monumental buildings (buildings with a historical value according to the municipality). The buildings have to keep their monumental appearance. At the other side, monumental buildings currently are popular among people due to their historical appearance. Redevelopment of offices would for example be easier than redevelopment of monumental buildings with regard to the several redevelopment options within the building. However, offices don't have the charismatic look as monumental buildings.

Over the years, many different buildings with different building styles have been built. The Basic registration Addresses and Buildings (BAG) is an organization in the Netherlands which maps all the buildings in the Netherlands according to their building characteristics (building year, building destination etc.). The inner cities of the big cities in the Netherlands comprises out of buildings dating back to before 1800. From that starting point, more and more buildings have been built around the city center. Figure 3 gives an example of the building composition of the city of Amsterdam based on BAG data made by Bert Spaan (2015).

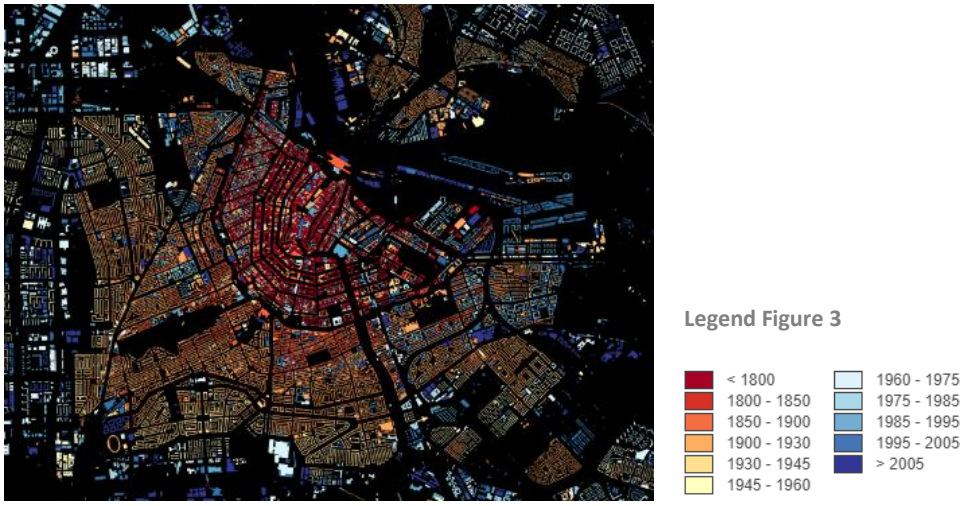

Figure 3: Building composition Amsterdam *(BAG, 2015)*

The more red a building is, the older it is. The inner city of Amsterdam has been developed before 1800. A lot of those buildings have a monumental status, which means that the building has to remain its' historic characteristics as much as possible. Because every building is in a different condition, it is not possible to have a general statement which buildings are suitable for redevelopment purposes. The redevelopment costs will be different per building, and needs to be calculated per project. Unfortunately, no database is available about which buildings are vacant at the moment as well. However, there are real-life examples of redevelopment projects where vacant buildings have been transformed into dwellings. A housing corporation in Nieuwegein, managed to transform a former office building to a student building complex with 15 rooms (Jong, 2013). Another housing corporation (Jutphaas Wonen) transformed a former office in Utrecht to 25 societal renting dwellings in 2013 (Provincie Utrecht, 2013).

2.5 Conclusion

From the gathered information in this chapter, a few things can be concluded. The location within real estate is very important. The building can be changed, the environment can be changed, but the location of a building never can be changed. Locations located near infrastructure related amenities (i.e. near highway) are in most cases good locations. But other characteristics defining a good location are hard to estimate, because preferred locations change over time. However, bad locations are easier to recognize. These are for example buildings located in economic unstable areas and located near flyways.

Different housing attributes have been used in several studies. The attributes can be clustered into two main groups: location attributes and dwelling attributes. Within the location attributes, a distinction can be made between three components: physical environment characteristics, social environment characteristics and functional environment characteristics. Table 2 states all the housing attributes which are found in literature and are categorized into the different categories stated in section 2.2.1 and 2.2.2. In Table 2, different abbreviations have been used to be able to order the table in a better way. The following abbreviations are used:

Type:
LA = Location attributes
DA = Dwelling attributes

Category:
PEC = Physical environment characteristics
SEC = Social environment characteristics
FEC = Functional environment characteristics

It can be concluded that lifestyle and housing preferences are related. The housing preferences over time of different generations differ. There is a bigger shift from security and having goods, to flexibility, freedom and sharing goods. Over the years, people like to rent a dwelling more in order to be financial flexible and have a certain luxury life style.

Redeveloping buildings instead of building new buildings have several advantages. Building reuse is sustainable for the environment, it has an economic benefit for surrounding buildings when a vacant building is occupied again, and green areas are able to remain green where no new buildings are built. Data about the composition of buildings in the Randstad is available, but data about vacancy of those buildings isn't public available. Therefore, it is hard to estimate which buildings are suitable for redevelopment because it is not known whether these buildings are occupied or not. With the use of a location analysis, locations can be determined according to the preferences of the starters. Within these locations, vacant buildings can be searched and analyzed whether they are suitable for redevelopment or not. With this process, the lack of a general vacant building database can still be targeted, where vacant buildings will be spotted.

Table 2: Housing attributes

Type	Category	Attribute	Source
LA	PEC	Green in neighborhood	Fennema (1995)
LA	PEC	Open water in neighborhood	
LA	PEC	Building density/ building environment location Parking in neighborhood	Dunse, Thanos & Bramley (2013)
LA	PEC	Children friendly amenities	Jansen (2008)
LA	PEC	Access to trails and parks	Borth and Summers (2018)
LA	PEC	Convenient transportation options	
LA	SEC	Good/bad public order	Wang and Li (2004)
LA	SEC	Peace and quiet Outside ambiance Sense of freedom Feeling safe/secure	Jansen (2008)
LA	SEC	Amount violent crime Population density Median household income Amount owning a housing unit Household size	Wilson et al (2004)
LA	SEC	Quality of the air Noise in neighborhood	Jabareen (2005)
LA	SEC	Near friends/family	Lee (2005)
LA	FEC	Near work	National Multifamily Housing Council (2015), Iman et al (2012), Boterman and Sleutjes (2014)
LA	FEC	Near public transportation/near highway	National Multifamily Housing Council (2015)
LA	FEC	Near grocery store	National Multifamily Housing Council (2015)
LA	FEC	Near restaurant	National Multifamily Housing Council (2015), Boterman and Sleutjes (2014)
LA	FEC	Near cultural amenities (museum, pop stages etc.)	Boterman and Sleutjes (2014)
LA	FEC	Near shops	Boterman and Sleutjes (2014)
LA	FEC	Near school/education	Iman et al (2012)
DA	-	Housing type (apartment, terraced house, semi-detached house or detached house	Boterman and Sleutjes (2014), Iman et al (2012)
DA	-	Price range (<200k, 200k-300k, 300k-400k)	Boterman and Sleutjes (2014), Iman et al (2012)
DA	-	Surface of the house	Iman et al (2012)
DA	-	Smart home features	Iman et al (2012)

3. Methodology

This chapter explains the methods which are used in order to be able to answer the main research question. Section 3.1 handle the stated preference method and how this method should be conducted. The survey format is laid out, as well as the profile generation. Section 3.2 provides the theory and framework for the experimental design. Here is explained how the survey is created and which parts are included into the survey design. At last, an expert interview is laid out in chapter 3.4.

3.1 Data collection method

There are multiple ways to gather data about the preferences of the starters on the housing market. According to All Business (2019), there are five basic methods of market research: surveys, focus groups, personal interviews, observations and field trials

Surveys are straightforward questionnaires which are suitable for analyzing a sample group which represents a target market. The larger the sample, the more reliable the results. In a focus group a moderator uses a series of topics or questions to lead a discussion among a group of people. A focus group usually takes two hours, and need at least three groups to get balanced results. Personal interviews include open unstructured questions. As the same with focus groups, personal interviews are not statistically reliable, which means they usually don't represent a large enough segment of population. Observations are useful when wanting to see the actual behavior of the target group in a certain circumstance. This gives a more accurate picture of the habits of the target group. At last, a field trial is the action of placing a new product in selected stores to test customer response under real-life conditions.

For this research, a big target group is needed to get reliable results for the complete housing starter group in the Randstad. Data has to be gathered and analyzed in an efficient and fast way. Focus groups and personal interviews represents a too little part of the target group. Observing housing preferences can't be conducted in a way like observing the purchase behavior of people in a store. Field trials aren't possible within this research and in real life. It is not possible to build different houses, and see which starters like what kind of house at a certain location. Therefore, a survey design will be used in other to gather data.

A distinction has to be made between the way how data is presented in such a design. The possibility is there to state revealed preference data or stated preference data. In a revealed preference study, data is obtained about what respondents actually did or experienced. A stated preference method asks respondents what they would do when they are faced with a specific situation (Sanko, 2001). Respondent might not have a dwelling yet according to their needs. In this case, they can't give a preference based on their current housing conditions. Therefore, the method is used based on stated preferences instead of revealed preferences.

A widely used stated preference data collection method is the conjoint analysis. The conjoint analysis is a survey-based method and postulates the utility of a multi-attributed item that can be decomposed into specific contributions of each attribute and possibly their interactions (Rao, 2014). The answers in the survey can have the form of monetary amounts, choices, ratings, or other indications of preferences. These are scaled following an appropriate model of preference to yield a measure of value (Sanko, 2001). The method was founded in the 1920s, but it is generally agreed that the explained method in the paper of Luce and Tukey (1964) is the foundation for the conjoint analysis. The method is useful in different fields. It can be used for marketing purposes, real estate projects or energy usage questions in order to understand the buyers' preferences and reasons to buy a certain product.

The use of a conjoint analysis has several advantages. Products can be treated which are not in the actual market yet. Collecting stochastically data is easier than collecting revealed data. Everyone is able to fill in stochastically data, but only the people who did a specific task are able to give revealed data. A big disadvantage about stochastic data is its reliability. There is a possibility that the expressed preference is not consistent with the actual behavior. Respondents can try to justify their actual behavior or try to control policies. Therefore, data from stated preference studies requires a careful interpretation.

There are several steps which need to be taken into account in order to do a proper conjoint analysis with the use of surveys. Churchill (1995) came up with these steps, which are stated below:

1. Determine the specific research problem and its objectives and estimate the amount of available resources.
2. Decide on the appropriate research population and a sampling procedure for reaching a representative sample of that population.
3. Select a survey format.
4. Decide on a limited number of attributes and levels for each attribute that are realistic and related to the problem.
5. Configuring attributes and levels into individual concepts.
6. Design the data collection instrument.
7. Conduct the survey.
8. Analyze data.
9. Validate the results, both internally and externally.
10. Interpret the results and draw conclusions.

3.1.1 Define appropriate research population

The first step already has been taken into account in Chapter 1. The next step is to decide what the appropriate research population is and what a representative number of respondents is for the targeted research population. Hensher et al. (2005) states that a typical stated choice experiment requires the pooling of choices made by 200 respondents. Several authors, mainly publishing in marketing literature, have examined various methods to reduce the number of sampled respondents required to complete choice tasks while maintaining reliability in the generated results. However, it is also stated that each choice task requires a minimum of 10 respondents. This study contains a total of 32 profiles, so a minimum of 320 respondents is required for this research.

3.1.2 Select a survey format

The third step comprises out of choosing the right survey format. There are different manners in order to conduct a survey. Information can be gathered with the use of a personal interview, a computer-aided interview, a mail survey or a telephone survey. Personal interviews and computer-aided interviews are the most common interview types used in a conjoint analysis. A personal interview will generate higher response rates and the data will be of bigger quality, because more questions will arise during the interview itself. The computer-aided interview can be used for financial reasons. Sending a questionnaire involves much smaller costs than having interviews in person. The number of respondents can also be way more compared to conducting personal interviews (Gustafsson, Ekdahl, & Bergman, 1999). Because a lot of respondents needs to be gathered in a specific time frame, the interview will be conducted with the use of a computer-aided survey design.

3.1.3 Selection of attributes

The next step is to choose the limited number of attributes and levels that are realistic and related to the problem. It is important to choose the right number of attributes and values to make sure the research won't get too big. Several studies use more than ten attributes to be used in the stated profiles. This however can give false data, due to the fact that the respondents aren't able to analyze all the information stated in the profiles. Molin and Timmermans (2003) states that the inclusion of more than six attributes has been found to render surveys confusing and too much for respondents to process. Churchill (1995) states that there are three general rules in choosing attributes for the analysis:

- Choose attributes which are of big importance to the respondents.
- Choose attributes which are still possible to alter.
- Include attributes which cover the core competences of the product.

3.1.4 Configuring attributes and levels into profiles

The next thing to do is to create the different profiles which has to be incorporated into the survey design. The design in most cases is orthogonal, which ensures that the attributes presented to respondents are varied independently from one another. The effect of each attribute level in this way is more isolated. This avoids the so-called 'multi-collinearity' between attributes, which is a state of very high inter correlations of inter-associations among the independent variables. The design could be either full factorial or fractional factorial. A full factorial design is a design where every possible combination will be used. So, three attributes with two levels will in total have $2^3 = 8$ combinations. A fractional factorial design is used when a bigger number of attributes and levels are incorporated into the design. The options would be so big, that a smaller amount of designs is generated which still is a representation of all the levels and attributes. In most cases, a fractional factorial design will be used, because the amount of combinations would be too big. (Sanko, 2001)

3.1.5 Survey design

The next step is to design the survey, where the profiles made in step 5 have to be incorporated. Within a survey in a stated preference experiment, there are multiple methods for the respondents to give their opinion about the profiles. It could be done with the use of ranking, rating, choice, degree or preference. The most used method is the choice option, where the respondent has the possibility to choose between three options: two alternatives, and the option to choose "none of these" (Sanko, 2001). Besides the profiles generated in step 5, it is also useful background information about the respondents. This information is so called socio economic and demographic information, which will help to get a better insight who the respondents are (age, education, work status etc.) This information can also be linked with the chosen profiles where there might be a connection between socio demographic and/or economic information and the chosen profiles.

3.1.6 Data collection

The data will be collected with the use of an online survey, which is cost friendly and easy for big respondent groups. Within the online survey environment, it can be seen how many respondents already filled in the survey which gives an indication how many respondents are needed in order to have the right number of respondents.

3.1.7 Analyze data

Once the data have been collected with the survey and enough respondents have filled in the survey, the data is ready to be analyzed. Analyzing the outcomes of a conjoint analysis arise from a random utility framework. This is a framework that arise from a consumer choice setting in which the model is of an individual's selection among two or more alternatives (Hensher, Rose, & Greene, 2005). This includes several models which can be used in order to analyze the data.

The data of conjoint analysis study can be analyzed with the use of a multinomial logit model. The model is used in order to predict whether a choice alternative will be chosen (Kemperman, 2000). The data are case specific: each dependent variable has a single value for each case. The model also assumes that the dependent variable cannot be perfectly predicted from the independent variables for any case. That is derived from the assumption that error distributions are independently and identically distributed according to a Gumbel distribution.

According to Hensher et al. (2005) the multinomial logit model is the most applied model for a conjoint analysis design, which is based on the random utility theory. The random utility theory is based on the assumption that people choose what they prefer and what they don't prefer, which can be explained by random factors.

The formula for the random utility theory is stated below:

$U_{in} = V_{in} + \varepsilon_{in}$ (1)

Where,
U_{in} is the overall utility
V_{in} are the systematic, observable contributions
ε_{in} is the stochastic error component

However, the utility is based upon the choices made by the individuals' preferences between two alternatives, the choice is made based on their social and economic environment. The relationship between social and economic characteristics and the utility of an alternative can be clarified as follows:

$V_{in} = \beta_1 x_{in1} + \beta_2 x_{in2} + \ldots + \beta_k x_{inK}$ (2)

Where,
V_{in} is the utility of an alternative
K is the unknown parameter
i is alternative i
B_k is the vector of K unknown parameters
X_{ink} is the value of the attribute level k of alternative i

3.1.8. Validate results and draw conclusion

This part comprises out of step 9 and 10 in the conjoint analysis steps. Once the analysis has been done, the results can be validated where certain attribute levels will be validated as statistically significant and most important. In the case of a conjoint analysis, there will be a winning concept which will be a certain housing profile stated in the survey. From that winning housing profile and winning attributes, a conclusion can be drawn which attributes are most in favor. With the use of these attributes, locations can be estimated which meet the preferences of the starters based on the conducted survey with the use of a geographic information system. When the locations have been determined, it can be discussed whether these locations also are realistic and feasible for redevelopment (i.e. taking costs into account).

3.2 Experimental design

Now the methods have been explained how to conduct the research, the next thing is to make the experimental design. The experimental design is the set-up for conducting the actual research. Before the experimental design can be generated, the first thing to do is to estimate the attributes which are used in the survey. When the attributes have been defined, it is time to generate the housing profiles. At last, the outlines of the survey are stated.

3.2.1 Attribute estimation

Molin and Timmerman (2013) states that including more than six attributes in a stated preference experiment is too confusing and unclear for the respondents. It can lead to unreliable data, where decisions are made from the wrong point of view regarding what the respondents actually think. Therefore, the current list of attributes obtained from the literature research stated in Table 2 have to be narrowed down. At the other side, Molin and Timmerman (2013) states that housing and residential choice cannot be represented in terms of only a few variables. Besides the attributes, also levels have to be estimated for the attributes. Molin and Timmerman (2013) also states that the use of an odd amount of levels will result in the possibility that certain levels won't be shown as much as other levels in de housing profiles. Therefore, the attributes should contain either two or four levels.

In literature, two main attribute groups have been found: location attributes and dwelling attributes. Within the location attribute component, three sub attribute groups have been found: physical environment characteristics, social environment characteristics and functional environment characteristics. Social environment characteristics are not being taken into account directly, because these characteristics are hard to quantify in the location analysis. It is possible to group attributes and use these attributes as levels for another attribute. Table 3 represents all the attributes found in the literature. The selected attributes for this research are colored in green. The category abbreviations presented in Table 3 are as follows:

Category:
PEC = Physical environment characteristics
SEC = Social environment characteristics
FEC = Functional environment characteristics

Table 3: Attribute estimation

Type	Category	Attribute	Source
LA	PEC	Green in neighborhood	Fennema (1995)
LA	PEC	Open water in neighborhood	
LA	PEC	Building density/building Environment location Parking in neighborhood Balcony Garden	Dunse, Thanos & Bramley (2013)
LA	PEC	Children friendly amenities	Jansen (2008)
LA	PEC	Access to trails and parks	Borth and Summers (2018)
LA	PEC	Convenient transportation options	
LA	SEC	Good/bad public order	Wang and Li (2004)
LA	SEC	Peace and quiet Outside ambiance Sense of freedom Feeling safe/secure	Jansen (2008)
LA	SEC	Amount violent crime Population density Median household income Amount owning a housing unit Household size	Wilson et al (2004)
LA	SEC	Quality of the air Noise in neighborhood	Jabareen (2005)
LA	SEC	Near friends/family	Lee (2005)
LA	FEC	Near work	National Multifamily Housing Council (2015), Iman et al (2012), Boterman and Sleutjes (2014)
LA	FEC	Near public transportation/near highway	National Multifamily Housing Council (2015)
LA	FEC	Near grocery store	National Multifamily Housing Council (2015)
LA	FEC	Near restaurant	National Multifamily Housing Council (2015), Boterman and Sleutjes (2014)
LA	FEC	Near cultural amenities (museum, pop stages etc.)	Boterman and Sleutjes (2014)
LA	FEC	Near shops	Boterman and Sleutjes (2014)
LA	FEC	Near school/education	Iman et al (2012)
DA	-	Housing type (apartment, terraced house, semi-detached house or detached house	Boterman and Sleutjes (2014), Iman et al (2012)
DA	-	Price range (<200k, 200k-300k, 300k-400k)	Boterman and Sleutjes (2014), Iman et al (2012)
DA	-	Surface of the house	Iman et al (2012)
DA	-	Smart home features	Iman et al (2012)

Dwelling attribute

For the dwelling attributes, three attributes are used: price (per person), surface and dwelling amenities. In literature, price and surface are used the most with regard to housing valuation and determination. After price and surface, different dwelling amenities are used a lot in studies (like for example a balcony or garden).

Price is in most cases one of the main reasons why people are buying or renting a house, where the price has to be as low as possible.

In order to avoid this trend to happen in this study, the maximum willing to pay price will be taken into account. This is the price a respondent is maximum willing to pay for his property per month. According to Gijzel (2018), the price range for the middle-rent segment is from €700 to approximately €950 per month. Those price values can be used as levels for the price attribute. The Randstad, on average, have higher housing prices than the rest of the Netherlands. However, possibilities to develop micro apartments or dwellings are also taken into account. Therefore, four prices are stated where the price of €950 per month is exceeded. The four following prices are used: Less than €700, €800, €900 and more than €1000.

The second dwelling attribute is the surface of the house. A lot of studies point out that the surface of the house has to be as big as possible. To be able to target this trend, the question is what the minimum surface of the dwelling has to be in order to think about taking the house or not. There is a current trend of micro apartments with a surface of 30 to 40 m^2. According to CBS (2018), the average housing surface from 2012 to 2018 for single households in Randstad cities are between the 60 and 100 m^2. With these values taken into account, the following values are used for the minimal needed surface regarding to housing: smaller than 30 m^2, 50, 70, and bigger than 90 m^2.

At last, the dwelling amenity attribute is used as a dwelling attribute. People often prefer to have outside space at their house. This could be in the form of a balcony or a garden. A near located parc is in the city also considered as outside space, however this space doesn't belong to the property of a dwelling. Therefore, this outside space isn't taken into account at this attribute level. Another important factor for a house is whether it has a parking place or not. A lot of people go to work by car, however it is encouraged more often to go with public transportation. It is interesting to see whether the target audience value a parking place or rather would like to have another dwelling amenity. The last dwelling amenity is whether the dwelling has a garage or storage facility or not. A place to store your bicycle, motorbike or other gear could be from high value for people who have a hobby which requires some storage place to store their goods. In order to see which factor is the most appealing to the target audience, the following levels are incorporated in the dwelling amenity level: balcony, parking place, garden and garage/storage.

Location attribute

A lot of different location attributes have been used in previous housing studies. The location attributes will be divided among two different location attribute types: physical environment characteristics and functional characteristics. Social environment characteristics will indirectly be taken into account, which will be explained below.

There are two attributes which can be clustered within the physical environment attribute: neighborhood amenities and the house location. Common neighborhood amenities are whether a house is situated near green or near water. Near green could be a park, but also grass fields or a forest. Water in this case could be a lake, but also a canal or a sea. Fennema (1995) concluded in her study that water or green around a house is from big value if it is in a 5-10-minute walking range.

A longer distance results in the feeling of not being directly connected with green or water, but just having the idea it is nearby. Therefore, the following levels are used in this attribute: water within 500 m (canal, lake, sea etc.) and green within 500 m (forest, public park, etc.).

It also has to be determined in what kind of neighborhood the respondents would like to live which can be defined as the 'house location'. A house could be stated in the middle of a city, but also in small village. Therefore, four levels are used in order to see what the house location preference is: city center, edge of city center, suburbs (within city) and village outside the city. When people prefer to live in the

city center, it also can be concluded they like to live nearby facilities and social related activities (restaurants, bars, cinema, etc.). This is where social environment characteristic also plays a role. The house location therefore primarily is a physical environment attribute, but also include social environment characteristics.

The other three attributes can be clustered into the functional environment attribute. The first attribute which is used is the distance to a grocery store. This attribute is used a lot in studies, which could easily be explained: people go to the supermarket often to get their food and drinks. From research, the following distances have been found: less than 250 m, less than 500 m, less than 750 m and less than 1000 m.

The other two functional environment attributes can be related to transportation. The first is the distance to the nearest train station and the second is the distance to the highway. There are studies which are using a specific number of minutes towards a train station or highway. It is however hard to estimate certain locations, because time can be interpreted differently among people. Therefore, distance will be used with kilometer as a unity. A lot of people use the train, especially starters who might not have a car on the beginning. On average, Dutch people life 5 km from the nearest train station (CBS, CLO, 2016). Therefore, the following distances to the train station are used: less than 1 km, less than 3 km, less than 5 km and less than 7 km. The last attribute is the distance to a highway. CBS (2012) specifies a neighborhood as a 'top neighborhood' if one of the characteristics of the neighborhood is when the highway is on average 2.5 km stated from the dwelling. Therefore, the following levels are used for this attribute: less than 1 km, less than 3 km, less than 5 km and less than 7 km. Table 4 gives an overview of all the attributes which are used in the profile generation and survey design.

Table 4: List of attributes and values

Number	Type of attribute	Sub attribute type	Attribute Name	Values
1	**Dwelling attribute**		Max amount willing to pay	1. Less than €700 2. €800 3. €900 4. More than €1000
2	**Dwelling attribute**		Minimal surface of the dwelling	1. Less than 30 m^2 2. 50 m^2 3. 70 m^2 4. More than 90 m^2
3	**Dwelling attribute**		Dwelling amenity	1. Balcony 2. Parking place 3. Garden 4. Garage/storage
4	**Location attribute**	Physical environment attribute	Neighborhood amenities	1. Water within 500 m (canal, lake, sea etc.) 2. Green within 500 m (forest, public park, etc.)
5	**Location attribute**	Physical environment attribute	House location	1. City center 2. Edge of city center 3. Suburbs (within city) 4. Village outside the city
6	**Location attribute**	Functional environment attribute	Distance to grocery store	1. Less than 250 m 2. Less than 500 m 3. Less than 750 m 4. Less than 1000 m
7	**Location attribute**	Functional environment attribute	Distance to train station	1. Less than 1 km 2. Less than 3 km 3. Less than 5 km 4. Less than 7 km
8	**Location attribute**	Functional environment attribute	Distance to highway	1. Less than 1 km 2. Less than 3 km 3. Less than 5 km 4. Less than 7 km

3.2.2 Profile generation

With the use of the attributes and levels stated in Table 4, an experimental design can be generated with different profiles. As can be seen in Table 4, eight different attributes will be used in the profile generation. Before the profiles can be generated, the first thing to do is to determine the type of design. There are two types of designs: a full factorial design and a fractional factorial design (Sanko, 2001). A full factorial design incorporates all the possible combinations with the use of the different attributes and values. The amount of different profiles can be calculated with the formula L^M, where L is the number of attribute levels and M the number of attributes. In this research a total of eight attributes are used, where seven attributes have four levels and one attribute have two levels. This means that a total of $4^7 + 2^1$ profiles are generated, which in total are 16.386 profiles. This amount is large to incorporate in the survey and for the respondents to be able to answer. Therefore, a fractional factorial design is chosen. A fractional factorial design is generated from a full factorial design with the use of an alias structure which determines which effects are intended and confounded with each other.

The big advantage of a fractional factorial design is that the number of treatments can be greatly reduced. The results don't differ significantly when taking into account only the main effects (Kemperman, 2000). In this case, a main effect is the effect of a single independent variable on a dependent variable, ignoring all other independent variables. In order to accomplish the main effect, all the attributes have to be independent from each other. This means that a design needs to be generated in which there are no correlations between all attributes. When this is the case, the effects can be estimated independently and any effect can be assigned to one single attribute. This is very useful in order to estimate the most important housing location attributes according to the respondents.

In order to be able to generate the profiles, a statistical software package needs to be used. For this research, the program SAS is used. With the use of SAS, and the knowledge of making a fractional factorial design, an orthogonal design is created within SAS. In fractional factorial designs that are orthogonal, the parameter estimates within the linear model are uncorrelated. This simply means that the attributes are statistically independent from each other, which is necessary within this research. A total of 32 profiles are generated with the use of SAS. Those 32 profiles won't be shown in a single survey design, since 32 profiles are too many profiles for respondents to choose from. Therefore, two survey designs will be made where the 32 profiles will be divided in two times 16 profiles in each survey design. The 32 housing profiles are stated in Appendix A.

When presenting the housing profiles to the respondents in the survey, it is also of importance to include the option 'none of these' next to the profiles. Hensher et al. (2005) states it is good to incorporate an option 'none of these' so respondents don't have to choose an alternative they don't prefer.

With these aspects taken into account, a total of 16 choice pages are included in both surveys where one choice task incorporates three choice options: two housing choice options and one option stating "none of these". Table 5 gives an example of a choice page with regard to the housing choice options.

Table 5: Housing profile choice example

Attribute	Alternative A	Alternative B	None of these
Max amount willing to pay	Less than €700	€800	
Minimal surface of the dwelling	50 m^2	70 m^2	
Dwelling amenity	Balcony	Parking place	
Neighborhood amenities	Water within 500 m (canal, lake, sea etc.)	Green within 500 m (forest, public park, etc.)	
House location	Village outside the city	Edge of city center	
Distance to grocery store	Less than 500 m	Less than 250 m	
Distance to train station	Less than 3 km	Less than 7 km	
Distance to highway	Less than 1 km	Less than 3 km	
Choice	0	0	0

3.2.3 Survey generation

The survey is generated with the use of the online survey system of the TU/e, called Bergenquête 2.2. With this survey system, it is easy to spread the survey with the use of a website link. The survey is composed of three parts: socio demographic and economic questions, the housing profiles and at last the current housing background of the respondents.

Firstly, socio demographic and economic information are asked to the respondents in order to be able to see what the background is of the respondents. The following questions are asked in this topic:

- What is your gender?
- What is your age?
- In which place have you been born?
- In which place do you live right now?
- What is your highest finished education level?
- What is your current work status?
- What is your current gross yearly income?

There are two options for the gender question: male and female. The age, place of birth and current living place are blank, where the respondent is able to fill in the number/place by him/herself. The education level has a lot of options, which are the following: high school mavo, high school havo, high school vwo, MBO, HBO bachelor, WO bachelor, HBO master, WO master and PhD. Work status have four options: student, have a job, jobless and other.

According to Jobnet (2018), the current average starter salary varies between €1800 and €2800 per month. With these numbers having in mind, the following income ranges are used for the yearly gross income characteristic: less than €19.999, between €20.000 - €24.999, between €25.000 - €29.999, between €30.000 - €34.999, between €35.000 - €39.999, more than €40.000 and "I don't like to say".

The last part of the survey comprises out of questions regarding the current housing situation of the respondent. The following questions are asked:

- Did you buy or do you rent your current home?
- What are your current net monthly costs in euro (exclusive gas, water and electricity)?
- What is the surface of your current dwelling in m^2?
- What is your current home composition?
- Which of the house location options do you prefer? Choose the one you think is most important.
- Do you have any intention buying a home in the coming two years?

The first questions have three options: bought, rent, and other. The answer 'other' could apply for someone who is living at his or her parents. Both the monthly costs and the surface of the dwelling are blank, and can be filled in with numbers corresponding to the answer. There are multiple options for the current home composition: I live alone, I live together with my partner, I live with my child(ren), I live with my partner and child(ren), I live with friends or I live with family. The house location question also has several options: I want to live near work, I want to live near educational amenities, I want to live near my family, I want to live near my friends or I want to live in the area where I grew up. The last questions regarding the buying intention has three options: yes, no and don't know yet. The layout of the survey is stated in Appendix B.

3.3 Location analysis

Once the preferences of the starters are analyzed, the locations have to be determined based on the preferences of the starters to redevelop buildings in starter dwellings. With the use of a location analysis, locations can be determined based on certain location requirements. The requirements in this study are the most important attribute levels. Once the locations have been determined, a case study can be done in one of the areas where suitable locations are situated. Within these areas, buildings can be analyzed whether they would be suitable for redevelopment purposes based on size, costs and the location.

In order to do this, first the locations have to be determined. A common way to map locations based on specific requirements for real estate purposes is the use of a geographic information system. A geographic information system (GIS) is software for managing spatial data. According to Grind GIS (2018), there are a lot of different ways GIS can be used in the real estate industry. The first application is to map locations based on spatial preferences of the user. GIS is also used to visualize data to make it more clear. Another application is that it helps with visualizing the spatial planning and developments within a certain area (Grind GIS, 2018). These are all applications which suits the aim of this study: find locations to redevelop buildings into starter dwellings based on the preferences of the starters.

GIS is using three words to describe the functions in general: geographic, information, and system. The word "geographic" implies that locations of data items are known or can be calculated in this system in terms of geographic coordinates. Most data items are programmed in a two-dimensional way. The possibility for three-dimensional data items is also available. "Information" in this context means that the data in GIS are organized to yield useful knowledge, often as colored maps and figures. It is also possible to show the information in statistical graphs and tables. The "system" component consists of a package of computer programs with a user interface that provides access to particular functions (Bonham-Carter, 1994). For a better understanding of a GIS, Figure 4 gives an overview of the different components within a GIS.

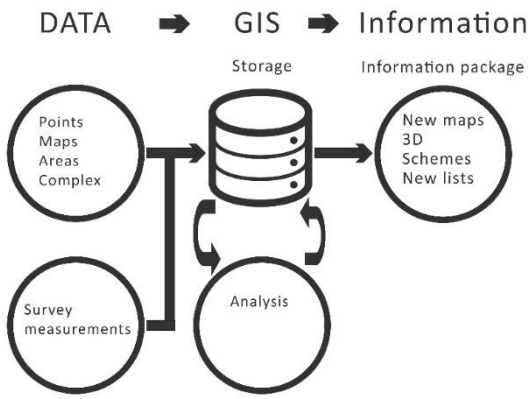

Figure 4: GIS data collection process *(Bonham-Carter, 1994)*

The process of using a GIS starts with the data. Spatial data is raw data distinguished by the presence of a geographic link. The geographic location of a forest or a lake is an example of spatial data. Most of the spatial data can be represented by using a combination of points, lines, or polygons. Usually, non-spatial data is linked to spatial data. This is data such as the name of the forest, or the seasonal temperature of the lake. These various characteristics placed in a GIS are called attributes (as in a conjoint analysis). The data originally comes from old fashion hard copy cards and maps by scanning them into the computer. Nowadays, a lot of data can be gathered from the internet. Also measuring and survey devices data, like GPS receivers and survey instruments with GIS-usable data, can be shared quickly with the use of the internet. All these data sets can be stored and managed as a single unit, called a database. This database resides in the GIS storage system, where it is available for software functions such as analysis and mapmaking. The GIS software is used to ask questions of the spatial data, to search through it, compare it, analyze it, and measure it. Once the analysis has been done, information products have been created. The information products can be presented in the form of schematics, 3D maps, 2D maps or new lists. Before using GIS and start the process of gathering data, transform it into information and create information products, it has to be determined up front what kind of information product is needed at the end of the process. Using GIS have the intentions of improving job performance and decision making.

3.4 Expert interview

It is significant to check the current developments in the market and the vision of real estate developers and investors. Based on some general questions, several companies have been approached in order to see what their vision is based on the current market. The general questions asked, are stated in Appendix C.

Real estate developer Synchroon located in Zoetermeer, really believes in the vision of tiny houses, micro apartments and shared communities. “We just need more dwellings in the Netherlands, especially in the Netherlands. The Netherlands won’t gather new land, so we have to deal with our lands on a different way. Therefore, we need to think more in tiny housing and micro appartments”, said Patrick van Bladel from Synchroon. It is understood that real estate investors look different towards housing: “We don’t invest in tiny houses and micro apartments. Currently, the housing market is booming. We all know that. But this is just a small period over a longer time. The market will already be different in 2020, where interest rates will be higher and the housing prices will decline. The first apartments which will become vacant in that situation, are the tiny houses and micro apartments. Therefore, we only invest in “normal” sized apartments, ranging from 50 – 90 m2,” Willem Helsoot from Bouwinvest said. Nicolette Blok from Annexum (also a real estate investor company) shared the thoughts of Willem, who just invested in a real estate development project made by the company City Side Apartments. City Side Apartments transforms vacant buildings into starter dwellings, but also don’t believe in the tiny housing concept. “We just want to offer qualitative apartments, with enough space. That is good for the renters, and also good for our investments over the long term”, Bob Klaarenbeek said from City Side Apartments.

It can be concluded that the vision of real estate investors and developers are different. According to Synchroon, tiny houses and micro apartments are the future due to the demographic forecasts in the Netherlands. Real estate investors don’t share this vision, and aren’t willing to invest in tiny houses and micro apartments due to the risks these type of dwellings have when the housing market will be different. After the data analysis of the housing preferences of the starters, it is important to compare the outcomes with the vision of the real estate developers and investors stated above. In this way, the housing preferences and the current market conditions are more aligned. The probability will increase that buildings are redeveloped in a realistic market-oriented way, where the housing preferences of the starters are met in the best way possible.

3.5 Conclusion

This chapter handled the several methodologies which will be used in order to analyze the housing preferences of the starters and also theory which will help to get a better understanding whether these preferences are realistic or not.

The preferences are gathered with the use of a conjoint analysis. The conjoint analysis is used in an online survey format in order to collect the data. In total, 8 attributes are used (7 attributes with 4 levels and 1 attribute with 2 levels) in order to generate the housing profiles. The housing profiles are generated with the software program SAS, which yield 32 housing profile choice tasks (with in total 64 housing profiles). Because 32 choice tasks are too many profiles to put into one single survey design, the 32 choice tasks are spread over two survey designs (both with 16 choice tasks). The choice tasks consist of three choice options: two housing profiles and one option stating “none of these”. This prevents that respondents choose a profile they actually don’t prefer.

The two survey designs with the housing profiles are generated in the online survey program “Berg survey 2.2 system”. Besides the choice tasks, also two other parts are included in the design: the socio-economic demographic characteristics and the housing background of the respondents.

This in order to get a better understanding of the background of the respondents, and to analyze differences in preferences based on certain background characteristics.

Once the data has been gathered from the survey design and the data has been processed, a location analysis is conducted to check whether the preferences of the starters are realistic or not. This is done with the use of a geographic information system (GIS) called QGIS.

At last, several short expert interviews have been given in order to get an insight into the vision of real estate developers and investors in the current housing market and to be able to take this vision into account in the final conclusion. In general, real estate investors still favor dwellings with "normal" sizes, (meaning dwellings with a surface of minimal 50 m^2). Investing in tiny houses and mini apartments is in their opinion to risky. When the tension in the housing market declines, those will be the first apartments which will become vacant. Real estate developer Synchroon however is really praising the concept of tiny houses and mini apartment of 30 m^2 based on the expected demographic increase in the Netherlands, and especially in the Randstad region.

4. Results

This chapter handles the results of the several analyses. Section 4.1 gives a short explanation how the data has been gathered. Section 4.2 gives an overview of the descriptive statistics gathered in the survey. This data is also compared with the characteristics of the Dutch population in the same age category, in order to see whether the respondent group is representative for the Dutch population or not. Section 4.3 gives an overview how the data is prepared for further analysis. Section 4.4 gives a description of the data analysis process. Section 4.5 gives the results of the multinomial logit model, both for the complete respondent group as well for separate respondent groups based on certain background characteristics. At last, section 4.6 translates the outcomes of section 4.5 into a location analysis with the use of GIS. Also, a short business case is presented to check the outcomes in real life, and whether the outcomes are feasible or not.

4.1 Data collection

Two surveys with both 16 housing profiles (so 32 in total) have been distributed among the target group. Before the survey has been distributed, a total of 8 people (within the age category of the starters) have looked at the survey and gave feedback regarding the overall layout and questions. These were persons both from the company Dev Real Estate, as well as friends. The surveys have been distributed among friends, family and Facebook. Friends and family have been asked to fill in the survey which has been sent by mail. A request has been sent out in different housing groups on Facebook where people are looking for dwellings or offering dwellings to rent, to fill in the survey.

In total 403 respondents filled in the survey, where 354 respondents in total completed the survey. Due to the age restriction for the definition of "starters on the housing market" between 25 and 34 years old, 32 respondents of the 354 respondents weren't suitable for the study. These respondents had the age of 35 or higher. In total 58 respondents with the age below 25 filled in the survey. These respondents are taken into account in the analysis, because they will be the starters on the housing market a few years from now. The other 49 respondents started with the survey, but didn't finish the survey until the end. Those results also haven't been taken into account. So, in total, 322 respondents are found useful for this study.

4.2 Descriptive statistics

Besides the housing profiles, also descriptive questions have been asked in order to know the background of the respondents and maybe also see some differences between groups within the target group. Economic, socio demographic as well as current housing situation questions have been asked, which are stated in section 3.3.3. Below in Table 6 the results have been summarized from the descriptive questions regarding gender, age, highest finished education level, work situation and gross yearly income. Those statistics belong to the socio demographic and economic questions. Also, statistics have been added about the Dutch population in the age category of 18-35, to see whether the respondent group is a representation of the Dutch population.

Table 6: Descriptive statistics respondent group

		Respondents sample (N)	Respondents sample (%)	Dutch population age 18-35 (%)
Gender	Male	106	33%	51%
	Female	217	67%	49%
Age	18 - 23	58	18%	35%
	24- 26	129	40%	18%
	27 - 30	100	31%	24%
	31 - 34	35	11%	23%
Highest finished education	Low education	6	2%	30%
	MBO	21	7%	25%
	HAVO/VWO	14	4%	16%
	HBO	100	31%	19%
	University	180	55%	10%
Work situation	Student	105	33%	21%
	Have a job	194	60%	74%
	Jobless	14	4%	5%
	Other	10	3%	No data
Gross yearly income	Less than €19.999	128	40%	31%
	€20.000 - €24.999	27	8%	17%
	€25.000 - €29.999	32	10%	16%
	€30.000 - €34.999	38	12%	13%
	€35.000 - €39.999	35	11%	9%
	More than €40.000	44	13%	16%
	Don't like to say	19	6%	No data

There are several differences between the Dutch population with the age between 18-35 and the respondent group according to Table 6. CBS (2019) gives an overview of the gender distribution among different age groups in the Netherlands. In Table 6 it can be seen that the gender distribution in this study isn't equal compared to the Dutch population. This study represents more women compared to the women distribution in the Netherlands. According to CBS (2018) the Netherlands had the following education distribution in 2018 in the age range from 18-35: low educated 30%, MBO 25%, HAVO/VWO 16%, HBO 19% and University 10%. The respondents on average have a higher education level than the average education distribution in the Netherlands in the same age group. In total, 86% of the respondents have an education level of HBO or University.

According to CBS (2018) the labor position in the age category 18-35 is as follow: student 21%, have a job 74% and jobless 5%. Unfortunately, no data can be obtained for the "other" part which have been used in the survey. The respondent group represents more students than the average student percentage in the age category 18-35. Likewise, the amount of people with a job is lower among the respondent group.

Unfortunately, no data is found what the income ranges are per age category in the Netherlands. Only the average income distribution of the complete population has been found. In the Netherlands, the average gross income in 2018 was €37.000 (Gemiddeld Inkomen, 2018). In the respondent group the average estimated yearly gross income is €25.800. The people who don't like to say what their income is haven't been taken into account. Because the options are ranges, this yearly gross income is an estimation and not an exact number. It can however be seen that there are more people in the respondent group with an annual gross income of less than €19.999 than in the Dutch population.

However, there are less people earning more than €40.000 on a yearly basis in the respondent group than the Dutch population. Therefore, it can be concluded that the average income of the respondent group is a little lower than the average income in the Netherlands (CBS, 2018).

It can be concluded that the respondent group doesn't represent the people in the Netherlands within the same age category. The respondent group comprises out of more females, have on average a higher education level, comprises out of more students and have a lower yearly gross income. A respondent group with more students and a lower income can have an effect on the housing price attribute.

4.2.1 Housing characteristics of respondents

Besides questions regarding socio economic and demographic characteristics, questions about past and current housing situations have been asked. Figure 5 represents the places where the respondents are born and Figure 6 represents the places where the respondents currently live. The dots don't represent the number of respondents living in a place, but just the places where the respondents used to live and current live. The list with how many respondents are living in which place, is stated in Appendix D.

Figure 5: Places where respondents are born

Figure 6: Places where respondents currently live

The respondents in the respondent group have moved to the Randstad from all of the country comparing Figure 5 with Figure 6. The outcomes of Figure 6 are logically, based on targeting people within the Randstad to fill in the survey. The difference between Figure 5 and Figure 6 can be explained by the fact that on average more students are represented in the respondent group compared to the same age category in the Netherlands. Students have to move to big cities where universities are stated. The Randstad has a lot of cities with universities and other schools. The employment rate in the

Randstad is compared to other parts of the Netherlands also higher, which could result that students stay more often in the region where they have studied because of the job opportunities (CBS, 2017).

Other questions regarding the current housing situation of the starters were the home location preference, the home composition, the current home ownership situation and the intention to buy a dwelling within two years. Those data have been displayed in graphs in the Figures 7-10.

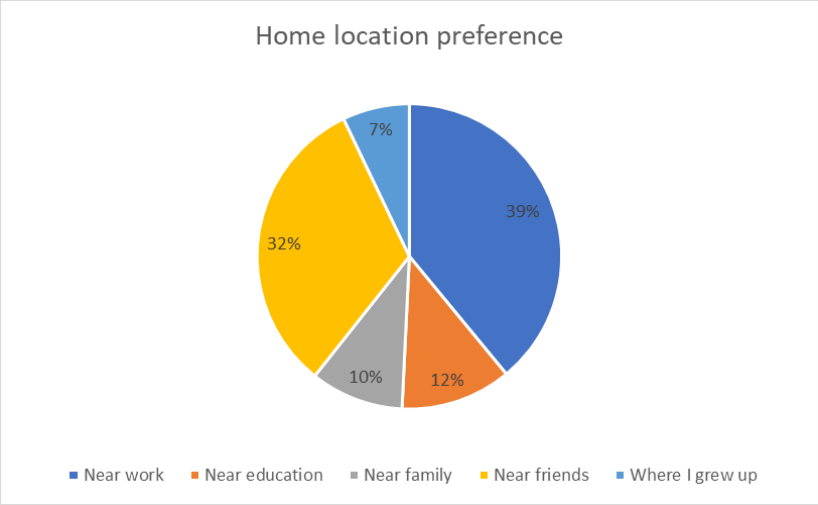

Figure 7: Home location preference

Figure 7 states that the respondents would like to live either close to their friends (32%) or close to their work (39%). The main reason for people to house themselves somewhere, according to studies stated in section 2.4.1, are also to live nearby friends or work. So, these results aren't a surprise. The respondents would like to live near education in 12% of the cases. This could be explained by the fact that a big number in the respondent group are students. The other two reasons, near family with 10% and "where I grew up" with 7%, are the least preferred reasons for the respondents to house themselves somewhere.

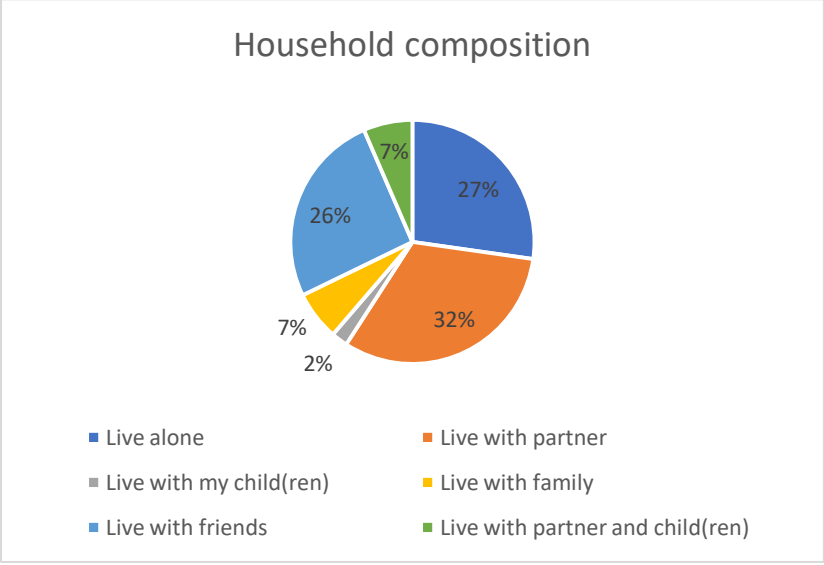

Figure 8: Household composition

Figure 8 represents the current home composition of the respondents. The biggest group, with 32%, is living with a partner. The other two big groups, are living alone (27%) or living with friends (26%). Currently, 37% of the inhabitants in the Netherlands are living alone. So, in this respondent group, less people are living alone compared to the Dutch population. This could be caused by the fact that the respondents are still young and in general haven't lost a partner due to aging and ended up living alone. The smallest percentage of the respondent group is living with child(ren) without a partner (2%).

This also can be caused by the fact that the respondents are relatively young and haven't been married and potentially divorced yet.

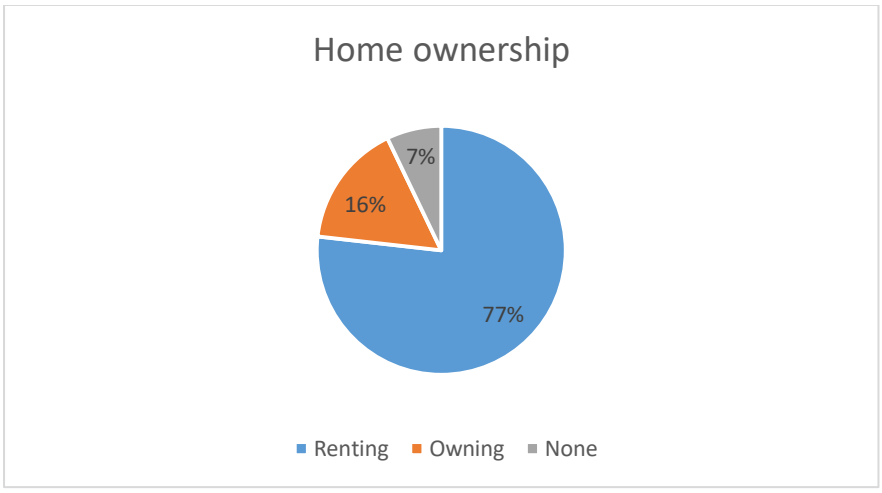

Figure 9: Home ownership

Figure 9 represents the diagram whether the respondents are owning a dwelling or not. Most respondents currently are renting a dwelling (77%). This could be explained by the fact that housing prices are very high at the moment and the shortage on the housing market is big (Voogt S. , 2018). From the remaining respondents, 16% is owning a dwelling and 7% neither is owning or renting a place and probably is still living with family.

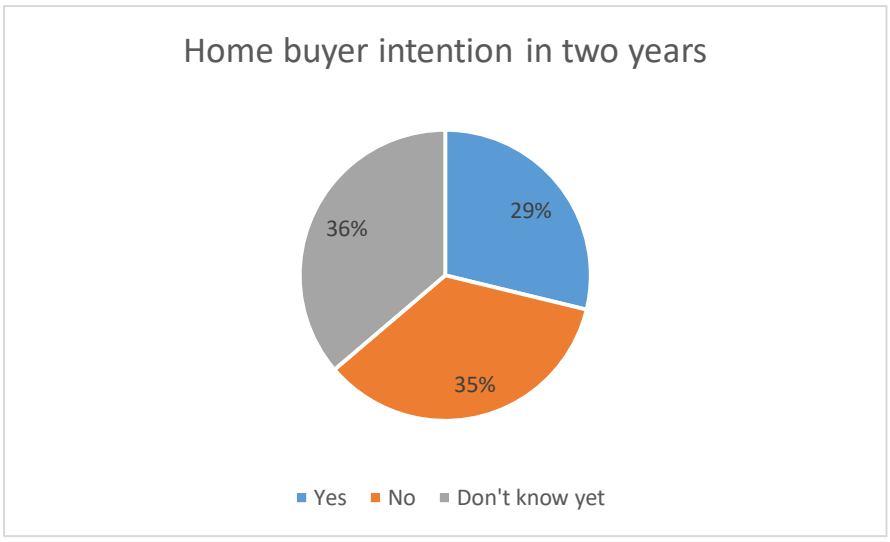

Figure 10: Home buyer intention in two years

Figure 10 represents whether respondents would like to buy a dwelling in the coming two years or not. It's surprising to see that the majority of the respondents either don't want to buy a dwelling (35%) or doesn't know yet whether they would like to buy a dwelling in the coming two years (36%). Only 29% states they would like to buy a dwelling in the coming two years. This may be explained due to the characteristics of the respondent group who likes to have a luxury and financial flexible lifestyle (which in terms of generations can be clustered into the millennials). The home ownership rate of the millennial group has fallen at a faster rate than any other age group. Some don't just see the value of owning a home, while others feel squeezed out of the housing market due to their student-loan debt. Millennials like to have a luxury life style, even if that means they can't buy a house (Patel, 2018).

4.3 Data preparation

A multinomial logit model is used in order to analyze the data. Multinomial logit models are used to model relationships between a polytomous response variable and a set of regressor variables (So & Kuhfeld, 2019). The data from the survey can't be imported directly into NLogit in order to make the analyses with the use of a multinomial logit model.

In order to prepare the data for the analysis in NLogit, several coding schemes can be used like effect coding and dummy coding. The most common and simplest coding system is dummy coding. Dummy coding is a way of incorporating nominal variables into regression analysis (Solution, 2019). This is the way to make the categorical variable into a series of dichotomous variables. A new variable will be created that has a value for each observation at that level and zero for all others. Effect coding allows to assign different weights to the various levels of the categorical variable. The rule in effect coding is that the sum of all values in any new variable must be zero, while the rule in dummy coding is that only values of zero and one are valid. Because dummy coding have been used in studies on a more common base, dummy coding has been used as the coding scheme.

Table 7: Dummy coding scheme

	Dummy coding		
Level	D1	D2	D3
1	1		
2	0		
1	1	0	
2	0	1	
3	0	0	
1	1	0	0
2	0	1	0
3	0	0	1
4	0	0	0

Table 7 represents the example of a dummy coding table. In the case of four levels, the first three levels are one or zero in order to represent a level or not. The fourth level only has zeros. If all the three levels have a zero as value, it is known that all those levels aren't represented, so the fourth level should be represented. When also incorporate the fourth level with a one to represent this level, the model would get redundant information which results in multicollinearity and could eventually break the model. This means one level per attribute has been left out, and calling this missing level the reference category (Solution, 2019). Appendix E gives an overview of the dummy coding layout which has been used as input file.

4.4 Data analysis

The data have been analyzed with the use of the econometric software package NLOGIT 5.0 to be able to estimate the MNL model. NLOGIT have been used for 25 years by a lot of scientific experts, which is therefore considered as a proper software package to estimate the MNL model. Firstly, the data of all the respondents will be analyzed. It will be checked whether the estimated model is good enough for further analysis, with the use of a goodness of fit check. If the goodness of fit is good, the analysis can be continued.

With the coefficients estimated by the model per level, the preferences for the levels within an attribute can be estimated. When these values are stated into a graph, it can easily be seen what the most preferred level is within an attribute. This is also called a part-worth utility graph, where the part-worths are the utility values for the separate parts of the housing profile. From these utility values, the importance per attribute will be calculated. In this way, it can be seen which attribute is valued as the most important by the respondents and which are the least. The most important attributes can be taken into account at the location analysis. At last, the 32 housing profiles are ranked according to the part-worth utilities of the housing profiles. In this way, a good insight is given which housing profiles are preferred the most (and also the corresponding levels of the attributes within that profile) and which housing profiles are preferred the least.

Besides analyzing the complete respondent group, also subgroups are analyzed based on similar background characteristics. This is done in order to see whether there are differences in preferences based on certain background characteristics. These outcomes can be used at the time when the target group for real estate investors or developers have certain background characteristics. When they target a high-educated group, the housing preference differences between different education levels can be taken into account in the building design.

The following subgroups are analyzed based on similar characteristics:

- Gender
- Work status
- Income
- Home location preference
- Education level

The difference between men and women are analyzed due to the fact that there are relative more women in the respondent group compared to the ratio between men and women among the Dutch population. Respondents with the same work status background are analyzed due to the fact that the respondent group has way more students than the Dutch population, so it is interesting to see what the differences are between students and people who for example have a job. Respondents with another income are analyzed because this gives insights of what kind of dwellings can be realized based on people with a certain income level. Respondents value to live near work or near friends in most cases regarding home location preferences. It is interesting to see whether these groups have other housing preferences than other respondents with another home location preference. At last, the different education levels are analyzed due to the fact that the respondent group have a relative high education level compared to the Dutch population. It is interesting to see what the home preference differences are among low educated respondents and high educated respondents.

4.5 Estimation Results

Both the outcomes of the complete respondent groups as well as the sub groups with certain background characteristics are stated below.

4.5.1 Complete respondent group

The data obtained from the second part of the survey, the conjoint analysis, is analyzed using the multinomial logit model. The outcomes of the survey have been coded as input data for NLogit. The input data set have been coded with the use of dummy coding, described in section 4.3. Because dummy coding has been used, the fourth level of the four level attributes, and the second level of two- level attribute are used as the reference level.

Due to dummy coding, the coefficients of the last level of each attribute has been set to zero. When the utility of a level is positive, this means that the level of the specific attribute is more preferred than the reference level. When the utility of a level is negative, this means that the level of that attribute is less preferred than the reference level.

From the estimated MNL model the goodness of fit of the model (R^2) is calculated. The R^2 is a statistical measure of how close the data are to the fitted regression (Minitab, The Minitab Blog, 2013). The formula of calculating the goodness of fit is stated below.

Goodness of fit: $R^2=1-LL(B)/LL(0)$
where LL(B) is the loglikelihood value of the estimated model
LL(0) is the loglikelihood of the null model

The calculation of the goodness of fit of the MNL model is 0,162, which is a proper value for such an experiment and design. Table 8 shows an overview of the coefficients and the significance of each attribute level.

Table 8: Outcomes MNL model

Attribute	Level	Coefficient	Standard Error	b/St.Er.	Prob |z|>Z*
Constant		-1,5370	0,1447	-10,624	0,0000
Price	<€700	1,8367	0,0869	21,123	0,0000
	€800	1,3374	0,0818	16,334	0,0000
	€900	0,8338	0,0742	11,234	0,0000
	>€1000	0[a]	-	-	-
Surface	<30 m^2	-2,0988	0,0888	-23,625	0,0000
	50 m^2	-0,7201	0,0669	-10,764	0,0000
	70 m^2	-0,1637	0,0693	-2,361	0,0182
	>90 m^2	0[a]	-	-	-
Dwelling amenity	Balcony	0,0781	0,0677	1,153	0,2490
	Parking place	-0,0152	0,0789	-0,193	0,8466
	Garden	0,3531	0,0717	4,952	0,0000
	Garage/storage	0[a]	-	-	-
Green amenity	Water within 500 m (canals etc.)	0,0658	0,0536	1,228	0,2193
	Green within 500 m (public park etc.)	0[a]	-	-	-
Dwelling location	City center	1,0837	0,0743	14,538	0,0000
	Edge of city center	0,5724	0,0772	7,413	0,0000
	Suburbs (within city)	0,5623	0,0688	8,173	0,0000

	Village outside the city	0[a]	-	-	-
Supermarket location	Less than 250 m	0,1300	0,0802	1,621	0,1050
	Less than 500 m	0,0395	0,0820	0,482	0,6299
	Less than 750 m	0,0547	0,0669	0,818	0,4133
	Less than 1000 m	0[a]	-	-	-
Train station location	Less than 1 km	0,9044	0,0854	10,583	0,0000
	Less than 3 km	0,6040	0,0820	7,367	0,0000
	Less than 5 km	0,4788	0,0748	6,400	0,0000
	Less than 7 km	0[a]	-	-	-
Highway location	Less than 1 km	0,3494	0,0882	3,960	0,0001
	Less than 3 km	0,4009	0,0862	4,650	0,0000
	Less than 5 km	0,2956	00745	3,969	0,0001
	Less than 7 km	0[a]	-	-	-

a. This parameter is set to zero because it is set as the reference category within the attribute.

The coefficient of the constant states whether respondents in general preferred the housing profiles or not. The coefficient of the constant in Table 8 is negative, which implies that the respondents in general don't prefer the housing profiles stated in the survey. Regarding the attribute levels, a positive coefficient indicates that respondents are more likely to prefer that attribute level compared to the reference level. A negative coefficient indicates that respondents are less likely to prefer that level compared to the reference level.

The significance of each attribute is determined by analyzing the probability value (P) of each attribute level. The model is based on a 95% confidence interval. This means that a probability value of $P<0.05$ means the level is statistically significant. With the outcomes of Table 8, the following attributes and the corresponding levels are significant, stated in Table 9. The levels 'balcony' and 'parking place' within the dwelling amenity group aren't statistically significant.

Table 9: Significant attribute levels

Attribute	Level	Coefficient	Significance
Price	€700	1,8637	0,000
	€800	1,3374	0,000
	€900	0,8338	0,000
Surface	30 m2	-2,0988	0,000
	50 m2	-0,7201	0,000
	70 m2	-0,1637	0,0182
Dwelling amenity	Balcony	0,0781	Not Sig.
	Parking Place	-0,0152	Not Sig.
	Garden	0,3531	0,000
Dwelling location	City center	1,0837	0,000
	Edge of city center	0,5724	0,000
	Suburbs (within city)	0,5623	0,000
Train station location	Less than 1 km	0,9044	0,000
	Less than 3 km	0,6040	0,000
	Less than 5 km	0,4788	0,000
Highway location	Less than 1 km	0,3494	0,001
	Less than 3 km	0,4009	0,000
	Less than 5 km	0,2956	0,001

This means that these attributes in combination with the levels are decisive in the decision-making process of the respondents. The other attributes with their corresponding levels do not have an effect in the decision-making process of the respondents with regard to housing preferences.

Price

Starters are more likely to choose the lowest price level which is €700. It is also seen that the preference declines when the price is moving up. It can be concluded that the starters would like to have a price as low as possible.

Surface

The surface attribute is the attribute where a dwelling becomes less attractive when it becomes smaller and smaller. A dwelling with a surface of <30 m2 is the least preferred level with a coefficient of -2,0988 compared with the reference level. The degree of negative preference based on the surface declines once the surface becomes bigger, where the coefficient of 70 m^2 is -0,1637. It can be concluded that respondents aren't willing to pay €700 for a 30 m^2, but are willing to pay €700 for a 90 m^2.

Dwelling amenity

Only the garden level of the dwelling amenity is significant, implying that the other levels (balcony and parking place) don't influence the home preferences of the respondents. The balcony level however has a positive coefficient, implying this is a preferred level for the respondents. A parking place however has a negative preference in the housing preference of starters compared with the reference level.

Dwelling location

All the levels of the dwelling location attribute are significant, implying this is an important attribute for respondents. The closer a house is located near the city center, the better. It is however remarkable to see that the difference between the utilities of the "edge of city center" level and "suburbs (within city)" level is very small (respectively 0,5724 and 0,5623), implying that a dwelling located in one of the two areas almost have the same preference for the respondents.

Train station location

The train station location also is of big importance, because all the levels are significant implying that a train station has to be in the neighborhood of the dwelling. The closer the train station is located, the higher the preference for a dwelling is.

Highway location

Also, at the highway location attribute, all the levels are significant. The second level of the attribute (less than 3 km) is the most preferred level in the attribute. This can be explained by the fact that people don't like to live to nearby a highway, due to noise and smell, but still would like to be on the highway on a short base in order to go to work for example (Kam, Lim, Al-Obaidi, & Lim, 2018). Figure 11 gives the total part-worth utility graph, which represents Table 9 in a more visual way.

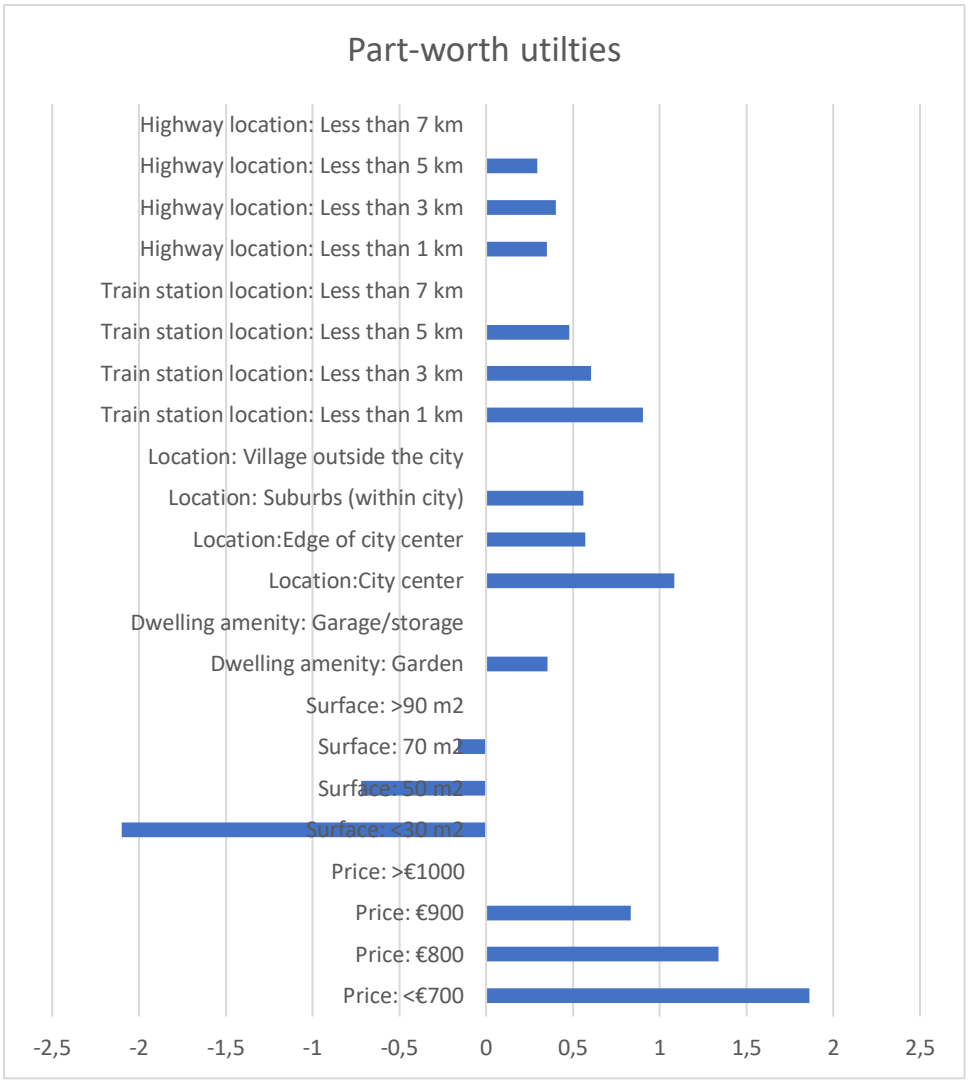

Figure 11: Part-worth utilities of significant attribute levels

It is also possible to check the relative importance of the attributes with significant levels. This is done on the basis of the range between the highest and the lowest utility value of each significant attribute level. By calculating this range and determining the sum of all these ranges, a percentage of the degree of importance of each attribute is calculated to each other. First, the attribute utility range has to be calculated. Next, the total attribute utility range has to be calculated. The final step is to calculate the relative importance of the attributes. The calculations of the attribute utility range are stated in Table 10.

Table 10: Relative attribute importance for significant levels calculation

Attribute	Level	Part-worth utility	Attribute utility range	Attribute importance
Price	<€700	1,8637	1,8637-0=1,8637	(1,8637/6,6531)*100% = 28,0%
	€800	1,3374		
	€900	0,8338		
	>€1000	0		
Surface	<30 m2	-2,0988	0—2,0988 = 2,0988	(2,0988/6,6531)*100% = 31,5%
	50 m2	0,7201		
	70 m2	-0,1637		
	>90 m2	0		
Dwelling amenities	Garden	0,3531	0,3531-0=0,3531	(0,3531/6,6531)*100% = 5,3%
	Garage/storage	0		
House location	City center	1,0837	1,0837-0=1,0837	(1,0837/6,6531)*100% = 16,3%
	Edge of city center	0,5724		
	Suburbs (within city)	0,5623		
	Village outside the city	0		
Distance to train station	Less than 1 km	0,9044	0,9044-0=0,9044	(0,9044/6,6531)*100% = 13,6%
	Less than 3 km	0,6040		
	Less than 5 km	0,4788		
	Less than 7 km	0		
Distance to highway	Less than 1 km	0,3494	0,3494-0=0,3494	(0,3494/6,6531)/100% = 5,3%
	Less than 3 km	0,4009		
	Less than 5 km	0,2956		
	Less than 7 km	0		
Sum			6,6531	100%

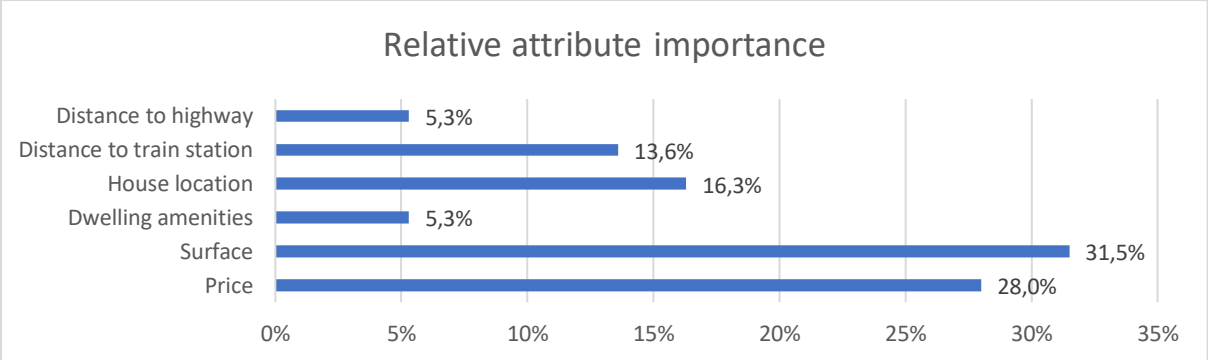

Figure 12: Relative attribute importance for significant attributes

In Figure 12 it can be seen that the surface attribute (31,5%) and the price attribute (28,0%) are the most important attributes. This isn't a surprise, because these attributes come forward in other studies as the most important attributes by respondents regarding housing preferences. The two most important attributes next to surface and price are house location (16,3%) and distance to train station (13,6%). The two other attributes (distance to highway and dwelling amenities) both have an attribute importance percentage of 5,3%

Now the attribute importance has been calculated, it can be seen what the preference per choice task is by calculating the so-called utilities of the housing profiles. The utility is calculated by summing up all the coefficients stated in a housing profile. By calculating this utility, it is possible to say which housing profile is the most appealing for the respondents. Also, the least appealing housing profile can be estimated. Below a ranking is stated in Table 11, with the three most preferred housing profiles and the three least preferred housing profiles. The complete ranking table can be found in Appendix F. The calculations for the utilities are stated in Appendix G.

Table 11: Top 3 most and least preferred housing profiles

	Rank	Utility	Housing profile	Choice set
Most preferred	1	3,9569	4	2
		Less than €700 - More than 90 m^2 - Balcony - Green within 500 m - City Center - Supermarket within 250 m - Train station within 5 km - Highway within 1 km		
Most preferred	2	3,7068	51	26
		Less than €700 - 70 m2 - Garden - Water within 500 m - City Center - Supermarket within 250 m - Train station within 7 km - Highway within 3 km		
Most preferred	3	3,493	30	15
		Less than €700 - 70 m2 - Garden - Green within 500 m - Suburbs - Supermarket within 250 m - Train station within 5 km - Highway within 5 km		
Least preferred	62	-1,2059	31	16
		More than €1000 - More than 90 m2 - Balcony - Green within 500 m - Village outside city - Supermarket within 750 m - Train station within 5 km - Highway within 3 km		
Least preferred	63	-1,5503	14	7
		More than €1000 - 70 m2 - Garden - Green within 500 m - Village outside - Supermarket within 1000 m - Train station within 5 km - Highway within 7 km		
Least preferred	64	-1,7602	40	20
		Less than €700 - Less than 30 m2 - Garage/storage - Green within 500 m - Village outside the city center - Supermarket within 1000 m - Train station within 5 km - Highway within 5 km		

From the 64 profiles, 57 profiles have a positive overall utility value. This means that 57 housing profiles have a positive preference according to the respondent group. Since price and surface are the most important attributes according to the relative attribute importance estimation, it is also not a surprise that the respondents would like to have the biggest apartment for the lowest price (less than €700 and more than 90 m2). The respondents also would like to live in the city center, which can be explained by the fact they would like to live nearby social facilities and amenities. The first profile however isn't a realistic profile in the current housing market with regard to price and size and the demand of houses. Looking at the second and third profile, it is remarkable to see that both profiles have a smaller preferred surface (70 m^2). The preferred distance to the highway is however bigger. The preference for the house location at the third profile is also different, with a preference of living in the suburbs. The challenge is to meet as many housing preferences of the respondents which are in line with the current housing market. This has been studied in the business case in section 4.6.2.

Remarkable to see is that the least preferred profile has the lowest price, and still is the least preferred housing profile. This is due to the fact that the levels "Less than 30 m2" and "Village outside the city center" are within this housing profile. These levels both have a big negative utility value, resulting in an overall big negative utility.

4.5.2 Separate respondent groups

It is interesting to see whether there are differences in preferences within respondent groups based on certain background characteristics besides the preferences of the complete sample. Conducting a MNL model based on those certain characteristics, could give new insights in the preferences. Groups with a relative low income may have other preferences than groups with a relative higher income. The different groups are determined based on the asked socio-demographic question in the survey. The groups which will be analyzed are the following:

- Groups based on gender
- Groups based on work status
- Groups based on income
- Groups based on home location preference (living near friends, work, etc.)
- Groups based on education level

Those groups have been chosen for a reason. The first one is gender. The ratio between men and women in the respondent group of the survey isn't the same as the ratio between men and women in the Netherlands. Therefore, it is interesting to see whether there are differences between the two groups. Secondly, groups are studied based on work status background characteristics. The general understanding is that students prefer other attributes than people who are working. This is the same for people with other income levels. People who are able to spend more on a monthly basis, probably also prefer bigger dwellings with a higher price. Another interesting characteristic to study is the difference between the respondents who like to live on a certain place for a specific reason. People who like to live near work to reduce travel time, may have other preferences than people who like to live near friends. Lastly, the differences between education levels are taken into account. Only the attribute levels which are significant are taken into account. When there are levels within an attribute which are significant and there are levels which aren't significant, all the levels are stated but the non-significant levels are not taken into account.

For every background characteristic group, the relative attribute importance table is stated. The corresponding coefficients and significant values are stated in Appendix H.

Gender

The first background characteristic group that has been taken into account is the gender group. In total 105 male respondents filled in the survey and 217 female respondents filled in the survey. The ratio male-female isn't the same as the ratio in the Dutch population, where the ratio is nearly 50:50. So in the respondent group more females are stated. Looking at the R^2-value, the model of the men (0,17385) has a slightly better fit than the model of the women (0,16057). Figure 13 gives the relative attribute importance graph for the gender groups.

The preferences between men and women are significantly different for three attribuets. First of all, the price. It can be stated that women value price more than men, because of the higher utilities for the different price levels. The other two attributes are related to the location. The train station location is preferred more by the women, while the highway location is preferred more by men. A reason for this difference may be the car possession among men and women in the starter age category. According to CBS (2019) 54% of the men in the age range of 25-35 owns a car, while 41% of the women owning a car in the same age category. Furthermore, the preference for the house location and the dwelling amenity are more the less the same. There is a slight difference between the surface preference, where men value the surface a little more than women (33,4% and 30,6%).

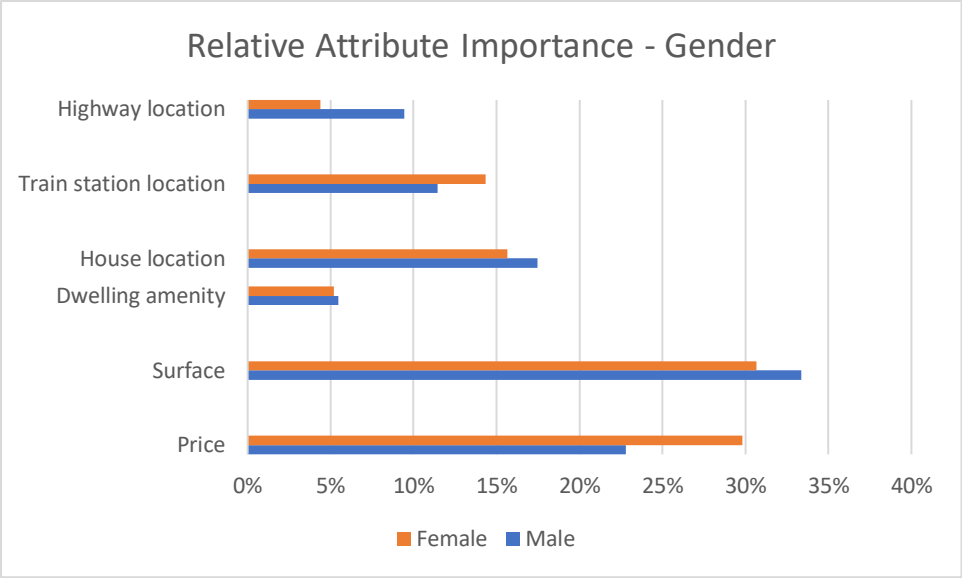

Figure 13: Relative attribute importance for gender groups

Work Status

Within the work status characteristic group, two categories have been removed and can't be analyzed due to a lack of respondents with that background. These are the "jobless" group (14 respondents) and the "other" group (10). According to Hensher et al. (2015) there must be at least 30 respondents within a group to be able to say something about their behavior and characteristics. Therefore, these groups can't be taken into account. In total 105 respondents marked themselves as students, and 194 respondents marked themselves as having a job. The R^2 for people with a job is slightly better than for students (0,17581 compared to 0,16479) which makes the fit for the model a little better for the "have a job" group. Figure 14 states the relative attribute importance graph for the work status group.

The first interesting thing to see is that the highway location and the dwelling amenity aren't of significant importance to students, so these attributes aren't of importance for students when they want a dwelling. This can be explained by the fact that in general more people with a job own a car, compared to students which makes a preference for a near located highway less. The preference for the train station location and the dwelling location are almost the same for both groups. There is however a big difference in the surface preference, where people with a job have a far more negative preference for small dwellings with a surface of <30 m^2 than students (-2,4313 compared to -1,7771). This can be explained by the fact that people with a job don't like to live in a student room anymore, and want a bigger place to live.

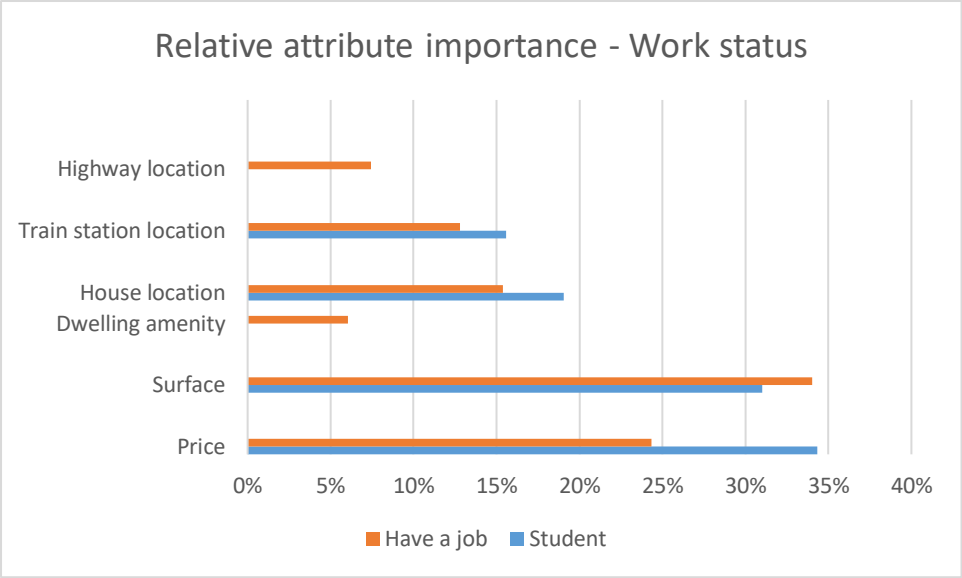

Figure 14: Relative attribute importance for work status groups

Income

Two categories within the income characteristic group aren't suitable for further analysis. The "€20.000 - €24.999" group has 27 respondents and the "don't want to say" group has 19 respondents, which is below the required minimum of 30 according to Hensher et al. (2015). The ">€40.000" income group has the best model fit, with a R^2 of 0,23897. Figure 15 gives the relative attribute importance graph for the income group.

Every attribute is taken into account because there is a total of five categories. The first attribute is the price attribute. In general, the higher the income the less important the price attribute is for the respondent. The income group "€25.000-29.999" values the price attribute as the most important compared to the other groups. With the surface level, it is exactly the other way around. The higher the income, the higher the surface attribute is valued as important as can be seen in Figure 15. This can be explained by the fact that people with more money overall have more choice compared to housing. Looking at the dwelling amenity, there are only two groups who are valuing the dwelling amenity attribute, namely the "<€19.999" group and the ">€40.000" group. It looks respondents with a low income and good earning respondents are valuing a garden a little bit. This is however remarkable, because "students" (where it can be assumed that they are in the lowest income category) in the work status part don't value a dwelling amenity as important. So, these may be people earning less than €19.999 but aren't students. The house location attribute is more the less the same, where the ">€40.000" and the "<19.999" groups value this attribute as the most important compared to the other groups. The train station location is valued as the least important by the "> 40.000" group, which may be explained by the assumption that these people have cars and other income groups in general owning cars less. At last, the highway location is valued as important only by three groups: ">€40.000", "€30.000-€34.999" and "<€19.999". It is hard to explain the preferences among these income categories, because these groups are very different from each other regarding the income level.

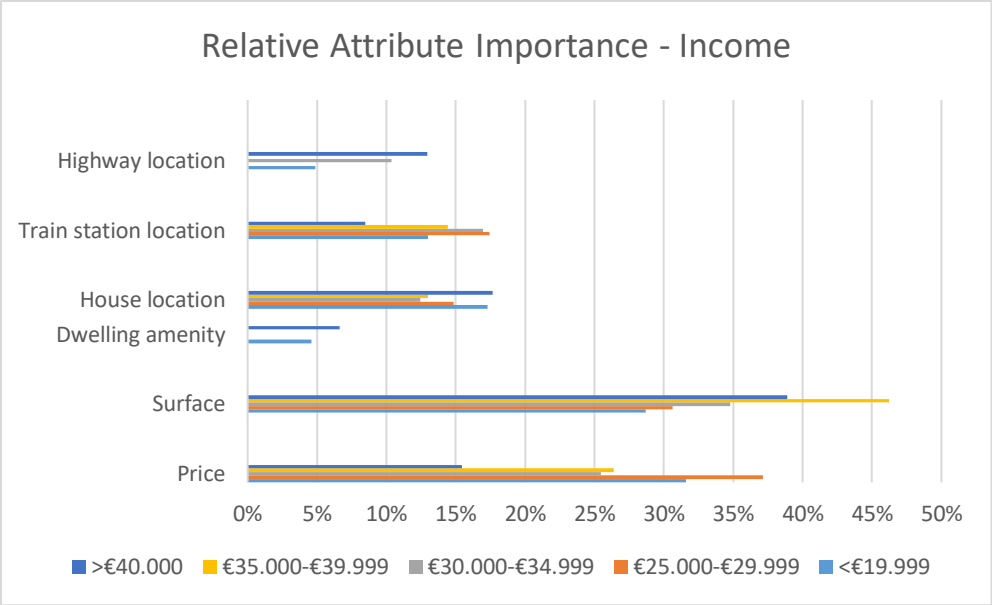

Figure 15: Relative attribute importance for income groups

Home location preference

Also, in this group there is one category which can't be included in the analysis. The "where I grew up" group only has 23 respondents, which is too small for further analysis. The other groups have the following number regarding respondents: near work (126 respondents), near education (38 respondents), near family (32 respondents) and near friends (104). The "near friends" group has the best model fit of all the groups regarding the R^2 with a value of 0,21274. The group with the lowest fit is the "near family" group, with a R^2 of 0,14466. Figure 16 represents the relative attribute importance of the home location preference category.

It's interesting to see that the people who would like to live near friends, don't value the price as important as the other groups. Maybe they are willing to pay a little more to be able to live nearby their friends. The surface attribute importance is for all the groups approximately the same. The dwelling amenity only has been valued as important by the "near friends" and "near family" groups. This may be caused because these groups might be more social oriented, and would like to welcome their friends in their garden at home. The house location attribute has two groups which values this attribute way more than the other groups: the "near friends" group and the "near work" group. These groups are the two most common reasons why people move to a certain place, so for these people the place where they house themselves is very important. The "near family" group values the train station location a less than the other groups. At last, the "near school/education" group is valuing the highway location way more than the other groups, where the "near family" group don't even value it as important. This is remarkable, because people who would like to live near school or education, in general are students who are owning less cars than people who for example work.

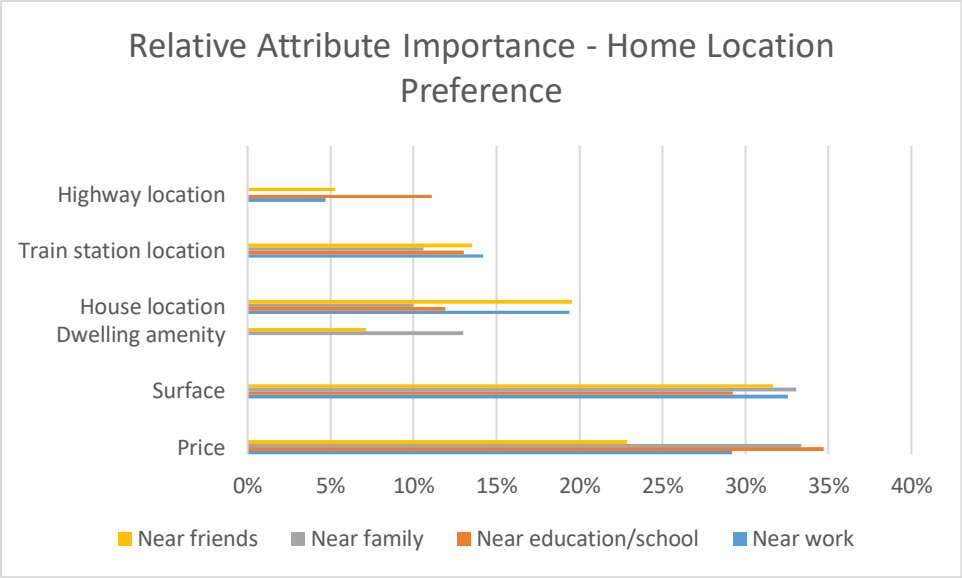

Figure 16: Relative attribute importance for home location preferences groups

Education level

At the education level, there are only two groups suitable for further analysis: HBO and WO. The other groups (MBO with 14 respondents, Low education with 21 respondents) have to little respondents to be analyzed. The HBO group has 100 respondents, and the WO groups has 181 respondents. The model fit is the best for the WO group, with a R^2 of 0,21130. The HBO group has a R^2 of 0,13100. Figure 17 gives the table of the relative attribute importance of the education level category.

There is a big difference in price valuation by the HBO and the WO group. The HBO group is valuing price as way more important than the WO group. At the surface attribute, the HBO group even don't value the surface as important at all. This may be explained by the fact that on average a person with a HBO background own less than a person with a WO degree. The dwelling amenity isn't valued as important by both groups. For the house location and the train station location attribute, HBO is valuing both attributes as more important than the WO group. The highway location isn't valued by the HBO group at all.

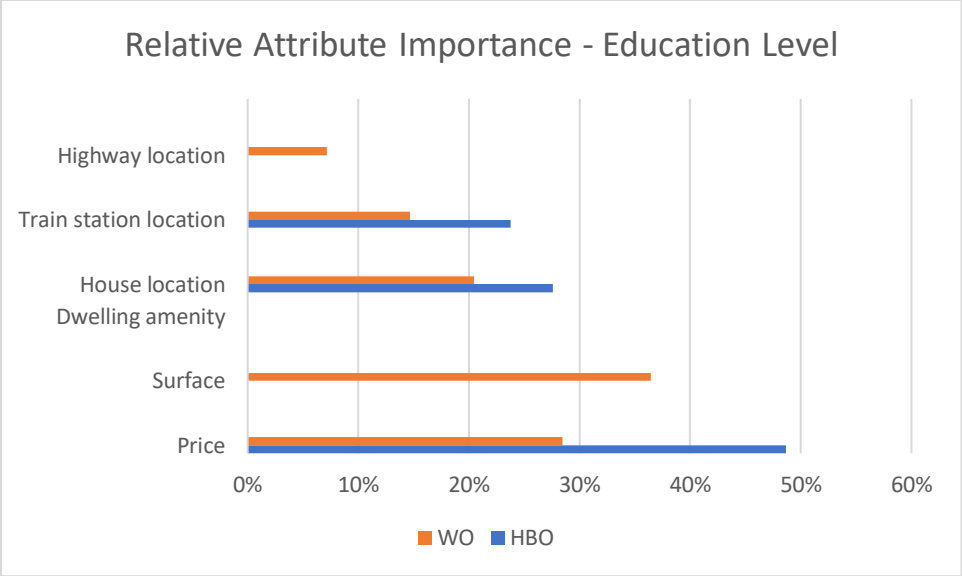

Figure 17: Relative attribute importance for education level groups

It can be concluded that there are differences among groups with different background characteristics, but they don't differ significantly compared to the general outcomes. The best relation can be seen in the income group, where the respondents with the lowest income value price as most important and the surface as least important compared to the other income groups. This is the other way around for the higher income group. People who like to live near work and near friends almost have the same outcomes, where these groups value the house location the most compared to the other groups. It also can be stated that people with a lower education value price higher than surface, which can be explained by the fact that these groups in general have a lower income.

4.6 Location analysis results

From the outcomes in section 4.5, several things can be concluded. The attribute "distance to supermarket" isn't statistically significant for any level, so this attribute doesn't have to be taken into account. For the dwelling amenity, only one level is significant, which is the garden.

The most important attributes are surface (31,5%) and price (28,0%). Unfortunately, no data could be found about the prices per m^2 per building which could be loaded into GIS immediately. Therefore, these attributes will be handled at last when locations have been determined based on the other attributes. Based on these locations and the average price per m^2 for residential dwellings in that area, an estimation can be made whether these locations are suitable according to the price and surface preferences.

The house location attribute is valued as the most important attribute for all the location attributes (16,3%), the distance to the train station attributes comes second (13,6%) and the distance to the highway attribute (5,3%) is valued as the least important attribute of all the location attributes. Therefore, the statistically significant location attributes (house location, distance to train station and distance to the highway) are taken into account as input for GIS to determine the locations based on these attributes.

The most preferred house location is a dwelling located in the city center. The most preferred distance to the train station is within 1 km and the most preferred distance to the highway is within 3 km. No data could be found which could define the type of area within a region (whether a house is located in the city center, or in a village). It can be manually determined within a geographic map (for example Google Maps) whether a certain location is geographically situated within a location attribute level area (for example the city center). Therefore, the "distance to train station" and "distance to highway" attribute will be taken into account first in the location analysis.

First of all, the train station locations and the highways need to be buffered within GIS. A buffer means that a specific point, line, or polygon will be expanded in the circumference with an input variable r (where r is the radius). The most preferred level of the "distance to train station" attribute is less than 1 km, and the most preferred level of the "distance to highway" is less than 3 km. Therefore, the input variable for the train station locations is 1 km and the input variable for the highway locations is 3 km. This results in two different maps in GIS: the train station locations with an area of 1 km around them as their buffer, and the highway locations with lines with an expansion of 3 km at both sites as a buffer.

In order to see where the locations are stated where both restrictions are met, these two layers have to be clipped. Clipping in GIS means that two layers are converted into one layer, where the characteristics of both layers have to be met. So, in this case, the locations are determined which are located within a 1 km radius of the train station and are also located within a radius of 3 km of the highway. The locations are stated in Figure 18.

Figure 18: Clip output layer GIS

The next step is to incorporate the "house location" attribute into the clip output layer stated in Figure 18. The respondents prefer to live in the city center the most. However, it is remarkable to see that the third most preferred housing profile stated in Table 11 has the suburbs as the preferred house location level. Regarding the preference outcomes regarding surface and price, not only the "city center" level has been taken into account, but the levels "outside the city center" and "suburbs" as well. This because in general the city center is the most expensive place to live, which makes it hard to realize starter dwellings with a surface of 90 m^2 for a price of €700. The "village outside the city" attribute level has a negative preference regarding the other house location attributes. Therefore, locations in Figure 18 located in villages are not taken into account.

Figure 19 gives the overview of the locations located in city centers, locations outside the city center and the locations in the suburbs with taken in mind that the locations are within a 1 km radius of a train station and within a 3 km radius of a highway.

Figure 19: Preferred housing locations after clip in GIS

4.6.1 Price and Surface within GIS

The next step is to incorporate the two most important attributes into the GIS output: price and surface. With the use of the average m^2 price of residential dwellings per area in the Netherlands, it can be estimated what the price of dwellings are within a certain location for the different surface attribute levels. Figure 20 gives an overview of the prices per m^2 in 2017 per district in the Netherlands.

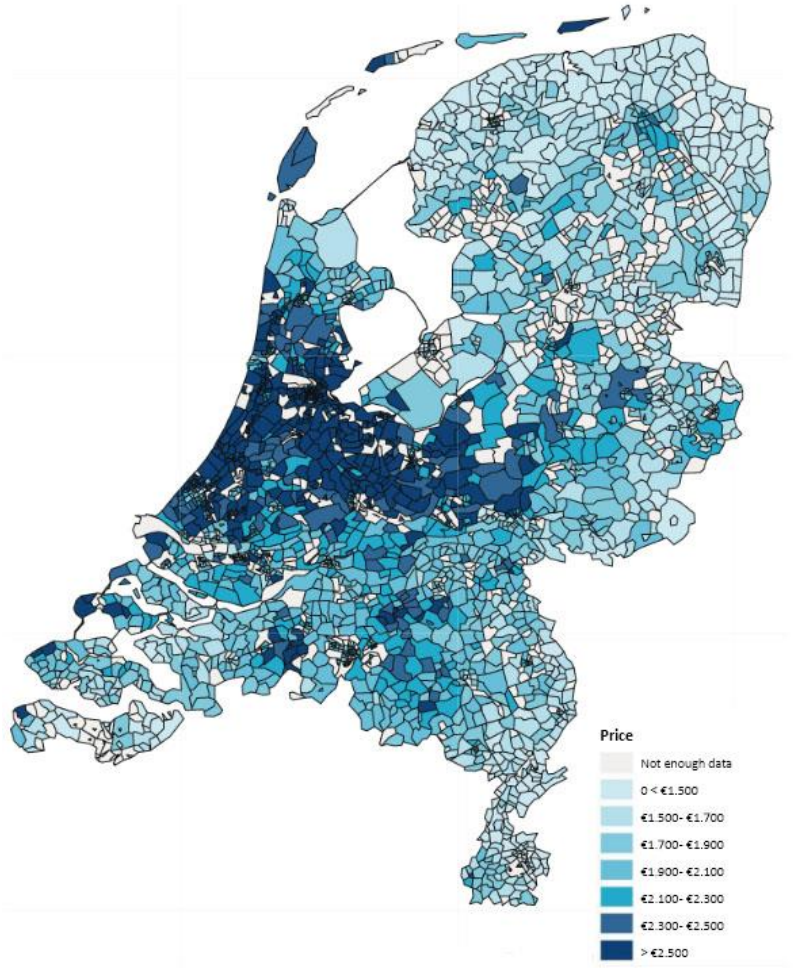

Figure 20: Dwelling prices per m^2 per district in 2017 *(Elsevier, 2019)*

According to NVM (2019) the price increase in the 4th quarter of 2018 comparing to the 4th quarter of 2017 is on average 10,2%. So, an additional 10,2% can be added upon the prices stated in Figure 20 for the average current prices per m^2 for residential buildings in the Netherlands.

The respondents prefer the surface level of more than 90 m^2 the most with a monthly price of <€700. In order to see whether these preferences are feasible for the determined locations stated in Figure 19, the total dwelling price of dwellings can be estimated by multiplying the m^2 prices with the surface. With the use of mortgage calculations, it can be estimated what the monthly expenses are for dwellings. However, the maximal mortgage also can be determined based on the maximum price willing to spend on a monthly base. Table 12 gives an overview how much money would be available in terms of a mortgage if the monthly mortgage costs needs to be €700, €800, €900 or €1000 according to NVM (2019). These maximum mortgages have been rounded up to thousands of euros and are an estimation, so numbers in real life may deviate. The estimation could differ for rent prices, but there are no straight calculation guidelines for rent prices which are in line with the real market situation. This because rent

prices in the Randstad are often higher than the suggested rent prices according to the rental calculations according to the Dutch Huurcommissie (2019).

Table 12: Maximum mortgage based on preferred net monthly costs

Monthly costs	Maximum possible mortgage
€700	€194.000
€800	€222.000
€900	€250.000
€1000	€277.000

Table 13 gives an overview of the preferred areas, clustered per city, with their corresponding m^2 price per area according to Elsevier (2019). From that point, the prices for dwelling with the different surface levels (30 m^2, 50 m^2, 70 m^2 and 90 m^2) have been determined. The prices have been rounded up to thousands of euros.

Table 13: Average prices per area based on different surface levels.

City	Area	Price per m^2 2017	Price per m^2 2018	30 m^2	50 m^2	70 m^2	90 m^2
Amersfoort	De Berg Noord	€3.113	€3.431	€103.000	€172.000	€241.000	€309.000
	De Berg Zuid	€2.974	€3.277	€98.000	€164.000	€230.000	€295.000
	Soesterkwartier	€2.745	€3.025	€91.000	€152.000	€212.000	€273.000
	Zielhorst	€2.152	€2.372	€72.000	€119.000	€166.000	€214.000
	Hooglanderveen	€2.500	€2.755	€83.000	€138.000	€193.000	€248.000
Hilversum	Zuidoost	€3.135	€3.455	€104.000	€173.000	€242.000	€311.000
Amsterdam	Bijlmer Centrum (D,F,H)	€2.668	€2.940	€89.000	€147.000	€206.000	€265.000
	Diemen Noord	€3.196	€3.522	€106.000	€176.000	€247.000	€317.000
	Diemen Zuid	€3.186	€3.511	€106.000	€176.000	€246.000	€316.000
	Transvaalbuurt	€5.480	€6.039	€182.000	€302.000	€423.000	€544.000
	Middenmeer	€5.265	€5.802	€174.000	€290.000	€407.000	€523.000
	Indische Buurt	€5.444	€5.999	€180.000	€300.000	€420.000	€540.000
	Apollobuurt	€6.783	€7.475	€225.000	€374.000	€524.000	€673.000
	Rijnbuurt	€6.130	€6.755	€203.000	€338.000	€473.000	€610.000
	Overtoomseveld	€3.649	€4.021	€121.000	€202.000	€282.000	€362.000
	Slotervaart	€3.801	€4.189	€126.000	€210.000	€294.000	€377.000
	Westlandgracht	€4.151	€4.574	€138.000	€229.000	€321.000	€412.000
	Slotermeer-Noordoost	€3.778	€4.163	€125.000	€209.000	€292.000	€375.000
Haarlem	Parkwijk	€2.861	€3.153	€95.000	€158.000	€221.000	€284.000
Leiden	Leiden Noord	€3.026	€3.335	€100.000	€167.000	€234.000	€300.000
	Binnenstad Zuid	€3.517	€3.876	€117.000	€194.000	€272.000	€349.000
	Bos- en Gasthuisdistrict	€2.713	€2.990	€90.000	€150.000	€210.000	€270.000
Den Haag	Bezuidenhout	€2.271	€2.503	€75.000	€126.000	€176.000	€226.000
	Laakkwartier en Spoortwijk	€1.694	€1.867	€56.000	€94.000	€131.000	€168.000
	Centrum	€3.132	€3.451	€104.000	€173.000	€242.000	€311.000
Delft	Hof van Delft	€2.798	€3.083	€93.000	€155.000	€216.000	€278.000

	Tanthof-Oost	€2.465	€2.716	€82.000	€136.000	€191.000	€245.000
	Voorhof	€1.990	€2.193	€66.000	€110.000	€154.000	€198.000
Zoetermeer	Rokkeveen	€2.277	€2.509	€76.000	€126.000	€176.000	€226.000
	Centrum	€2.055	€2.265	€68.000	€114.000	€159.000	€204.000
Schiedam	Oost	€1.493	€1.645	€50.000	€83.000	€116.000	€149.000
Rotterdam	Centrum	€3.233	€3.563	€107.000	€179.000	€250.000	€321.000
	Kralingen-Crooswijk	€2.943	€3.243	€98.000	€163.000	€228.000	€292.000
	Feijenoord	€2.300	€2.535	€76.000	€127.000	€178.000	€229.000
	Prins Alexander	€2.205	€2.430	€73.000	€122.000	€171.000	€219.000
	IJsselmonde	€1.741	€1.919	€58.000	€96.000	€135.000	€173.000
Gouda	Binnenstad	€2.235	€2.463	€74.000	€122.000	€173.000	€222.000
	Bloemendaal	€1.977	€2.179	€66.000	€109.000	€153.000	€197.000
Woerden	Woerden-Midden	€2.707	€2.983	€90.000	€150.000	€209.000	€269.000
	Woerden-Oost	€2.591	€2.855	€86.000	€143.000	€200.000	€257.000
Utrecht	Vleuten-De Meern	€2.970	€3.273	€99.000	€164.000	€230.000	€295.000
	Leidsche Rijdn	€2.865	€3.157	€95.000	€158.000	€221.000	€285.000
	West	€3.655	€4.028	€121.000	€202.000	€282.000	€363.000
	Noordwest	€3.123	€3.442	€104.000	€173.000	€241.000	€310.000
	Binnenstad	€4.175	€4.601	€138.000	€231.000	€323.000	€415.000
	Zuidwest	€2.811	€3.098	€93.000	€156.000	€217.000	€279.000
	Zuid	€3.027	€3.336	€100.000	€167.000	€234.000	€301.000
	Overvecht	€2.111	€2.326	€70.000	€117.000	€163.000	€210.000
	Maarssenbroek	€2.164	€2.385	€72.000	€120.000	€167.000	€215.000

The maximum mortgage starters can get when they would like to have a dwelling for a net price of €700 per month, based on a surface of 90 m^2 is €194.000. Looking at the prices in the last column in Table 13, the following areas have been found as suitable for redevelopment purposes when dwellings need to be 90 m^2 with monthly costs of €700.

- Den Haag - Laakkwartier en Spoortwijk
- Schiedam - Oost
- Rotterdam -IJsselmonde

Adjusting the price as well as the surface, gives other opportunities regarding suitable redevelopment locations within the Randstad. Table 14 gives the representation of the amount of feasible areas with 16 different price surface combinations (the four surface levels and the four price levels). Figure 21 gives the price surface curve, to represent whether there is a relationship between surface and the amount of feasible areas based on the different monthly price levels.

Table 14: Feasible areas based on four price levels and four surface levels

Monthly net costs	Mortgage based on monthly costs	Surface (m^2)	Feasible areas within price range
€700	€194.000	30	47
		50	37
		70	16
		90	3
€800	€222.000	30	48
		50	42
		70	25
		90	10
€900	€250.000	30	49
		50	44
		70	36
		90	16
€1000	€277.000	30	49
		50	44
		70	38
		90	21

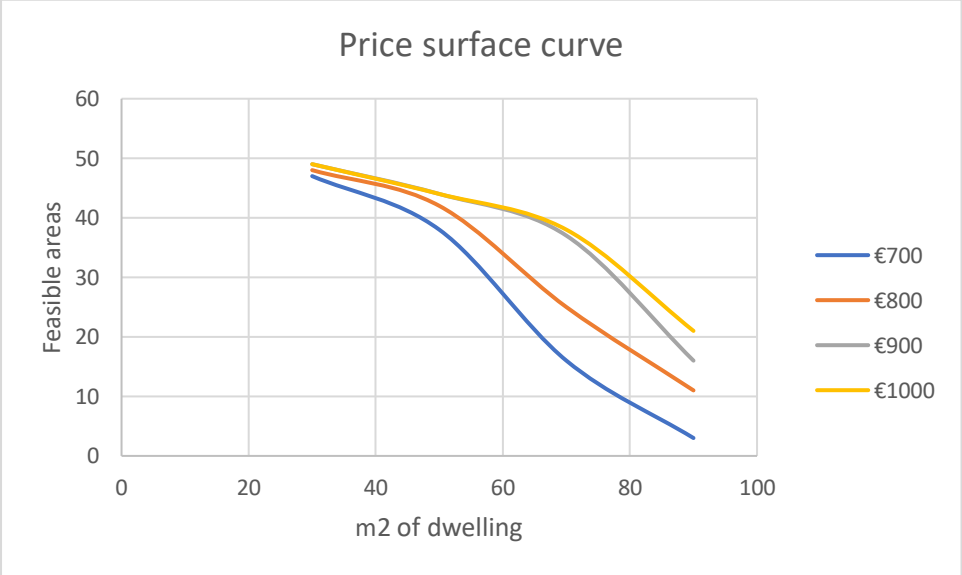

Figure 21: Price surface curve

Figure 21 states that there is a tipping point around the surface of 50 m^2 for the price levels €700 and €800 with regard to the amount of feasible areas to redevelop buildings. Realizing bigger dwellings, results in a fast decline with regard to feasible areas. Especially for the price of €700. Looking at the housing profile preference ranking in Table 11, it can be seen that the second and third housing profiles in the ranking also have a preferred price of €700. Only a limited number of locations are feasible to have monthly costs of €700. When adding €100 to the €700, eight additional locations are added to the feasible areas with taking into account that the surface has to be 90 m^2. However, the size of a dwelling has a higher impact on the number of suitable locations compared to price. Having an apartment of 70 m^2 instead of 90 m^2, increases the number of extra feasible locations with 13.

4.6.2 Business case for the region Rotterdam

The outcomes of section 4.6.1 are based upon general numbers of the housing market. In order to see whether these outcomes (based on the preferences of the starters) are in line with the current housing market conditions, a business case can be made in order to check whether the outcomes are realistic. Vacant buildings are used in order to see whether the preferences of the starters are realistic in real life.

There are only three areas which suits the restrictions of a 90 m^2 dwelling for a monthly price of €700 (areas within Schiedam, Den Haag and Rotterdam). It is interesting to explore regions closely stated to the best locations, to see whether there are more proper locations and buildings to redevelop in the current housing market conditions. Therefore, a complete region of a city is analyzed in order to find dwellings which could be suitable for redevelopment. At first, the price and surface requirements won't be taken into account. These attributes will be tested at last when a building has been found regarding the other location attribute preferences.

Schiedam only has one area that suits the preference, Den Haag has three areas and Rotterdam has five areas. Because it is useful to explore as many options as possible, the region of Rotterdam is used as the business case area. The five areas that meet the location attributes (without taking into account the surface and price attributes) are the following:

- Centrum
- Kralingen-Crooswijk
- Feijenoord
- Prins Alexander
- IJsselmonde

Because the respondents' value the surface and price as the most important attributes, the city area which suits the preference of the respondents will be taken into account first, which is Rotterdam – IJsselmonde. Unfortunately, there is no database available of dwellings and buildings which are vacant. With the use of the website "Funda in Business" it is possible to check which buildings are for sale at the moment. The assumption can be made that buildings which are for sale are vacant or will be vacant soon. However, there is a possibility that there are vacant buildings that aren't for sale, but would be suitable for redevelopment.

There are two other factors which has to be taken into account regarding redevelopment. At first, hallways need to be made in the vacant buildings between the apartments to be able to come from one apartment to the other apartment. According to the Bouwbesluit Online (2019) hallways at least have to have a width of 1,2 m. Based on a rectangular building surface of 10m x 50m (500 m^2), a hallway surface is needed (in the worst-case scenario) of 10 m x 1,2 m = 12 m^2. This is a percentage of 2,4%. In real life, buildings don't have perfect rectangular designs, where more m^2 of hallways are needed. Therefore, a 5% loss is used on a total surface due to hallway usage. The other factor is the amount of costs which have to be taken into account to redevelop an office building into starter dwellings. A housing corporation in Nieuwegein, managed to transform a former office building to student housing for €700 per m^2 with the use of prefab construction methods (Jong, 2013). Jutphaas Wonen (2013) also was able to transform an office in Utrecht to 25 social renting dwellings in 2013 for €700 per m^2 (Provincie Utrecht, 2013). However, both of these projects were established in 2013, where building costs were lower than nowadays due to lower material costs and lower labor costs. Comparing 2013 with 2019, there has been a general price increase of 19% (Cobouw, 2019). Based on these numbers, costs would raise to €833 per m^2 in 2018. Costs might have even rise even more in real practices. Therefore, a transformation price of €900 per m^2 is accepted for this study.

IJsselmonde

In IJsselmonde, the average household price for a 90 m^2 dwelling is €173.000. When looking at the price per m^2, the price is €1922 per m^2. There are a lot of buildings vacant in the region of IJsselmonde. Most of the buildings are however vacant and could be rented, but are not for sale. When adapting the search results to "only for sale buildings", the amount drops drastically. Several buildings aren't suitable for redevelopment purposes, based on their location and their current use. An example is a building in the middle of the shopping center of IJsselmonde, which is only suitable for shops. Also, a car company building isn't suitable to redevelop into starter dwellings. With these aspects taken into account, only two buildings are found suitable to redevelop into starter dwellings, stated in Figure 22.

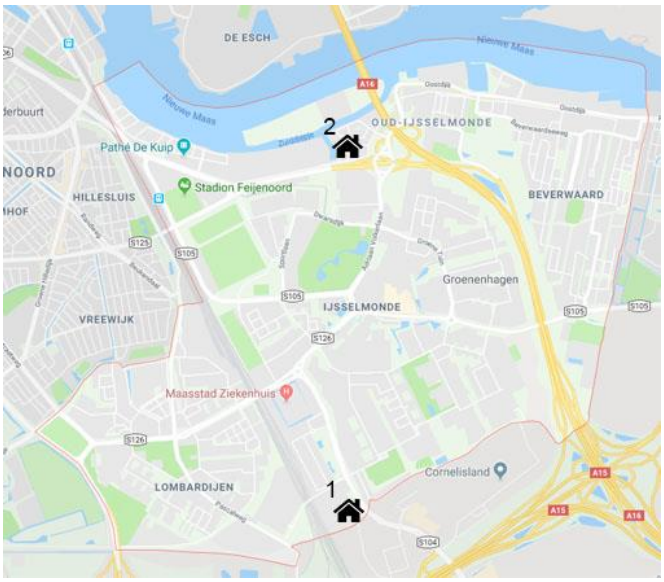

Figure 22: Building 1 and 2 in IJsselmonde, Rotterdam

Building 1 – Van 't Hoffstraat 25:

The first building is an office building with showroom, a terrain and 8 parking places shown in Figure 23. The total inner surface of the building is 853 m^2 and the asking price is €835.000. When deducting 5% of the surface due to hallway loss, the space would be 810 m^2. With taking an average dwelling price per m^2 of €1919, the building would increase in price from €835.000 to €1.555.000. So, there is a €720.000 redevelopment costs space in order to break even. The transformation costs are €900 per m^2, which are a total cost of €767.000 (based on 853 m^2). So, redeveloping this building would not be interesting for investors and developers.

Besides that, the back of the building is a warehouse as can be seen in Figure 24, which will cost more money than the average m^2 redevelopment price of €900 per m^2. Therefore, this dwelling won't be suitable to be redeveloped into starter dwellings.

Figure 23: Van 't Hoffstraat 25, Rotterdam
(Funda in Business, 2019)

Figure 24: Warehouse of Van 't Hoffstraat 25, Rotterdam
(Funda in Business, 2019)

Building 2 – Pesestraat 60:

The second building is a building without a warehouse, stated in Figure 25. It has a surface of 617 m^2 and costs €910.000. Cutting down a 5% surface loss due to hallways, results in a dwelling surface of 586 m^2. Redeveloping the building into starter dwellings, will result that the building will be worth €1.125.000 after redevelopment with taking the average dwelling price of €1919 per m^2 into account. So, the space for redevelopment purposes is €215.000 in order to break even. However, the redevelopment costs are €528.000, which will result in a loss of €313.000 for the project, which makes this project financial not feasible.

Figure 25: Pesestraat 60, Rotterdam
(Funda in Business, 2019)

Figure 26: Back view, Pesestraat 60, Rotterdam
(Funda in Business, 2019)

The location of the building also doesn't meet the most important location preferences by the respondents, namely that the building is located within the city center. Table 17 already states that there are only 3 regions in the complete Randstad to redevelop buildings according to the surface and price guidelines of 90 m^2 for €700. However, the other possibilities are still taken into account in the other regions of Rotterdam, starting with the city center of Rotterdam.

Centrum

Unfortunately, no suitable vacant buildings are stated at the moment in the city center of Rotterdam. This may be caused by the fact that the city center always is a highly demand area with regard to housing and real estate.

Kralingen-Crooswijk

In the city part Kralingen-Crooswijk of Rotterdam, only one building would be suitable for redevelopment purposes, which is the building located at the Jan Leentvaarlaan 61-67 stated in Figure 27 and 28. This is an office villa, with a total surface of 737 m^2 excluding the rooftop balcony for a price of €1.650.000. After the 5% hallway deduction, this would be a dwelling surface of 700 m^2. The dwelling price per m^2 in Kralingen-Crooswijk is €3.243 which results that the building would be worth €2.270.000 after redevelopment. Redevelopment costs would be €630.000, resulting in a project loss of €10.000.

However, the price per dwelling would be approximately €292.000 when making apartments of 90 m^2, which already is above the €1000 per month based on the mortgage calculations. The price has to be €194.000 in order to have a monthly cost of €700. By dividing the price by €3.243, the maximum surface which can be developed in order to get this price is 59 m^2 without even taken the redevelopment costs into account. So, also this building can't meet the preferences of the starters.

Figure 27: Leentvaarlaan 61-67, Rotterdam
(Funda in Business, 2019)

Figure 28: Google Maps location Leentvaarlaan, 61-77 Rotterdam

Feijenoord

The same applies for the region Feijenoord as the city center of Rotterdam. In this region also no suitable buildings are for sale at the moment for redevelopment purposes.

Prins Alexander

In the region of Prins Alexander, several buildings are stated which could be suitable to be redeveloped. However, the same applies to the region of IJsselmonde. There are a lot of buildings with warehouses and garages in the building, which are hard to be transformed into starter dwellings. However, the vacant office building located at the Zevenkampse Ring 342 may be suitable for redevelopment purposes stated in Figure 29 and 30. The building has a space of 500 m^2 and has a price of €675.000. This space only applies to the ground floor. The price per m^2 for dwellings in this area on average is €2.430. After the 5% hallway deduction, the dwelling surface is 475 m^2. This would mean that the building would be worth €1.155.000 after redevelopment. There is €520.000 left to be able to redevelop the building and break even with the project. Redevelopment costs for this building would be €427.000, resulting in a €93.000 profit. There are also multiple parking places, and a big green area behind the building which tenants can use as their garden.

Figure 29: Zevenkampse Ring 342, Rotterdam
(Funda in Business, 2019)

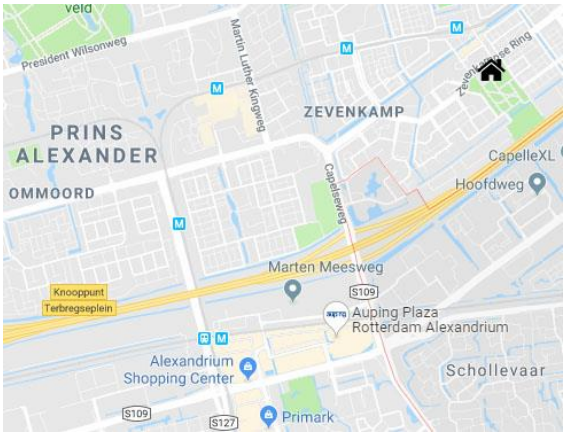

Figure 30: Google Maps location Zevenkampse Ring 342, Rotterdam

4.6.3 Rotterdam area comparison with preferences starters

Now the feasible areas of Rotterdam (regardless of price and surface) have been handled, the differences per area can be compared regarding the preferences of the respondents. Table 15 represents which preferences are met in all the five areas of Rotterdam.

Table 15: Starter housing preference reality check

		Rotterdam				
Attribute	**Area**	**Centrum**	**Kralingen-Crooswijk**	**Feijenoord**	**Prins-Alexander**	**IJsselmonde**
	Preference					
Price and surface	90 m^2 for €700	No	No	No	No	Yes
Dwelling amenity	Garden	No	No	No	Yes	Yes
House location	City center	Yes	No	No	No	No
Distance to train station	Less than 1 km	Yes	Yes	Yes	Yes	Yes
Distance to highway	Less than 3 km	Yes	Yes	Yes	Yes	Yes

As can be seen in Table 15, not a single area is meeting all the preferences of the respondents. IJsselmonde is almost meeting all the preferences, except the building isn't located in the city center. Prins Alexander has the same problem, where the 90 m^2 for €700 also can't be met in this area. In the areas Feijenoord and Centrum there aren't suitable vacant buildings available at the moment according to Funda in Business (2019). The building in Kralingen-Crooswijk has the façade already looking like an apartment building, however it isn't in line with the preferences of the respondents with regard to the price – surface ratio, the dwelling amenity and the house location.

4.6.4 Meeting preferences of starters

Within the business case stated in section 4.6.3, the most preferred attribute levels have been used. According to the expert interview in section 3.4, real estate developer Synchroon believe in the power of tiny houses and micro apartments in a shared community environment. However, several real estate investors don't want to take the risk of investing in very small apartments in a tensed housing market situation, and believe in investing in apartments with a minimal size of 50 m^2. It can be concluded that all the housing preferences of starters can't be met. It is important to both meet the preferences of the starters, as well as having enough possibilities to redevelop buildings within the Randstad.

Figure 12 states that the two most important attributes are surface (31.5%) and price (28,0%) for the starters. It can be stated that surface has a bigger importance than price for this starter group. It is however interesting to see what the difference in the number of feasible areas are when adjusting the price and having the same surface, as well as changing the surface while having the same price. Table 16 represents the number of feasible areas based on a dwelling surface of 90 m2 and other monthly costs. Table 17 represents the number of feasible areas based with monthly costs of €700, and a different dwelling surface.

Table 16: Number of feasible areas based on same dwelling surface (90 m^2)

Monthly net costs	Mortgage based on monthly costs	Feasible areas within price range
€700	€194.000	3
€800	€222.000	11
€900	€250.000	16
€1000	€277.000	21

Table 17: Number of feasible areas based on same monthly costs (€700)

Surface	Mortgage based on monthly costs	Feasible areas within price range
90 m2	€194.000	3
70 m2	€194.000	16
50 m2	€194.000	37
30 m2	€194.000	47

It can be seen that adding two extra levels regarding price (€900) for a 90 m^2 surface gives the same amount of feasible development locations as downgrading the surface with one step to 70 m2 for €700. Next to the surface and the price, the location of the house is at the third place of most important attribute. Location has a very strong connection with the price of a building in an area. In order to be able to meet the preferences of the starters at best, it is recommended to increase the monthly price to €800 and decrease the size to 70 m^2 for several reasons. Firstly, it increases the number of feasible areas to redevelop buildings from 3 to 25. This increases the possibilities for real estate developers and investors to redevelop dwellings according to the needs of the starters. Secondly, with more possible areas, the house location preference can be met as good as possible. Unfortunately, within the 25 areas no area is situated within a city center. However, there are areas situated at the edge of the city center. At last, with downgrading both size and price with one level, the preferences of the starters are still met as good as possible based on the most important attributes.

4.7 Conclusion

This chapter describes the results of the analyses done in this research. In total 409 respondents filled in the survey, from which 322 respondents fit in the starter profile with the age between 25 and 34. Respondents younger than 25 have also been taken into account because they will be in the starter group in a few years.

The descriptive statistics of the respondent group have been compared to the statistics of the complete Dutch population group. In the respondent group, more females are stated compared to the Dutch population. The group on average also have a higher education level, comprises out of more students and on average has a lower income. The lower income can easily be explained by the fact that more students are represented in the respondent group compared to the Dutch population. Below, the most common filled in answers are stated regarding housing characteristics:

- Home location preference: near work 39%, near friends 32%
- Home composition: Live with partner 32%, live alone 27%
- Home ownership: Renting 77%
- Home buyer intention: Don't know yet 36%, No 35%

The data has been prepared with the use of dummy coding, based by the fact this coding language is used most common in research. Both the complete respondent group has been analyzed, as well as separate respondent groups in order to see differences in respondents with different background characteristics. Below the attribute levels have been stated with the highest utility, which also are statistically significant:

- Price: <€700
- Surface: >90 m^2
- Dwelling amenity: Garden
- House location: City Center
- Train station location: Less than 1 km
- Highway location: Less than 3 km

Also, separate groups have been analyzed in order to see differences in certain groups with specific background characteristics. These outcomes don't differ substantially from the general outcomes. The outcomes are however useful for future redevelopment plans when targeting a specific group with certain background characteristics, like for example income.

The last part comprised of the location analyses in combination with the business case. It can be concluded that the optimal profile regarding dwelling- and location preferences can't be met in the current housing market. Starters either have to house themselves in another location than the city center, have to pay more for a 90 m^2 dwelling or have to pay €700 for a smaller dwelling. It is recommended to increase the monthly price to €800 and decrease the surface to 70 m^2 in order to increase the number of feasible areas from 3 to 25. In this way, the house location preferences also can be met as good as possible and real estate developers and investors have more opportunities to redevelop dwellings according to the preferences of the starters.

5. Conclusion and recommendations

This chapter gives the conclusion of the overall research. Both the sub questions and the main questions are answered in section 5.1. After the conclusion have been given, the scientific relevance will be stated in section 5.2. Section 5.3 describes the limitations of the research. At last, section 5.4 will give recommendations for future research and to real estate investors and developers with regard to developing.

5.1 Conclusion

This research has the initial purpose to get an insight in the housing preferences of starters at the housing market in the Randstad region. Starters on the housing market in this study are people with the age between 25 and 34. Currently, there is a big shortage in affordable dwellings for these starters in the Randstad. When vacant buildings are redeveloped into starter dwellings in the Randstad region, more housing possibilities might be created for this group. With taking the preferences of these starters into account, proper dwellings are created according to the preferences of the starters. On the other side, this research is a guideline for real estate developers and investors to develop and invest in real estate located in the preferred areas according to their target group: starters. This helps to either make dwellings according to the preferences of the starters, as well as help to target the societal issue of the lack of affordable dwellings in the Randstad. The main research question in this research is as follows:

What are the most suitable locations to redevelop vacant non-residential buildings in the Randstad region of the Netherlands for starters at the housing market with taking in mind the housing preferences of these starters?

The big cities in the Randstad region have a very old building history. The buildings in the inner city dating back before 1800. Moving away from the city center to the other parts of the city results in buildings with different building styles. During periods in history, new building blocks have been made in order to meet the demographic changes in those days. This is not only the case for the big cities, but also for the smaller places.

It is hard to make a general conclusion which buildings are suitable for redevelopment based on building types. Buildings with a monumental status are in general harder to redevelop because redevelopment demands for those buildings are very strict, stated by the government. On the other hand, these buildings currently are highly in favor due to their location, their appearance and their inside building style (with high ceilings, ornaments and other decorations).

Several real estate developers and real estate investors have been interviewed in order to check what their vision is regarding real estate development and investments. The vision on redevelopment differ per party. Synchroon (a real estate developer) really believes in the power of micro apartments and tiny houses. They expect the increase of inhabitants within the Randstad region won't stop within a few years, where a lot of new dwellings have to be made. New land can however not be gained, so the apartments and dwellings have to be smaller. Apartments of 30 m^2 could be a real outcome to target the shortage of the dwellings in the Randstad in their objective when designing them in a very efficient way. Implementing the shared economy vision within these tiny apartment buildings would result that the shared areas will feel like an additional room to your apartment, so your apartment feels bigger than the 30 m^2 you have for yourself.

Real estate investors however have a different view on the statement of Synchroon. The current housing market is on its peak, where housing prices exceeds the value of the dwelling due to a shortage of dwellings. Despite the fact that the demographic forecasts are that even more people will live in the Netherlands in the future, the housing market peak will be flattened due to the probable increase of

mortgage rent which will result that the general demand for buying a house will be smaller. It is hard to estimate if there will be any changes in the demand for rental dwellings when the mortgage rent increases. The dwellings and houses which will be vacant at first will be the dwellings which are small and not really comfortable to live (which in the opinion of the real estate investors are the tiny houses and apartments). To avoid this vacant hazard, they only invest in apartments starting from 50 m^2. This is safer for their investments on the long run, and will yield a higher return on investment in their opinion.

The real estate investors and developers also have a shared vision. They both belief in developing and redeveloping buildings in the Randstad, due to the attractiveness of this area for young people with regard to jobs, but also friends which are moving to this area of the Netherlands. Other parts of the Netherlands are riskier regarding real estate investments due to the aging trend these areas.

A home buying survey by Century 21 found that millennial homebuyers (those born after 1980) are twice as likely as baby boomers (born in 1946-1965) to rank location as their highest priority in choosing a home (Canada, 2013). Location attributes can be divided into three groups: physical environment characteristics, social environment characteristics and functional environment characteristics. Physical environment characteristics are characteristics of a location like the amount of green in the area or the building density. Social environment characteristics are neighborhood characteristics, like the composition of the population in the neighborhood, the unemployment rate in a neighborhood and the average income per household. Functional environment characteristics are for example the proximity to different amenities with a certain function. A lot of studies have incorporated different house location attributes in their studies, where functional environment characteristics are the most common location attributes. These attributes are for example the distance to a grocery store, a restaurant, cultural amenities, school and shops. Physical characteristics are on the second place, with attributes like green- or water in the neighborhood, access to trails and parks, good transportation options etc. Social environment characteristics are the hardest to monitor because these values are subjective in most cases. Having a safe feeling in the neighborhood and having a sense of freedom are values which differ for every person. Besides location attributes, the attributes of the dwellings are taken into account often in combination with the location of the dwelling. The two most common housing attributes are the surface and the price of the house. These are also attributes which are used in studies regarding whether housing prices in general are rising in a specific region or not.

In order to see which attributes are most in favor for the respondents, a conjoint analysis has been conducted in a digital survey format. The following attributes have been taken into account based on studies: maximum amount willing to pay, minimal surface of the dwelling, dwelling amenities, neighborhood amenities, house location, distance to grocery store, distance to train station and distance to highway.

In total 403 respondents filled in the survey, where 322 results eventually could be used for the analyses. With the use of a multinomial logit model, the most preferred attributes and the most preferred levels of the attributes have been estimated which at the same time also are statistically significant. The surface attribute has been found the most important with a relative importance of 31.5%, and the second place is for the price (28.0%). Looking at the location attributes, the house location attribute is the most important with 16.3%. The other significant important location attributes are the distance to the train station (13,6%) and the distance to highway (5,3%). Only one dwelling amenity has been found as statistically significant, namely the garden level with a percentage of 5.3%. The others haven't been identified as statistically significant.

Attributes which aren't statistically significant are the distance to the supermarket and the green amenities.

The following levels are the most important within the statistically significant attributes:

- Price: <€700
- Surface: >90 m^2
- House Location: City center
- Dwelling amenity: Garden
- Distance to train station: within 1 km
- Distance to highway: within 3 km

A total of 49 feasible areas have been found in the Randstad to redevelop buildings into starter dwellings. These are locations based on all the above stated attributes, despite the price and surface attribute.

When the price and surface attributes are taken into account and the most preferred levels of these attributes are chosen, only 3 areas fit within the boundaries of the preferences of the starters: Den Haag – Laakkwartier en Spoortwijk, Schiedam – Oost and Rotterdam – IJsselmonde.

At last a business case have been conducted for the city of Rotterdam in order to see how realistic the preferences of the respondents are in real life. In total 5 areas are suitable in Rotterdam for redevelopment purposes (without taking into account the price and surface attributes). In none of the areas, all the preferences can be met stated by the respondents. It can be assumed this will be the same for the other city areas within the Randstad. The area that fits the price and surface preferences (IJsselmonde), isn't for example situated in the city center. Price and surface are however almost twice as important as the house location according to the respondents. However, location in real estate is linked with the price of the property. City center locations are more expensive than buildings located elsewhere in the city.

It is suggested for real estate developers and investors to redevelop buildings into dwellings with a surface of 70 m^2 for a monthly price of €800. This increases the number of feasible areas from 3 to 25 in the Randstad. This is still a price surface combination which is preferred by the respondents, where the possibility to live near the city center increases. In this way, the house location preference can be met better than the price surface combination of 90 m^2 for €700. This price surface combination is also in line with the vision of real estate investors. Real estate investors would like to invest in apartments with a surface of 50 m^2 or bigger. With a surface of 70 m^2 this preference is met. Investing in 70 m^2 with monthly costs for the tenant of €800, investors and real estate developers would contribute to the lack of affordable dwellings for starters in the Randstad region.

5.2 Scientific relevance

From a scientific perspective, the results based on the research questions are directly contributing to a better understanding about the housing preferences of starters on the housing markets. According to Capital Value (2018) it is important that construction is market-oriented and the housing needs are clear in order to get an accurate picture of the long-term needs. It can be concluded that the current housing market isn't in line with these preferences, where all the housing preferences of the starters can't be realized at the moment. However, only the most preferred attribute levels have been taken into account and investigated further in the business case. Realizing dwellings with a surface of 70 m^2 for a monthly cost of €800 would however be a proper compromise, where the preferences of starters are still met as good as possible. Other housing profiles can be used in future research, in order to see what other outcomes might be when changing some of the attributes. Also, specific cases can be made according

to the separate group outcomes, where the preferences are determined based on respondent groups with certain background characteristics. This can be from big value when targeting a specific group in redevelopment plans.

5.3 Limitations

The results could have been different due to some factors. First of all, the respondent group comprises relative out of many students (33%) compared to the percentage of students in the overall Dutch population (7%). The annual gross income is therefore on average also lower than the average income in the Netherlands. It can be the case that the students don't have a lot of knowledge yet about current housing prices and surface, and they just would like to pay the least for the biggest space, which isn't realistic. It is also the case that respondents may have another view on housing based on their current and future career prospects. People with a higher education level on average have a higher income, who also have other housing preferences than people with a lower income. It is therefore a challenge to target the housing shortage for people with a low income as well as for the people with a high income.

Secondly, a stated choice design in an online survey format have been used. This is the proper research method for this research (where a lot of data was needed) regarding other methods. There are however some drawbacks of this method. Only a limited number of attributes have been used in this research. When other attribute types would have been used, the outcomes could have been different. In this research, only physical- and functional environment characteristics have been used in the housing profile generation. This because social environment characteristics are hard to quantify and to incorporate in a stated choice design. However, social environment characteristics have a big influence on housing choice according to Jansen (2014) and Beamish et al. (2001). Incorporating these characteristics within another type of design (for example a focus group) could have led to other outcomes than the current outcomes.

Also, the outcomes could have been different if the display order in the stated housing profiles in the survey would have been different. Van der Waerden et al. (2006) conducted a study regarding order effects in stated choice experiments. The study shows that the effect in the order of attributes are relatively small, but significant. The two most important attributes (surface and price) are the first two attributes in the housing profiles in the choice tasks, which also are the two most important attributes. If these two attributes were on the bottom of the housing profiles, outcomes could have been different. However, van der Waerden et al. (2006) stated that the effects are low, so there wouldn't be major differences in outcomes with attributes stated in a different order.

From the business case, no buildings could be found which suits all the preferences. However, only one urban area (Rotterdam) have been used for the business case. It could be the case that business cases with other cities with the feasible areas could have yield some buildings which meet all the preferences of the starters. However, looking at the m^2 prices for dwellings in the city centers of big cities, the monthly price of €700 would still be too low for a dwelling of 90 m^2. At this moment, building costs are high, so the profit margins are also reducing when redeveloping a building. This isn't in favor for the price of starter dwellings. However, in the business case only buildings have been analyzed which are for sale at this moment. It could be the case that there are more vacant buildings in the cities, but aren't for sale and therefore can't be found on real estate broker website. Unfortunately, no database is available at the moment of vacant buildings in the Netherlands, which would be a true outcome for real estate developers and investors in the Netherlands.

No distinction has been made between buy and rent dwellings regarding the preferences of starters. It could be the case that the preferences are different for people when renting a dwelling or buying a dwelling.

The distinction hasn't been made because there is a general shortage of dwellings which has to be targeted. However, it can be concluded from the data that people value rental dwellings over time more. Therefore, rental dwellings are a good way of housing to target the dwelling shortage over time in the Randstad area.

At last, the two most important attributes (price and surface) have been adjusted in order to create more opportunities regarding feasible redevelopment areas in the Randstad. This because these two attributes have been found as the two most important attributes, which are also highly connected with the house location which is at the third place as most important attribute. Changing distances towards the distance to the highway or the distance to the train station location, could yield other feasible redevelopment areas. However, prices and surfaces still have to be calculated after determining the new areas. This would still result in the fact that buildings within the city center are too expensive to redevelop according to the preferences of the starters.

5.4 Recommendation

The recommendation comprises out of two parts: the recommendation towards real estate developers and investors and the recommendations for future research.

The current housing market is hard for real estate developers and investors. The housing demand is big, and prices are high due to the high demand. So, it is hard to estimate whether it is interesting to invest/develop or not during these days. It isn't possible for real estate developers at the moment to meet the preferences of the starters (which aren't realistic either with the current housing market conditions). The most important attributes for starters are the surface (31.5%) and price (28.0%). The preference of a 90 m^2 dwelling for €700 in the city center can't be met. However, adjusting the price and surface to a combination of a 70 m^2 for a monthly price of €800, increases the number of feasible areas from 3 to 25. In this way, more redeveloping opportunities are created where the chance also increases that starter dwellings can be realized as close as possible to the city center. The advice is to make at least apartments of 70 m^2 to prevent vacancy in the future when the housing market might be less overstrained than now and still meet the demand of starters for a monthly price of €800 (or a buy price of €222.000).

According to Cobouw (2019) multiple real estate parties expect there will be a shift in the building costs and housing prices at the end of 2019. So, waiting with redevelopment projects to the end of 2019 or beginning of 2020, will increases the probability of realizing dwellings which are as close as possible to the preferences of the starters. Looking at the overall housing preference trends of different generations, it is recommended to develop more rental dwellings instead of buy dwellings. This because the generations value flexibility and freedom more over time, which suits better with a rental dwelling than a buy dwelling. Besides the building costs, it is recommended for real estate developers and investors to look at building methods which are in line with the flex estate vision. With for example mountable walls, spaces can be adjusted over time based on the preferences on the tenants. This makes the probability of vacancy over the years smaller.

It would be interesting to incorporate social environment characteristics in future research studies. Generations value a social and luxury life more and more over time. This means that the environment around the building becomes more important for starters. The outcomes of a housing study with social environment characteristics would enhance the overall housing experience of current and future starters. It also would be interesting to conduct a study in the housing preference differences for rental and buy dwellings. The demand for rental dwellings increases, where dwelling and location attributes might have other preferences compared with buy dwellings.

With this information, it would be interesting for future research to firstly make a database of all the vacant buildings in the Netherland and to keep this database up to date. This might be interesting for the government, where the data can be sold to real estate investors and developers. Secondly, from that point of view it would be really interesting to make a general model where an estimation can be made about the redevelopment costs for s specific building based on the building type, building date, energy label and layout. This will give a very quick insight whether a building is suitable for redevelopment purposes with taking the redevelopment costs into account. The associated costs can then be linked to a database, where current market prices for building regarding material and labor are updated every day.

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Appendix A – The 32 housing profiles

Housing profiles Survey 1

Table 18: Housing profiles survey 1

Choice Set	Profile	Price €	Surface m^2	Dwelling Amenity	Green Amenity	House Location	Distance Supermarket	Distance Train Station	Distance Highway
1	1	<700	<30	Balcony	Near Green	Suburbs	Within 500m	Within 3 km	Within 3 km
1	2	800	50	Garden	Near Green	Outside center	Within 250m	Within 1 km	Within 5 km
2	3	800	>90	Garden	Near green	Suburbs	Within 750 m	Within 3 km	Within 5 km
2	4	<700	>90	Balcony	Near green	City center	Within 250 m	Within 5 km	Within 1 km
3	5	>1000	50	Garage/storage	Near green	Suburbs	Within 1000 m	Within 5 km	Within 7 km
3	6	900	>90	Balcony	Near water	Village	Within 750 m	Within 7 km	Within 5 km
4	7	900	50	Balcony	Near water	Suburbs	Within 750 m	Within 3 km	Within 1 km
4	8	800	<30	Parking place	Near green	City center	Within 500 m	Within 5 km	Within 3 km
5	9	<700	<30	Parking place	Near water	Suburbs	Within 250 m	Within 1 km	Within 5 km
5	10	900	70	Garden	Near water	City center	Within 500 m	Within 3 km	Within 1 km
6	11	>1000	50	Garden	Near water	Outside center	Within 250 m	Within 7 km	Within 3 km
6	12	800	70	Balcony	Near green	Suburbs	Within 1000 m	Within 5 km	Within 5 km
7	13	900	>90	Garage/Storage	Near water	Suburbs	Within 750 m	Within 7 km	Within 5 km
7	14	>1000	70	Garden	Near green	Village	Within 1000 m	Within 5 km	Within 7 km
8	15	>1000	70	Parking place	Near water	Outside center	Within 750 m	Within 5 km	Within 1 km
8	16	900	<30	Garden	Near water	City center	Within 250 m	Within 1 km	Within 5 km
9	17	>1000	70	Garage/Storage	Near green	Suburbs	Within 750 m	Within 1 km	Within 3 km
9	18	>1000	<30	Garage/Storage	Near green	Outside center	Within 500 m	Within 3 km	Within 5 km
10	19	>1000	<30	Parking place	Near water	Village	Within 1000 m	Within 3 km	Within 1 km
10	20	<700	>90	Garden	Near green	Outside center	Within 750 m	Within 3 km	Within 1 km
11	21	800	<30	Garden	Near green	Village	Within 250 m	Within 5 km	Within 1 km
11	22	900	70	Parking place	Near green	Village	Within 500 m	Within 1 km	Within 5 km
12	23	800	70	Parking place	Near green	City center	Within 250 m	Within 3 km	Within 5 km
12	24	<700	<30	Garden	Near green	Outside center	Within 500 m	Within 1 km	Within 1 km
13	25	900	<30	Parking place	Near green	City center	Within 250 m	Within 1 km	Within 1 km
13	26	<700	50	Balcony	Near green	Suburbs	Within 500 m	Within 5 km	Within 5 km
14	27	<700	50	Parking place	Near green	City center	Within 750 m	Within 1 km	Within 5 km
14	28	800	>90	Garden	Near water	Suburbs	Within 1000 m	Within 1 km	Within 3 km
15	29	800	50	Balcony	Near green	City center	Within 500 m	Within 1 km	Within 3 km
15	30	<700	70	Garden	Near green	Suburbs	Within 250 m	Within 5 km	Within 5 km
16	31	>1000	>90	Balcony	Near green	Village	Within 750 m	Within 5 km	Within 3 km
16	32	900	50	Garage/Storage	Near water	Suburbs	Within 1000 m	Within 7 km	Within 1 km

Housing profiles Survey 2

Table 19: Housing profile survey 2

Choice Set	Profile	Price €	Surface m^2	Dwelling Amenity	Green Amenity	House Location	Distance Supermarket	Distance Train Station	Distance Highway
1	33	>1000	50	Garage/storage	Near water	Village	Within 500 m	Within 1 km	Within 5 km
1	34	900	>90	Parking place	Near green	Outside center	Within 1000 m	Within 3 km	Within 7 km
2	35	<700	70	Balcony	Near green	Outside city	Within 750 m	Within 1 km	Within 7 km
2	36	900	50	Parking place	Near green	Suburbs	Within 500 m	Within 5 km	Within 3 km
3	37	>1000	>90	Garden	Near green	City center	Within 750 m	Within 5 km	Within 5 km
3	38	>1000	>90	Garage/storage	Near green	Outside center	Within 250 m	Within 3 km	Within 3 km
4	39	800	50	Balcony	Near water	Suburbs	Within 500 m	Within 5 km	Within 5 km
4	40	<700	<30	Garage/ Storage	Near green	Village	Within 1000 m	Within 5 km	Within 5 km
5	41	800	50	Balcony	Near green	Village	Within 250 m	Within 3 km	Within 1 km
5	42	900	<30	Garden	Near water	Outside center	Within 750 m	Within 5 km	Within 3 km
6	43	800	>90	Garage/ Storage	Near water	Village	Within 500 m	Within 1 km	Within 5 km
6	44	800	>90	Garage/ Storage	Near water	Village	Within 500 m	Within 7 km	Within 7 km
7	45	800	<30	Garage/ Storage	Near water	City center	Within 750 m	Within 5 km	Within 7 km
7	46	<700	50	Balcony	Near green	Outside center	Within 1000 m	Within 7 km	Within 5 km
8	47	>1000	>90	Balcony	Near green	City center	Within 1000 m	Within 3 km	Within 5 km
8	48	900	70	Parking place	Near water	Village	Within 750 m	Within 5 km	Within 7 km
9	49	>1000	>90	Balcony	Near water	Suburbs	Within 1000 m	Within 5 km	Within 7 km
9	50	900	70	Garage/ Storage	Near green	Village	Within 750 m	Within 7 km	Within 3 km
10	51	<700	70	Garden	Near water	City center	Within 250 m	Within 7 km	Within 3 km
10	52	900	50	Parking place	Near green	Outside center	Within 750 m	Within 5 km	Within 3 km
11	53	800	70	Balcony	Near green	Suburbs	Within 500 m	Within 7 km	Within 1 km
11	54	<700	>90	Garden	Near water	Village	Within 500 m	Within 3 km	Within 5 km
12	55	<700	50	Parking place	Near water	Outside center	Within 1000 m	Within 5 km	Within 3 km
12	56	>1000	<30	Balcony	Near green	Suburbs	Within 750 m	Within 7 km	Within 1 km
13	57	800	70	Garage/ Storage	Near water	Outside center	Within 750 m	Within 5 km	Within 5 km
13	58	900	50	Garden	Near green	Suburbs	Within 250 m	Within 1 km	Within 7 km
14	59	900	>90	Garage/ Storage	Near water	City center	Within 500 m	Within 5 km	Within 1 km
14	60	<700	<30	Balcony	Near water	Outside center	Within 750 m	Within 3 km	Within 3 km
15	61	900	50	Balcony	Near green	City center	Within 750 m	Within 5 km	Within 3 km
15	62	800	70	Parking place	Near green	Suburbs	Within 500 m	Within 1 km	Within 1 km
16	63	<700	50	Parking place	Near green	City center	Within 750 m	Within 3 km	Within 1 km
16	64	900	70	Balcony	Near green	Outside center	Within 250 m	Within 5 km	Within 5 km

Appendix B – Survey layout

Introduction page

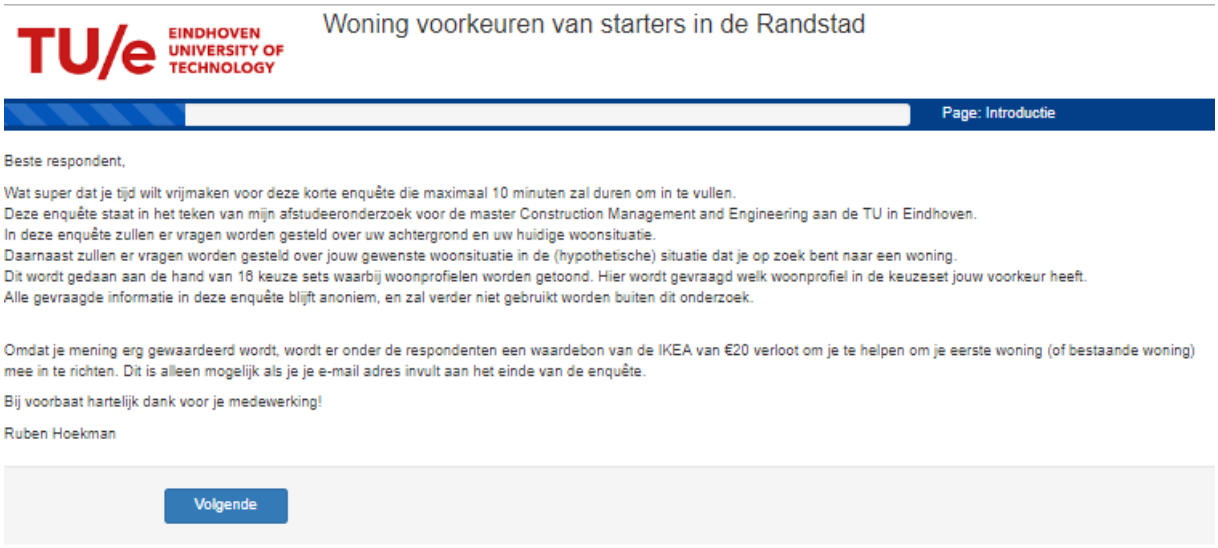

Figure 31: Introduction page of survey

Socio demographic and economic questions page

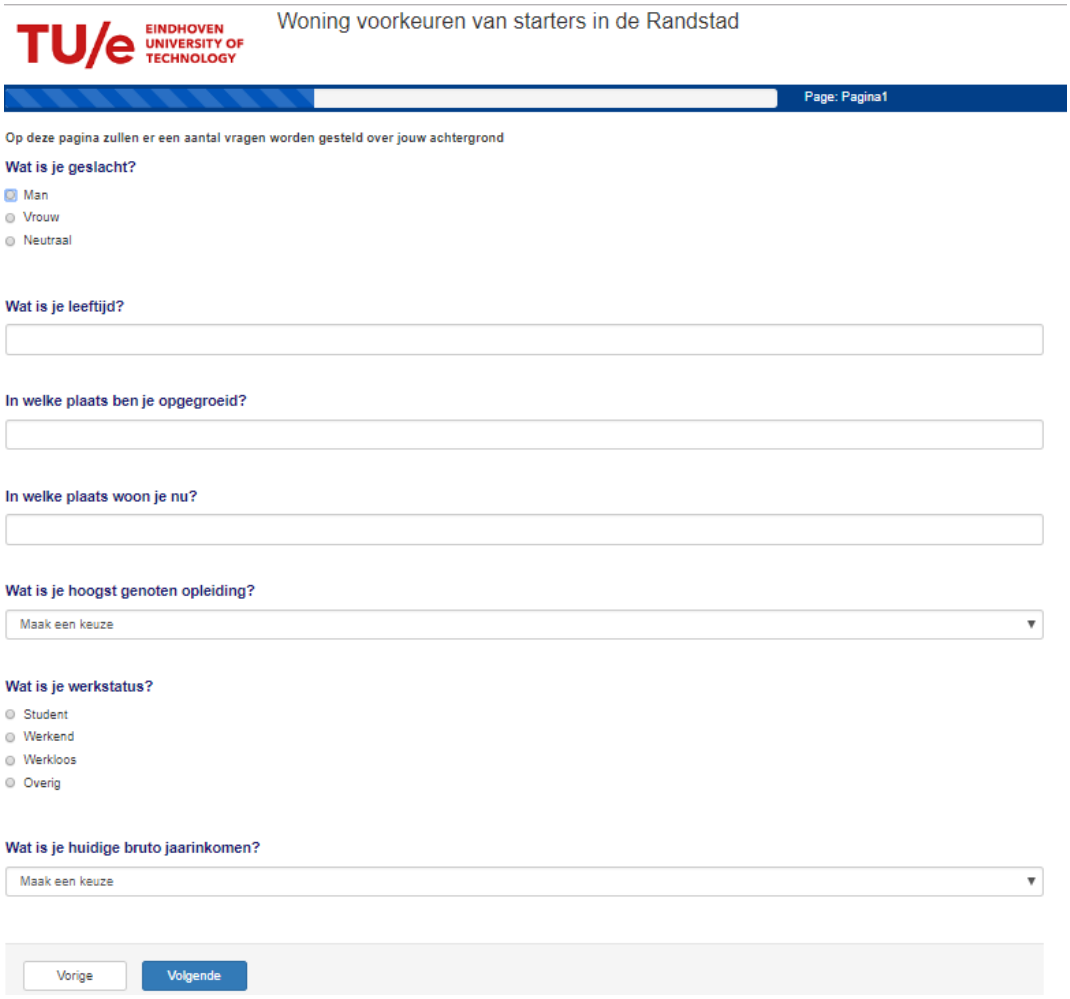

Figure 32: Socio demographic and economic questions page of survey

Housing profile example page

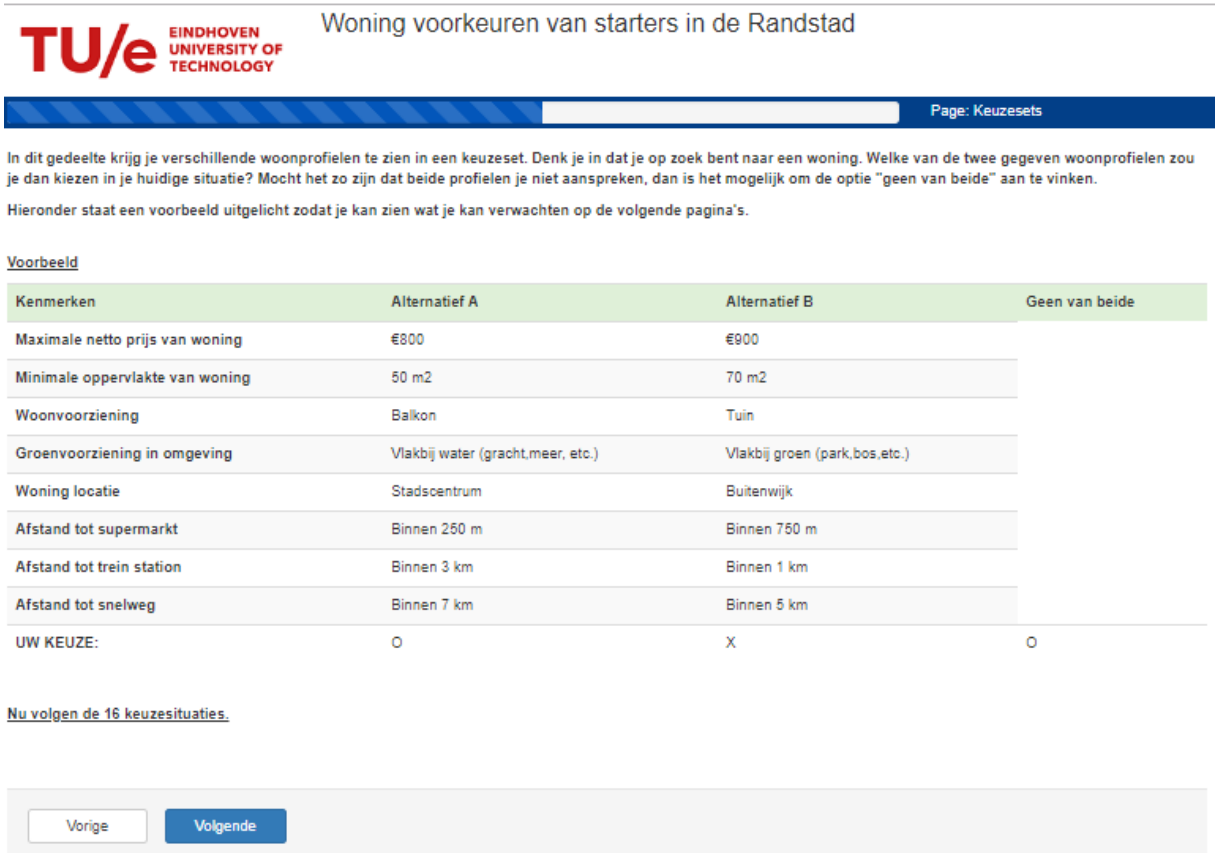

Figure 33: Housing profile example page of survey

Housing profile page

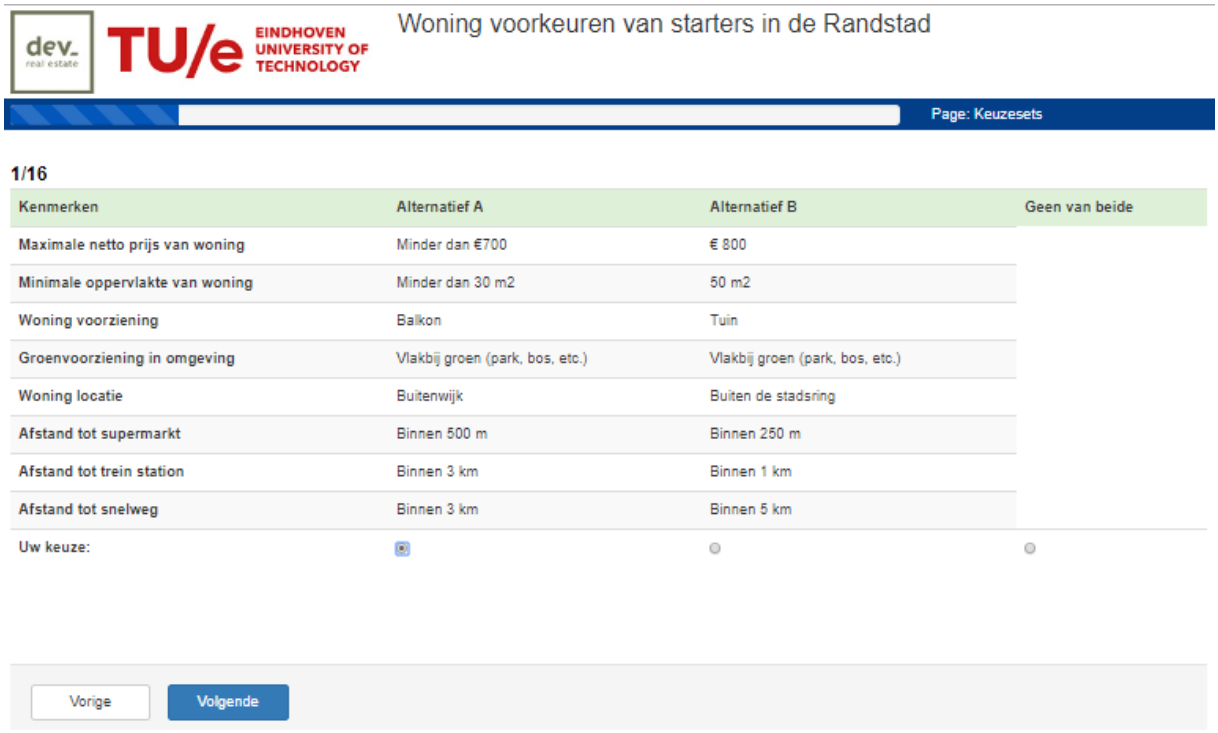

Figure 34: Housing profile page of survey

Housing background page

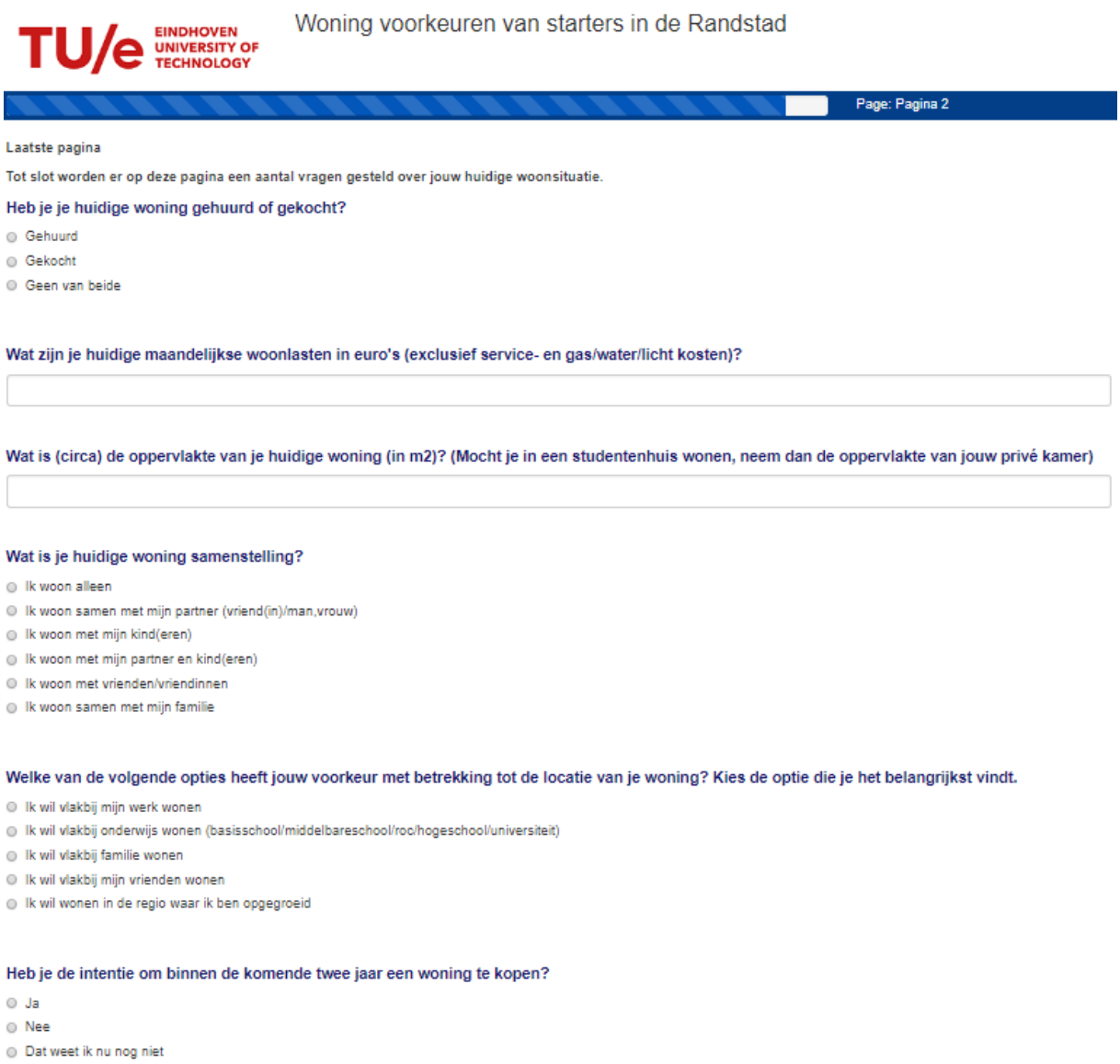

Figure 35: Housing background page of survey

Appendix C – Expert interview general questions

These questions have been used as guidelines to get some general information about the vision of real estate developers and investors on the current housing market.

Developer part:

1. What are the main aspects you take into account when (re)developing a building?

2. What is currently most appealing for your organization, redevelopment or new building? And why?

3. What are interesting location for you to redevelop? And what are the aspects you take into account?

4. What do you think is important with regard to real estate developing in the area of starter dwellings?

5. What are currently the biggest stumbling blocks for the real estate development sector?

6. What are currently the biggest chances in the current real estate market?

7. Are you currently also take into account the principle of tiny houses and micro dwellings?

Investor part:

1. What are the main aspects you take into account when investing in buildings and dwellings?

2. What kind of dwellings are the most appealing for you?

3. What is the current rate of return compared to the return at the financial crisis?

    3.1 How are you adapting on a possible new financial crisis in a few years?

4. Do you think tiny houses and micro apartments is the future way of living?

5. What are currently the biggest challenges with regard to investing into dwellings?

6. What do you think is important when investing in starter dwellings?

7. Do you have a lot of buy-fix-sell projects? Or do you have a lot of dwellings in your own possession?

Appendix D – Housing background respondents

Place of birth of respondents

Table 20: Place of birth of respondents

Place	Amount	Place	Amount	Place	Amount	Place	Amount
Aalten	1	Akersloot	1	Alkmaar	6	Urk	1
Amerongen	2	Amersfoort	8	Amstelveen	1	Utrecht	17
Amsterdam	5	Antwerpen	1	Apeldoorn	9	Utrechtse Heuvelrug	1
Arnhem	2	Aruba	1	Asten	1	Veenendaal	2
Augustinus	1	Babberich	2	Barneveld	3	Vianen	1
Bergeijk	1	Bergen op Zoom	1	Bilthoven	3	Vleuten	1
Blaricum	1	Bodegraven	1	Boskoop	1	Vogelenzang	1
Breda	2	Bredevoort	1	Brielle	2	Vorden	2
Bunnik	1	Bunschoten	1	Burgum	1	Vriezenveen	3
Bussum	1	Casteren	1	Chili	1	Vroomshoop	2
Cothen	1	Damwoude	1	De Rijp	1	Wassenaar	1
Deil	1	Delft	1	Den Bosch	1	Weert	1
Den Dolder	1	Den Haag	6	Deventer	4	Westervoort	1
Diemen	1	Diepenheim	1	Doetinchem	4	Westzaan	1
Dom. Rep	1	Doorn	1	Dronten	2	Wierden	1
Duiven	3	Dwingeloo	1	Ede	1	Wijhe	2
Eindhoven	5	Emmeloord	1	Emmen	2	Wijk bij Duurstede	2
Enschede	7	Garijp	1	Geldrop	1	Woerden	3
Giesbeek	1	Goor	1	Gorinchem	1	Zeist	1
Gorssel	1	Gouda	3	Groenlo	1	Zelhem	1
Groningen	1	Haaften	1	Haarlem	2	Zevenaar	1
Hardenberg	1	Harderwijk	2	Harmelen	2	Zijderveld	1
Havelte	3	Heemskerk	2	Heemstede	1	Zoetermeer	2
Heerenveen	1	Heerlen	1	Heilo	1	Zuid-Scharwoude	1
Helmond	4	Hengelo	2	Herkenbosch	1	Zwartsluis	2
Hilversum	1	Hippolytushoef	1	Holten	1	Zwolle	1
Hoogblokland	2	Hoogeveen	1	Hoogezand Sappemeer	1	Silvolde	1
Hoorn	2	Houten	7	Hulst	1	Sint-Michielsgestel	1
IJhorst	1	IJsselstein	1	Julianadorp	1	Schiedam	1
Katwijk	1	Keijenborg	1	Kerkrade	1	Sevenum	1
Kesteren	1	Koekange	1	Kudelstraat	1	Sijbekarspel	1
Leiden	4	Leidschendam	1	Leimuiden	1	Sneek	2
Lelystad	1	Lent	1	Leusden	2	Soest	1
Linschoten	1	Lochem	1	Lopik	1	Staphorst	1
Maarssen	4	Maastricht	2	Masqat, Oman	1	Steenwijk	1
Meppel	7	Monnickendam	1	Monster	1	Tilburg	2
Montfoort	1	Naarden	2	Nieuwegein	2	Tienhoven	1
Nieuwehorne	1	Nieuwleusen	1	Nijeveen	15	Uddel	1
Nijverdal	1	Odijk	2	Oisterwijk	1		
Oldenzaal	2	Oosterbeek	2	Oost-Graftdijk	1		
Portugal	1	Purmerend	4	Raamsdonkveer	1		
Renkum	1	Renswoude	1	Rheezerveen	1		
Rhoon	1	Rijswijk	2	Roosendaal	2		
Rotterdam	4	Ruurlo	1	Sassenheim	1		

Current living place respondents

Table 21: Current living place respondents

Place	Amount	Place	Amount	Place	Amount	Place	Amount
Almere	1	Amersfoort	11	Amsterdam	47	Bilthoven	3
Bloemendaal	1	Bodegraven	1	Breda	1	Bunschoten	1
Bussum	1	Capelle aan de IJssel	1	De Meern	1	Delft	5
Den Haag	14	Mijdrecht	1	Diemen	2	Dordrecht	2
Eindhoven	6	Naarden	2	Nieuwegein	3	Gouda	2
Nieuwekerk aan den Ijssel	1	Haarlem	4	Hilversum	3	Hoevelaken	1
Hoofddorp	1	Hoorn	1	Houten	2	Leiden	4
Leimuiden	1	Lelystad	1	Maartensdijk	1	Meerkerk	1
Montfoort	1	Nieuwkoop	1	Nieuwveen	1	Nijmegen	1
Purmerend	2	Renswoude	1	Rotterdam	18	Santpoort-Noord	1
Schiedam	1	Spaarnwoude	1	Ter Aar	1	Utrecht	140
Veenendaal	1	Vianen	1	Vleuten	4	Voorburg	1
Voorschoten	1	Weesp	1	Woerden	5	Zeist	6
Zevenhuizen	1	Zijderveld	1				

Appendix E – Dummy coding input

Choice_set	Option	Choice	Constant	Prijs1	Prijs2	Prijs3	Prijs4	Opp1	Opp2	Opp3	Opp4	Vz1	Vz2	Vz3	Vz4	Gvz1	Gvz2	WL1	WL2	WL3	WL4	SL1	SL2	SL3	SL4	TSL1	TSL2	TSL3	TSL4	SnL1	SnL2	SnL3	SnL4
0	House 1	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0
0	House 2	1	1	0	1	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0
0	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	House 1	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0
1	House 2	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0
1	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	House 1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1
2	House 2	1	1	0	0	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0
2	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	House 1	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0
3	House 2	0	1	0	1	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0
3	None of bo	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	House 1	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0
4	House 2	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0
4	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	House 1	0	1	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0
5	House 2	1	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	0
5	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	House 1	1	1	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0
6	House 2	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1
6	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	House 1	0	1	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0
7	House 2	0	1	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	1	0
7	None of bo	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	House 1	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0
8	House 2	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0
8	None of bo	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	House 1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	1	0	0	1	0	0	0
9	House 2	1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0
9	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	House 1	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	0
10	House 2	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0
10	None of bo	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	House 1	1	1	0	1	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0
11	House 2	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0
11	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	House 1	0	1	0	0	1	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
12	House 2	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0
12	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	House 1	1	1	1	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0
13	House 2	0	1	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	0
13	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	House 1	1	1	0	1	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0
14	House 2	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0
14	None of bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	House 1	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0
15	House 2	0	1	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0
15	None of bo	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 36: Dummy coding input

Appendix F – Housing profile preference ranking

Table 22: Housing profile preference ranking

Rank	Utility	Housing profile	Choice set
1	3,9569	4	2
Less than €700 – More than 90 m2 – Balcony – Green within 500 m – City Center – Supermarket within 250 m – Train station within 5 km – Highway within 1 km			
2	3,7068	51	26
Less than €700 – 70 m2 – Garden – Water within 500 m – City Center – Supermarket within 250 m – Train station within 7 km – Highway within 3 km			
3	3,493	30	15
Less than €700 – 70 m2 – Garden – Green within 500 m – Suburbs – Supermarket within 250 m – Train station within 5 km – Highway within 5 km			
4	3,4399	27	14
5	3,3999	28	14
6	3,2828	35	18
7	3,2719	23	12
8	3,2073	3	2
9	3,1979	54	27
10	3,1933	63	32
11	3,172	10	5
12	3,1241	29	15
13	3,0141	62	31
14	2,873	2	1
15	2,8511	59	30
16	2,6429	43	22
17	2,6412	57	29
18	2,6195	55	28
19	2,5886	12	6
20	2,571	26	13
21	2,2660	37	19
22	2,2251	64	32
23	2,2100	61	32
24	2,2030	53	27
25	2,1375	39	20
26	2,0635	58	29
27	2,0615	47	24
28	1,9951	34	17
29	1,9569	24	12
30	1,8944	22	11
31	1,8281	7	4
32	1,8123	13	7
33	1,7789	41	21
34	1,7075	38	19
35	1,6809	9	5
36	1,6054	52	26
37	1,58	36	18
38	1,5677	16	8
39	1,5141	60	30
40	1,4428	44	22
41	1,4229	1	1

42	1,3428	17	9
43	1,3423	15	8
44	1,3281	6	3
45	1,2542	48	24
46	1,2263	8	4
47	1,1873	25	13
48	1,1851	49	25
49	1,1258	50	25
50	1,0912	32	16
51	0,9795	20	10
52	0,9217	45	23
53	0,8023	11	6
54	0,6609	42	21
55	0,5853	33	17
56	0,5499	21	11
57	0,312	5	3
58	-0,8063	46	23
59	-1,0032	18	9
60	-1,0544	56	28
61	-1,0949	19	10
62	-1,2059	31	16
More than €1000 – More than 90 m2 – Balcony – Green within 500 m – Village outside city – Supermarket within 750 m – Train Station within 5 km – Highway within 3 km			
63	-1,5503	14	7
More than €1000 – 70 m2 – Garden – Green within 500 m – Village outside – Supermarket within 1000 m – Train station within 5 km - Highway within 7 km			
64	-1,7602	40	20
Less than €700 – Less than 30 m2 – Garage/storage – Green within 500 m – Village outside the city center – Supermarket within 1000 m – Train Station within 5 km – Highway within 5 km			

Appendix G– Housing profile utility calculations

Choice sets survey 1

Choice set 1

Table 23: Survey 1, Choice set 1

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	€800	1.3466
Min dwelling surface	Less than 30 m2	-2.1129	50 m2	1.3466
Dwelling amenities	Balcony	0.0758	Garden	0.3525
Green amenities	Near green	0	Near green	0
House location	Suburbs	0.5681	Outside city center	0.5782
Distance to supermarket	Within 500 m	0.0433	Within 250 m	0.1372
Distance to train station	Within 3 km	0.6058	Within 1 km	0.9053
Distance to highway	Within 3 km	0.4013	Within 5 km	0.2930
Total		1,4229		2,8730

Choice set 2

Table 24: Survey 1, Choice set 2

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	Less than €700	1.8463
Min dwelling surface	More than 90 m2	0	More than 90 m2	0
Dwelling amenities	Garden	0.3525	Balcony	0,0758
Green amenities	Near green	0	Near green	0
House location	Suburbs	0.5681	City center	1.0909
Distance to supermarket	Within 750 m	0.0612	Within 250 m	0.1372
Distance to train station	Within 3 km	0.6058	Within 5 km	0.4809
Distance to highway	Within 5 km	0.2930	Within 1 km	0.3450
Total		3,2073		3,9569

Choice set 3

Table 25: Sruvey 2, Choise set 3

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€900	0.8401
Min dwelling surface	50 m2	-0.7252	More than 90 m2	0
Dwelling amenities	Garage/storage	0	Balcony	0.0758
Green amenities	Near green	0	Near water	0.0619
House location	Suburbs	0.5681	Village outside city	0
Distance to supermarket	Within 1000 m	0	Within 750 m	0.0612
Distance to train station	Within 5 km	0.4809	Within 7 km	0
Distance to highway	Within 7 km	0	Within 5 km	0.2930
Total		0,3210		1,3281

Choice set 4

Table 26: Survey 1, Choice set 4

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€900	0.8401	€800	1.3466
Min dwelling surface	50 m2	-0.7252	Less than 30 m2	-2.1129
Dwelling amenities	Balcony	0.0758	Parking place	-0.0183
Green amenities	Near water	0.0619	Near green	0
House location	Suburbs	0.5681	City center	1.0909
Distance to supermarket	Within 750 m	0.0612	Within 500 m	0.0433
Distance to train station	Within 3 km	0.6058	Within 5 km	0.4809
Distance to highway	Within 1 km	0.3450	Within 3 km	0.4013
Total		1,8280		1,2263

Choice set 5

Table 27: Survey 1, Choice set 5

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	€900	0.8401
Min dwelling surface	Less than 30 m2	-2.1129	70 m2	-0.1675
Dwelling amenities	Parking place	-0.0183	Garden	0.3525
Green amenities	Near water	0.0619	Near water	0.0619
House location	Suburbs	0.5681	City center	1.0909
Distance to supermarket	Within 250 m	0.1372	Within 500 m	0.0433
Distance to train station	Within 1 km	0.9053	Within 3 km	0.6058
Distance to highway	Within 5 km	0.2930	Within 1 km	0.3450
Total		1,6809		3,1720

Choice set 6

Table 28: Survey 1, Choice set 6

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€800	1.3466
Min dwelling surface	50 m2	-0.7252	70 m2	-0.1675
Dwelling amenities	Garden	0.3525	Balcony	0.0758
Green amenities	Near water	0.0619	Near green	0
House location	Outside city center	0.5782	Suburbs	0.5681
Distance to supermarket	Within 250 m	0.1372	Within 1000 m	0
Distance to train station	Within 7 km	0	Within 5 km	0.4809
Distance to highway	Within 3 km	0.4013	Within 5 km	0.2930
Total		0,8023		2,2985

Choice set 7

Table 29: Survey 1, Choice set 7

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€900	0.8401	More than €1000	0
Min dwelling surface	More than 90 m2	0	70 m2	-0.1675
Dwelling amenities	Garage/storage	0	Garden	0.3525
Green amenities	Near water	0.0619	Near green	0
House location	Suburbs	0.5681	Village outside city	-2.2372
Distance to supermarket	Within 750 m	0.0612	Within 1000 m	0
Distance to train station	Within 7 km	0	Within 5 km	0.4809
Distance to highway	Within 5 km	0.2930	Within 7 km	0
Total		2,3918		-1,5503

Choice set 8

Table 30: Survey 1, Choice set 8

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€900	0.8401
Min dwelling surface	70 m2	-0.165	Less than 30 m2	-2.1129
Dwelling amenities	Parking place	-0.0183	Garden	0.3525
Green amenities	Near water	0.0619	Near water	0.0619
House location	Outside city center	0.5782	City center	1.0909
Distance to supermarket	Within 750 m	0.0612	Within 250 m	0.1372
Distance to train station	Within 5 km	0.4809	Within 1 km	0.9053
Distance to highway	Within 1 km	0.3450	Within 5 km	0.2930
Total		1,3423		1,5677

Choice set 9

Table 31: Survey 1, Choice set 9

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	More than €1000	0
Min dwelling surface	70 m2	-0.1675	Less than 30 m2	-2.1129
Dwelling amenities	Garage/storage	-0.41	Garage/storage	-0.41
Green amenities	Near green	0	Near green	0
House location	Suburbs	0.5681	Outside city center	0.5782
Distance to supermarket	Within 750 m	0.0612	Within 500 m	0.0433
Distance to train station	Within 1 km	0.9053	Within 3 km	0.6058
Distance to highway	Within 3 km	0.4013	Within 5 km	0.2930
Total		1,3428		-1,0032

Choice set 10

Table 32: Survey 1, Choice set 10

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	Less than €700	1.8463
Min dwelling surface	Less than 30 m2	-2.1129	More than 90 m2	0
Dwelling amenities	Parking place	-0.0183	Garden	0.3525
Green amenities	Near water	0.0619	Near green	0
House location	Village outside city	0	Outside city center	0.5782
Distance to supermarket	Within 1000 m	0	Within 750 m	0.0612
Distance to train station	Within 3 km	0.6058	Within 3 km	0.6058
Distance to highway	Within 1 km	0.3450	Within 1 km	0.3450
Total		-1,0949		3,8964

Choice set 11

Table 33: Survey 1, Choice set 11

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	€900	0.8401
Min dwelling surface	Less than 30 m2	-2.1129	70 m2	-0.1675
Dwelling amenities	Garden	0.3525	Parking place	-0.0183
Green amenities	Near green	0	Near green	0
House location	Village outside city	0	Village outside city	0
Distance to supermarket	Within 250 m	0.1372	Within 500 m	0.0433
Distance to train station	Within 5 km	0.4809	Within 1 km	0.9053
Distance to highway	Within 1 km	0.3450	Within 5 km	0.2930
Total		0,5499		1,8944

Choice set 12

Table 34: Survey 1, Choice set 12

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	Less than €700	1.8463
Min dwelling surface	70 m2	-0.1675	Less than 30 m2	-2.1129
Dwelling amenities	Parking place	-0.0183	Garden	0.3525
Green amenities	Near green	0	Near green	0
House location	City center	1.0909	Outside city center	0.5782
Distance to supermarket	Within 250 m	0.1372	Within 500 m	0.0433
Distance to train station	Within 3 km	0.6058	Within 1 km	0.9053
Distance to highway	Within 5 km	0.2930	Within 1 km	0.3450
Total		3,2719		1,9569

Choice set 13

Table 35: Survey 1, Choice set 13

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€900	0.8401	Less than €700	1.8463
Min dwelling surface	Less than 30 m2	-2.1129	50 m2	-0.7252
Dwelling amenities	Parking place	-0.0183	Balcony	0.0758
Green amenities	Near green	0	Near green	0
House location	City center	1.0909	Suburbs	0.5681
Distance to supermarket	Within 250 m	0.1372	Within 500 m	0.0433
Distance to train station	Within 1 km	0.9053	Within 5 km	0.4809
Distance to highway	Within 1 km	0.3450	Within 5 km	0.2930
Total		1,1873		2,571

Choice set 14

Table 36: Survey 1, Choice set 14

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	€800	1.3466
Min dwelling surface	50 m2	-0.7252	More than 90 m2	0
Dwelling amenities	Parking place	-0.0183	Garden	0.3525
Green amenities	Near green	0	Near water	0.0619
House location	City center	1.0909	Suburbs	0.5681
Distance to supermarket	Within 750 m	0.0612	Within 1000 m	-0.2417
Distance to train station	Within 1 km	0.9053	Within 1 km	0.9053
Distance to highway	Within 5 km	0.2930	Within 3 km	0.4013
Total		3,4399		3,3999

Choice set 15

Table 37: Survey 1, Choice set 15

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	Less than €700	1.8463
Min dwelling surface	50 m2	-0.7252	70 m2	-0.1675
Dwelling amenities	Balcony	0.0758	Garden	0.3525
Green amenities	Near green	0	Near green	0
House location	City center	1.0909	Suburbs	0.5681
Distance to supermarket	Within 500 m	0.0433	Within 250 m	0.1372
Distance to train station	Within 1 km	0.9053	Within 5 km	0.4809
Distance to highway	Within 3 km	0.4013	Within 5 km	0.2930
Total		3,1241		3,4930

Choice set 16

Table 38: Survey 1, Choice set 16

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€900	0.8401
Min dwelling surface	More than 90 m2	0	50 m2	-0.7252
Dwelling amenities	Balcony	0.0758	Garage/storage	0
Green amenities	Near green	0	Near water	0.0619
House location	Village outside city	-2.2372	Suburbs	0.5681
Distance to supermarket	Within 750 m	0.0612	Within 1000 m	0
Distance to train station	Within 5 km	0.4809	Within 7 km	0
Distance to highway	Within 3 km	0.4013	Within 1 km	0.3450
Total		-2,2970		-1,5363

Choice sets survey 2

Choice set 17

Table 39: Survey 2, Choice set 17

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€900	0.8401
Min dwelling surface	50 m2	-0.7252	More than 90 m2	0
Dwelling amenities	Garage/storage	0	Parking place	-0.0183
Green amenities	Near water	0.0619	Near green	0
House location	Village outside city	0	Outside city center	0.5782
Distance to supermarket	Within 500 m	0.0433	Within 1000 m	0
Distance to train station	Within 1 km	0.9053	Within 3 km	0.6058
Distance to highway	Within 5 km	0.2930	Within 7 km	-1.051
Total		0,5853		3,6417

Choice set 18

Table 40: Survey 2, Choice set 18

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	€900	0.8401
Min dwelling surface	70 m2	-0.1675	50 m2	-0.7152
Dwelling amenities	Balcony	0.0758	Parking place	-0.0183
Green amenities	Near green	0	Near green	0
House location	Outside city center	0.5782	Suburbs	0.5681
Distance to supermarket	Within 750 m	0.0612	Within 500 m	0.0433
Distance to train station	Within 1 km	0.9053	Within 5 km	0.4809
Distance to highway	Within 7 km	0	Within 3 km	0.4013
Total		2,1710		1,5142

Choice set 19

Table 41: Survey 2, Choice set 19

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	More than €1000	0
Min dwelling surface	More than 90 m2	0	More than 90 m2	0
Dwelling amenities	Garden	0.3525	Garage/storage	0
Green amenities	Near green	0	Near green	0
House location	City center	1.0909	Outside city center	0.5782
Distance to supermarket	Within 750 m	0.0612	Within 250 m	0.1372
Distance to train station	Within 5 km	0.4809	Within 3 km	0.6058
Distance to highway	Within 5 km	0.2930	Within 3 km	0.4013
Total		2,2660		1,7075

Choice set 20

Table 42: Survey 2, Choice set 20

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	Less than €700	1.8463
Min dwelling surface	50 m2	-0.7252	Less than 30 m2	-2.1129
Dwelling amenities	Balcony	0.0758	Garage/storage	0
Green amenities	Near water	0.0619	Near green	0
House location	Suburbs	0.5681	Village outside city	-2.2372
Distance to supermarket	Within 500 m	0.0433	Within 1000 m	0
Distance to train station	Within 5 km	0.4809	Within 5 km	0.4809
Distance to highway	Within 5 km	0.2930	Within 5 km	0.2930
Total		2,1375		-1,7602

Choice set 21

Table 43: Survey 2, Choice set 21

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1,3466	€900	0.8401
Min dwelling surface	50 m2	-0.7252	Less than 30 m2	-2.1129
Dwelling amenities	Balcony	0.0758	Garden	0.3525
Green amenities	Near green	0	Near water	0.0619
House location	Village outside city	0	Outside city center	0.5782
Distance to supermarket	Near 250 m	0.1372	Within 750 m	0.0612
Distance to train station	Near 3 km	0.6058	Within 5 km	0.4809
Distance to highway	Near 1 km	0.3450	Within 3 km	0.4013
Total		1,7789		0,6609

Choice set 22

Table 44: Survey 2, Choice set 22

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	€800	1.3466
Min dwelling surface	More than 90 m2	0	More than 90 m2	0
Dwelling amenities	Garage/storage	0	Garage/storage	0
Green amenities	Near water	0.0619	Near water	0.0619
House location	Village outside city	0	Village outside city	0
Distance to supermarket	Within 500 m	0.0433	Within 500 m	0.0433
Distance to train station	Within 1 km	0.9053	Within 7 km	0
Distance to highway	Within 5 km	0.2930	Within 7 km	0
Total		2,6429		1,4428

Choice set 23

Table 45: Survey 2, Choice set 23

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	Less than €700	1.8463
Min dwelling surface	Less than 30 m2	-2.1129	50 m2	-.07252
Dwelling amenities	Garage/storage	0	Balcony	0.0758
Green amenities	Near water	0.0619	Near green	0
House location	City center	1.0909	Outside city center	0.5782
Distance to supermarket	Within 750 m	0.0612	Winter 1000 m	0
Distance to train station	Within 5 km	0.4809	Within 7 km	0
Distance to highway	Within 7 km	0	Within 5 km	0.2930
Total		-0,9217		-0,8063

Choice set 24

Table 46: Survey 2, Choice set 24

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€900	0.8401
Min dwelling surface	More than 90 m2	0	70 m2	-0.1675
Dwelling amenities	Balcony	0.0758	Parking place	-0.0183
Green amenities	Near green	0	Near water	0.0619
House location	City center	1.0909	Village outside city	0
Distance to supermarket	Within 1000 m	0	Within 750 m	0.0612
Distance to train station	Within 3 km	0.6058	Within 5 km	0.4809
Distance to highway	Within 5 km	0.2930	Within 7 km	0
Total		2,0615		1,2542

Choice set 25

Table 47: Survey 2, Choice set 25

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	More than €1000	0	€900	0.8401
Min dwelling surface	More than 90 m2	0	70 m2	-0.1675
Dwelling amenities	Balcony	0.0758	Garage/storage	0
Green amenities	Near water	0.0619	Near green	0
House location	Suburbs	0.5681	Village outside city	0
Distance to supermarket	Within 1000 m	0	Within 750 m	0.0612
Distance to train station	Within 5 km	0.4809	Within 7 km	0
Distance to highway	Within 7 km	0	Within 3 km	0.4013
Total		1,1851		1,1258

Choice set 26

Table 48: Survey 2, Choice set 26

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	€900	0.8401
Min dwelling surface	70 m2	-0.1675	50 m2	-0.7252
Dwelling amenities	Garden	0.3525	Parking place	-0.0183
Green amenities	Near water	0.0619	Near green	0
House location	City center	1.0909	Outside city center	0.5782
Distance to supermarket	Within 250 m	0.1372	Within 750 m	0.0612
Distance to train station	Within 7 km	0	Within 5 km	0.4809
Distance to highway	Within 3 km	0.4013	Within 3 km	0.4013
Total		3,7068		1,6054

Choice set 27

Table 49: Survey 2, Choice set 27

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	Less than €700	1.8463
Min dwelling surface	70 m2	-0.1675	More than 90 m2	0
Dwelling amenities	Balcony	0.0758	Garden	0.3525
Green amenities	Near green	0	Near water	0.0619
House location	Suburbs	0.5681	Village outside the city	-2.2372
Distance to supermarket	Within 500 m	0.0433	Within 500 m	0.0433
Distance to train station	Within 7 km	0	Within 3 km	0.6058
Distance to highway	Within 1 km	0.3450	Within 5 km	0.2930
Total		2,2030		3,1979

Choice set 28

Table 50: Survey 2, Choice set 28

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	More than €1000	0
Min dwelling surface	50 m2	-0.7252	Less than 30 m2	-2.1129
Dwelling amenities	Parking place	-0.0183	Balcony	0.0758
Green amenities	Near water	0.0619	Near green	0
House location	Outside city center	0.5782	Suburbs	0.5681
Distance to supermarket	Within 1000 m	0	Within 750 m	0.0612
Distance to train station	Within 5 km	0.4809	Within 7 km	0
Distance to highway	Within 3 km	0.4013	Within 1 km	0.3450
Total		2,6195		-1,0544

Choice set 29

Table 51: Survey 2, Choice set 29

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€800	1.3466	€900	0.8401
Min dwelling surface	70 m2	-0.1675	50 m2	-0.7252
Dwelling amenities	Garage/storage	-0.41	Garden	0.3525
Green amenities	Near water	0.0619	Near green	-0.0619
House location	Outside city center	0.5782	Suburbs	0.5681
Distance to supermarket	Within 750 m	0.0612	Within 250 m	0.1372
Distance to train station	Within 5 km	0.4809	Within 1 km	0.9053
Distance to highway	Within 5 km	0.2930	Within 7 km	-1.051
Total		2,6412		2,0635

Choice set 30

Table 52: Survey 2, Choice set 30

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€900	0.8401	Less than €700	1.8463
Min dwelling surface	More than 90 m2	0	Less than 30 m2	-2.1129
Dwelling amenities	Garage/storage	0	Balcony	0.0758
Green amenities	Near water	0.0619	Near water	0.0619
House location	City center	1.0909	Outside city center	0.5782
Distance to supermarket	Within 500 m	0.0433	Within 750 m	0.0612
Distance to train station	Within 5 km	0.4809	Within 3 km	0.6058
Distance to highway	Within 1 km	0.3450	Within 3 km	0.4013
Total		2,8511		1,5141

Choice set 31

Table 53: Survey 2, Choice set 31

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	€900	0.8401	€800	1.3466
Min dwelling surface	50 m2	-0.7252	70 m2	-0.1675
Dwelling amenities	Balcony	0.0758	Parking place	-0.0183
Green amenities	Near green	0	Near green	0
House location	City center	1.0909	Suburbs	0.5681
Distance to supermarket	Within 750 m	0.0612	Within 500 m	0.0433
Distance to train station	Within 5 km	0.4809	Within 1 km	0.9053
Distance to highway	Within 3 km	0.4013	Within 1 km	0.3450
Total		2,2100		3,0141

Choice set 32

Table 54: Survey 2, Choice set 32

Housing attributes	Alternative 1	Utility	Alternative 2	Utility
Max net price	Less than €700	1.8463	€900	0.8401
Min dwelling surface	50 m2	-0.7252	70 m2	-0.1675
Dwelling amenities	Parking place	-0.0183	Balcony	0.0758
Green amenities	Near green	0	Near green	0
House location	City center	1.0909	Outside city center	0.5782
Distance to supermarket	Within 750 m	0.0612	Within 250 m	0.1372
Distance to train station	Within 3 km	0.6058	Within 5 km	0.4809
Distance to highway	Within 1 km	0.3450	Within 5 km	0.2930
Total		3,1933		2,2251

Appendix H - Subgroup coefficient and significance tables

Table 55: Gender subgroup analysis

		Gender			
Attribute	**Label**	**Male**		**Female**	
Sample size		105		217	
		Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*
Constant		-1,1933	0,000	-1,6811	0,000
Price	Less than €700	1,4819	0,000	2,0192	0,000
	€800	1,1419	0,000	1,4505	0,000
	€900	0,5617	0,000	0,9740	0,000
	More than €1000	0	0	0	0
Surface	Less than 30 m2	-2,1681	0,000	-2,0758	0,000
	50 m2	-0,7446	0,000	-0,7217	0,000
	70 m2	-0,0653	0,5997	-0,2060	0,0147
	More than 90 m2	0	0	0	0
Dwelling amenity	Garden	0,3547	0,0052	0,3509	0,0001
	Garage/storage	0	0	0	0
House location	City center	1,1356	0,000	1,0603	0,000
	Edge of city center	0,4716	0,0004	0,6174	0,000
	Suburbs (within city)	0,4722	0,0001	0,6015	0,000
	Village outside the city	0	0	0	0
Train station location	Less than 1 km	0,7434	0,0000	0,9708	0,0000
	Less than 3 km	0,5064	0,0004	0,6514	0,0000
	Less than 5 km	0,3982	0,0022	0,5104	0,0000
	Less than 7 km	0	0	0	0
Highway location	Less than 1 km	0,6046	0,0001	0,2193	0,0425
	Less than 3 km	0,6128	0	0,2959	0,0053
	Less than 5 km	0,5820	0	0,1524	Not Sig.
	Less than 7 km	0	0	0	0
R^2		0,17385		0,16057	

Table 56: Work status sub group analysis

		Work status			
Attribute	**Label**	**Student**		**Have a job**	
Sample size		105		194	
		Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*
Constant		-1,2440	0,000	-1,6046	0,000
Price	**<€700**	1,9671	0,000	1,7402	0,000
	€800	1,4117	0,000	1,2815	0,000
	€900	0,8138	0,000	0,8042	0,000
	>€1000	0	0	0	0
Surface	**<30 m2**	-1,7771	0,000	-2,4313	0,000
	50 m2	-0,6199	0,000	-0,8025	0,000
	70 m2	-0,1554	Not Sig.	-0,1764	Not Sig.
	>90 m2	0	0	0	0
Dwelling amenity	**Balcony**	0,0787	Not Sig.	0,0578	Not Sig.
	Parking place	0,0432	Not Sig.	-0,0956	Not Sig.
	Garden	0,1525	Not Sig.	0,4328	0,000
	Garage/storage	0	0	0	0
House location	**City center**	1,0916	0,000	1,0987	0,000
	Edge of city center	0,4434	0,0012	0,6388	0,000
	Suburbs	0,3041	0,0118	0,6516	0,000
	Village	0	0	0	0
Train station location	**Less than 1 km**	0,8932	0,000	0,9159	0,000
	Less than 3 km	0,5794	0,0001	0,6675	0,000
	Less than 5 km	0,3769	0,0056	0,5660	0,000
	Less than 7 km	0	0	0	0
Highway location	**Less than 1 km**	0,2571	Not Sig.	0,3940	0,0006
	Less than 3 km	0,2018	Not Sig.	0,5310	0,000
	Less than 5 km	0,2332	Not Sig.	0,3276	0,0007
	Less than 7 km	0	0	0	0
R^2		**0,16479**		**0,17581**	

Table 57: Income group analysis

		Income									
Attribute	**Label**	**< €19.999**		**€25.000 – €29.999**		**€30.000 – €34.999**		**€35.000 – €39.999**		**>€40.000**	
Sample size		128		32		38		35		44	
		Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*
Constant		-1,3848	0,0000	-1,6252	0,0003	-1,6915	0,0002	-1,8707	0,0000	-1,7256	0,0001
Price	**Less than €700**	1,9428	0,0000	2,1379	0,0000	2,0428	0,0000	1,4617	0,0000	1,2866	0,0000
	€800	1,3078	0,0000	1,5677	0,0000	1,5248	0,0000	1,4130	0,0000	1,0789	0,0000
	€900	0,7428	0,0000	1,0251	0,0000	0,9573	0,0000	0,8073	0,0002	0,7155	0,0011
	More than €1000	0	0	0	0	0	0	0	0	0	0
Surface	**Less than 30 m2**	-1,7638	0,0000	-1,7631	0,0000	-2,7915	0,0000	-2,5622	0	-3,2452	0,0000
	50 m2	-0,6385	0,0000	-0,2473	Not Sig.	-0,9320	0,0000	-0,3620	Not Sig.	-1,0491	0,0000
	70 m2	-0,1230	Not Sig.	0,0411	Not Sig.	-0,1752	Not Sig.	0,0310	Not Sig.	-0,1849	Not Sig.
	More than 90 m2	0	0	0	0	0	0	0	0	0	0
House Amenity	**Balcony**	0,1525	Not Sig.	-0,0028	Not Sig.	-0,0149	Not Sig.	0,2433	Not Sig.	0,0673	Not Sig.
	Parking place	0,1506	0,0000	-0,3135	Not Sig.	-0,3023	Not Sig.	-0,0130	Not Sig.	-0,0532	Not Sig.
	Garden	0,2829	0,0136	0,3295	Not Sig.	0,4768	Not Sig.	0,7193	0,0013	0,5528	0,0110
	Garage/storage	0	0	0	0	0	0	0	0	0	0
House location	**City center**	1,0626	0,0000	0,8557	0,0003	0,9998	0,0000	1,3866	0,0000	1,4729	0,0000
	Edge of city center	0,5368	0,0000	0,5732	0,0187	0,3918	Not Sig.	0,8792	0,0003	0,5838	Not Sig.
	Suburbs (within city)	0,4162	0,0001	0,8451	0,0001	0,4257	0,0364	0,7032	0,0010	0,5153	0,0111
	Village outside the city	0	0	0	0	0	0	0	0	0	0
Train station location	**Less than 1 km**	0,7993	0,0000	1,0029	0,0002	1,3620	0,0000	0,8004	0,0020	0,7899	Not Sig.
	Less than 3 km	0,4472	0,0006	0,7931	0,0020	0,9083	0,0005	0,5242	0,0367	0,7056	0,0030
	Less than 5 km	0,2577	0,0327	0,5603	0,0169	1,0148	0,0000	0,5339	0,0128	0,2208	Not Sig.
	Less than 7 km	0	0	0	0	0	0	0	0	0	0
Highway location	**Less than 1 km**	0,2989	0,0000	-0,0353	Not Sig.	0,8311	0,0017	0,0374	Not Sig.	0,9096	0,0016
	Less than 3 km	0,2638	Not Sig.	0,2183	Not Sig.	0,6737	0,0091	0,0454	Not Sig.	1,0799	0,0001
	Less than 5 km	0,2653	0,0289	-0,0036	Not Sig.	0,4648	0,0318	-0,0771	Not Sig.	0,9156	0,0003
	Less than 7 km	0	0	0	0	0	0	0	0	0	0
R^2		0,15684		0,16049		0,21988		0,18524		0,23897	

Table 58: Home location preference group analysis

Home location preference								
Attribute	**Label**	**Near work**		**Near education /school**		**Near family**		**Near friends**	
Sample size		126		38		32		104	
		Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*
Constant		-1,3784	0,0000	-1,6327	0,0001	-1,3754	0,0024	-2,0243	0,0000
Price	Less than €700	1,8024	0,0000	1,9261	0,0000	2,0223	0,0000	1,9250	0,0000
	€800	1,3019	0,0000	1,4587	0,0000	1,2832	0,0000	1,4644	0,0000
	€900	0,7383	0,0000	0,7550	0,0004	0,8595	0,0004	0,9827	0,0000
	More than €1000	0	0	0	0	0	0	0	0
Surface	Less than 30 m2	-2,0084	0,0000	-1,6232	0,0000	-2,0020	0,0000	-2,6662	0,0000
	50 m2	-0,6603	0,0000	-0,6014	0,0021	-0,9427	0,0000	-0,8621	0,0000
	70 m2	-0,1283	Not Sig.	-0,0222	Not Sig.	-0,5236	0,0161	-0,1600	Not Sig.
	More than 90 m2	0	0	0	0	0	0	0	0
House Amenity	Balcony	0,0270	Not Sig.	0,09075	Not Sig.	0,2958	Not Sig.	0,2542	0,0431
	Parking place	-0,1376	Not Sig.	0,1266	Not Sig.	0,4868	Not Sig.	0,0331	Not Sig.
	Garden	0,2131	Not Sig.	0,1853	Not Sig.	0,7866	0,0009	0,5993	0,0000
	Garage/storage	0	0	0	0,0000	0	0	0	0
House location	City center	1,1968	0,0000	0,6620	0,0018	0,6057	0,0107	1,6444	0,0000
	Edge of city center	0,6460	0,0000	0,3329	Not Sig.	0,2764	Not Sig.	0,9004	0,0000
	Suburbs (within city)	0,6160	0,0000	0,0785	Not Sig.	0,4914	0,0243	0,9052	0,0000
	Village outside the city	0	0	0	0	0	0	0	0
Train station location	Less than 1 km	0,8755	0,0000	0,7221	0,0032	0,6430	0,0179	1,1380	0,0000
	Less than 3 km	0,6460	0,0000	0,5404	0,0222	0,2802	Not Sig.	0,6674	0,0000
	Less than 5 km	0,4129	0,0008	0,3369	Not Sig.	0,3830	Not Sig.	0,5920	0,0000
	Less than 7 km	0	0	0	0	0	0	0	0,0000
Highway location	Less than 1 km	0,2593	Not Sig.	0,6168	0,0182	0,0380	Not Sig.	0,4090	0,0115
	Less than 3 km	0,2899	0,0443	0,5510	0,0303	0,1963	Not Sig.	0,4432	0,0049
	Less than 5 km	0,1813	Not Sig.	0,5491	0,0132	0,0157	Not Sig.	0,3400	0,0115
	Less than 7 km	0	0	0	0	0	0	0	0
R^2		**0,16254**		**0,15301**		**0,14466**		**0,21274**	

Table 59: Education level group analysis

		Education level			
Attribute	**Label**	**HBO**		**WO**	
Sample Size		100		181	
		Coefficient	Prob |z|>Z*	Coefficient	Prob |z|>Z*
Constant		-0,8104	Not Sig.	-2,1779	0,0013
Price	<€700	1,5255	0,0001	1,9931	0,0000
	€800	1,0998	0,0171	1,4994	0,0000
	€900	0,6954	Not Sig.	0,9077	0,0000
	>€1000	0	0	0	0
Surface	<30 m2	-1,9541	Not Sig.	-2,5515	0,0000
	50 m2	-0,7582	Not Sig.	-0,7433	0,0000
	70 m2	-0,3325	Not Sig.	-0,0387	0,0071
	>90 m2	0	0	0	0
Dwelling amenity	Balcony	-0,2075	Not Sig.	0,3718	Not Sig.
	Parking place	-0,1231	Not Sig.	0,1078	Not Sig.
	Garden	0,1315	Not Sig.	0,6244	Not Sig.
	Garage/storage	0	0	0	0
House location	City center	0,8656	0,0001	1,4340	0,0000
	Edge of city center	0,4408	0,0158	0,7376	0,0088
	Suburbs (witin city)	0,3122	0,0140	0,8123	0,0008
	Village outside city	0	0	0	0
Train station location	Less than 1 km	0,7454	0,0426	1,0270	0,0000
	Less than 3 km	0,5452	Not Sig.	0,6334	0,0002
	Less than 5 km	0,4756	Not Sig.	0,4500	0,0002
	Less than 7 km	0	0	0	0
Highway location	Less than 1 km	0,2484	Not Sig.	0,4089	0,0012
	Less than 3 km	0,2150	Not Sig.	0,5006	0,0001
	Less than 5 km	0,2274	Not Sig.	0,3259	0,0025
	Less than 7 km	0	0	0	0
R^2		**0,13100**		**0,21130**	