An insight into the residential preferences of young people on the rental housing market

A stated choice experiment to identify young people's (including students, young professionals, and expats) residential preferences and willingness-to-pay for housing-related and building-related facilities

Master Thesis

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"Keep creating places and spaces where young people want to live before they know they want to live there" (Zagster, 2017)

COLOPHON

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MNL: Multinomial Logit Model
DCE: Discrete Choice Experiment
WTP: Willingness-to-pay

PREFACE

This report represents the graduation project of Rowin Tazelaar as final product of the Master program Construction Management and Urban Development at Eindhoven University of Technology (TU/e). The aim of the study was to provide an insight into both the preferences and willingness-to-pay (WTP) for housing and building facilities of young people, including students, young professionals, and expats. The thesis was performed in cooperation with Holland2Stay, a real estate manager located in Eindhoven that offers affordable and luxurious accommodation for young people in central located cities in the Netherlands, such as Eindhoven, Amsterdam, Rotterdam, Utrecht, etc. Currently, Holland2Stay conduct the management activities, consisting of technical, financial, and administrative management, of approximately 2,600 self-contained properties. Their real estate portfolio will expand up to 6,000 properties by the year 2018.

Studying at the TU/e was an interesting and important period for me and carrying out this research was one of the most valuable components of my period at the TU/e. My interest in real estate and urban development triggered me to choose a topic for my graduation project that was related to this topic. Therefore, I was motivated to looking for a real estate company in which I could perform my final project.

First of all, I would like to thank dr. G.Z. (Gamze) Dane for her valuable support, guidance, feedback and overall her important help throughout my graduation project. Furthermore, I would like to thank my second and third supervisor dr. Q. (Qi) Han and dr. I.V. (Ioulia) Ossokina for their helpful feedback and cooperation during my project as well. Additionally, I would like to thank Zjef Bogers for his inputs during the project and I am grateful for the opportunity he gave me to conduct my research at Holland2Stay. Consequently, my family and girlfriend gave me a huge support as well during my whole graduation project, for which I am very thankful. Finally, a big thanks to the respondents that took time for filling in my online questionnaire; the quality of the research would not be that good without your help.

Rowin Tazelaar,

Eindhoven, September 2017

ABSTRACT

Innovative living concepts for urban millennials are entering the global market rapidly with the purpose to meet the demand and to meet the residential preferences of this group. However, urban millennials have higher expectations for their housing than their baby-boomer parents. This research therefore focuses on the residential preferences of young people in order to understand their needs and their willingness-to-pay for different types of housing alternatives varying in the presence and absence of different housing-related and building-related facilities. For this purpose, a stated choice experiment was designed and data of young people was collected via an online survey. The analysis of the data was executed by a Multinomial Logit Model and the results show that size and price are the most important significant factors for young people when making a housing decision, followed by different housing-related and building-relate facilities. The model even shows that there are differences in preferences among different socio-demographic groups and the model has estimated the willingness-to-pay expressed in euros for all attributes included in choice alternatives in the survey.

SUMMARY

The concept of Purpose-Built Student Accommodation, PBSA, has experienced a rapid growth and expansion at a global scale the last two years. PBSAs are accommodations for young people that offer on-site management, maintenance, administration, and letting services. PBSAs are characterized by properties with all-in rents including basic rent, energy costs, maintenance costs, cleaning costs, and costs for making use of several facilities the building offers. Records were achieved in both the UK and the USA and some European markets has seen enormous growth as well, mainly the Netherlands and Germany. On the other hand, the number of international students, expats, and young professionals has experienced an enormous increase in the Netherlands. In order to ensure that the demand meets the supply there is need for approximately 3,900 self-contained properties with a rent of smaller than €400 per month and 46,400 self-contained properties with a rent of more than €400 per month in order to fulfil the wishes of only the students in the Netherlands; mainly in the cities of Amsterdam, Rotterdam, Groningen, and Utrecht.

Furthermore, the residential needs and expectations of today's young people experience a rapid change. The trend is that they want to maximize the living comfort while keeping their responsibilities to a minimum. So, the global expansion of PBSAs, the enormous forecasted increase in young people population, and the trend of maximizing living comfort and keeping responsibilities to a minimum ask for a clear insight into the residential preferences of young people and the amounts of money young people want to spend in order to realize a maximum living comfort.

In order to determine the residential preferences of young people and estimating the WTP for both housing-related and building-related facilities, a choice experiment is executed where a total of 513 young people are consulted in a digital survey. The 513 respondents were presented with a total of twelve choice sets each including two housing alternatives and an option 'none of these', in case they do not have a preference for one of the provided housing alternatives. The attributes included in the housing alternatives are identified based upon an extensive literature review and cover size, price, dwelling division, washing machine, dishwasher, type furniture, insurances package, common area, bike sharing, and leisure facilities. After the data collection the influence of every attribute level on the housing choice of young people is estimated using a Multinomial Logit Model. Based upon the influences, the relative importance of every attribute is calculated. The results show that price is the most important attribute for young people when making a housing decision, followed by the size of the housing unit. In addition, the attributes dwelling division and washing machine for private use are equally important and are respectively the third and fourth ranked attributes in the sense of relative importance. This implies that the presence of a separate bedroom and the presence of an in-unit washing machine are the most important attributes to young people when making a housing decision apart from size and price. Additionally, the facilities dishwasher, insurances package, bike sharing, and leisure facilities have a collective relative importance of 14,19%, which implies that these attributes

are less important to young people when considering different housing alternatives. Furthermore, the results show that the model is heterogeneous in some attributes, meaning that there are differences in preferences. In order to identify the differences in preferences, different sub groups are created and their data is analysed. The results show that there are differences between students, young professionals, and expats; for all of the groups size and price are the most important attributes; size is the least important attribute for students compared to young professionals and expats while price is the most important attribute for students compared to the other groups. When looking at the dwelling division, it can be concluded that the presence of a separate bedroom is more important to young professionals and expats compared to students. In addition, a washing machine is more important to expats and students while a dishwasher is more important to young professionals. Finally, the attributes furniture, insurances package, common area, bike sharing, and leisure facilities each have a relative importance of 5% or less for all three of the groups, implying that these facilities are less important to students, young professionals and expats. Consequently, the results show that there are also differences in preferences between male and female. Where the size and the division of the dwelling are more important to women, the price is more important to men. Differences in preferences are also found for different household types and different income groups. However, people from different nationalities, both Western people and non-Western people, almost share the same preferences.

Based upon the part-worth utility of each attribute level, the willingness-to-pay of young people for the different facilities is calculated; this is expressed in Euros per month. The willingness-to-pay estimates are clearly in line with the relative importance of the attributes and vary from an amount of €143,71 for size to an amount of €11,26 for leisure facilities.

Finally, a decision support tool is created by integrating the data from young people's residential preferences. The tool could be valuable for real estate managers, real estate developers, policy makers, the government, and more stakeholders to review and monitor different housing alternatives and to extract the probability distributions that young people will choose for different housing alternatives.

SAMENVATTING

Het concept 'Purpose-Built Student Accommodation', PBSA, heeft de laatste twee jaar een sterke groei en uitbreiding ervaren op wereldwijd niveau. PBSAs zijn accommodaties voor jonge mensen die voorzien zijn van verhuurservices, administratie, onderhoud en reparaties ter plaatse van de accommodatie. PBSAs kenmerken zich door verhuur van units met maandelijkse all-in huurprijzen, bestaande uit kale huur, energiekosten, onderhoudskosten, schoonmaakkosten en kosten ten gevolge van het gebruik van verschillende faciliteiten in en om het gebouw. De afgelopen jaren heeft de markt op globale schaal een enorme groei laten zien in de investeringen in PBSAs, voornamelijk in het Verenigd Koninkrijk, de Verenigde Staten, Nederland en Duitsland. Aan de andere kant wordt er een enorme groei verwacht in de hoeveelheid studenten, kenniswerker en young professionals de komende jaren. Om te verzekeren dat de vraag in balans is met het aanbod de komende jaren is er in Nederland op korte termijn behoefte aan circa 3900 zelfstandige wooneenheden met een huur van minder dan €400 per maand en circa 46400 zelfstandige wooneenheden met een huur van €400 of meer. Deze hoeveelheden zijn voornamelijk nodig in Nederlandse universiteit-steden, zoals Amsterdam, Rotterdam, Groningen en Utrecht.

Daarnaast hebben de woonvoorkeuren- en verwachtingen van jonge mensen een snelle veranderingen doorlopen. De trend is dat jonge mensen de wooncomfort willen maximaliseren en de verantwoordelijkheden willen minimaliseren. Dus, de globale groei en evolutie in de ontwikkeling van PBSAs, de enorme groei en voorspelde groei in de populatie van student, kenniswerker en young professionals, en de veranderende woonwensen van jonge mensen vragen om een duidelijk inzicht in de woonvoorkeuren van jonge mensen en de bereidheid om te betalen voor diverse faciliteiten in en om het gebouw om de gewenste niveau van wooncomfort te bereiken.

Om een inzicht te krijgen in de woonvoorkeuren van jonge mensen en de bereidheid om te betalen voor diverse faciliteiten in de wooneenheid en in het gebouw is een keuze-experiment uitgevoerd met behulp van een online enquête; de enquête is uiteindelijk ingevuld door 513 respondenten. De respondenten kregen eerst een aantal socio-demografische vragen gevolgd door twaalf keuzesets bestaande uit twee woonalternatieven en een optie 'geen van beide'. De laatste optie werd aangeboden als keuzemogelijkheid indien de respondent geen voorkeur had voor één van de twee woonalternatieven. De keuzesets omvatte verschillende combinaties, variërend in levels van de volgende variabelen: oppervlakte, huurpijs, woningindeling, wasmachine, vaatwasser, type meubilering, verzekeringspakket, gedeelde ruimte, fietsen delen en gym/sauna. Na het verzamelen, opschonen en coderen van de data, de invloed van ieder variabele level op de onafhankelijke variabele 'woonkeuze' is geschat door toepassing van een zogenaamd Multinomiaal Logistisch Model. De uitkomsten van deze invloeden zijn gebruikt voor het berekenen van het procentuele belang van iedere variabele. De resultaten laten zien dat prijs het belangrijkste aspect is voor jonge mensen bij het maken van een woningkeuze, gevolgd door de oppervlakte van de wooneenheid. Daarnaast zijn de variabelen

woningindeling en wasmachine de meest belangrijke aspecten op prijs en oppervlakte na. De woningindeling betreft de aan- of afwezigheid van een aparte slaapkamer en een wasmachine betreft de aan- of afwezigheid van een wasmachine in de wooneenheid voor privégebruik. Tot slot zijn de faciliteiten vaatwasser, type meubilering, verzekeringspakket, gedeelde ruimte, fietsen delen en gym/sauna minder belangrijk, omdat deze variabelen een collectief belang hebben van slechts 14,19%. Eveneens laten de resultaten zien dat het model heterogeen is in sommige variabelen. Om de heterogeniteit in de variabelen te testen is er een onderscheid gemaakt tussen verschillende groepen mensen. Onderscheid is gemaakt tussen verschillende soorten groepen, namelijk studenten, young professionals en kenniswerkers, geslacht, nationaliteit, huishoudgroepen en inkomensgroepen. Deze zogenaamde subgroepen zijn eveneens geanalyseerd met behulp van een multinomiaal logistisch model en de uitkomsten laten zien waar de heterogeniteit in diverse variabelen vandaan komt. De verschillen tussen de doelgroep van dit onderzoek suggereren dat prijs het belangrijkste attribuut is voor studenten vergeleken met young professionals en kenniswerkers en oppervlakte is minder belangrijk voor studenten vergeleken met young professionals en kenniswerkers. De indeling van de woning, m.a.w. de aanwezigheid van een aparte slaapkamer, is juist belangrijker voor young professionals en kenniswerkers in vergelijking met studenten. Daarentegen is een wasmachine belangrijker voor kenniswerkers en studenten vergeleken met young professionals die meer een vaatwasser belangrijker vinden. De faciliteiten type meubilering, verzekeringspakket, gedeelde ruimte, fietsen delen en gym/sauna zijn minder belangrijk voor alle drie de groepen. Bovendien zijn er verschillen in voorkeuren gevonden tussen mannen en vrouwen. Waar de oppervlakte en de indeling van de woning belangrijker is voor vrouwen, is de prijs opvallend belangrijker voor mannen. Eveneens zijn er verschillen in voorkeuren gevonden tussen verschillende huishoudtypes en verschillende inkomensgroepen. Maar, verschillen in woonvoorkeuren tussen mensen van Westerse en niet-Westerse landen zijn er nauwelijks.

De uitkomsten van de invloeden per attribuut level zijn uiteindelijk gebruikt om in te schatten hoeveel euro per maand de totale doelgroep bereid is om te betalen voor iedere faciliteit. De schattingen komen uiteraard duidelijk overeen met het eerder berekende belang per attribuut en de bedragen verschillen van €143,71 voor oppervlakte tot €11,26 voor de faciliteit gym/sauna.

Tot slot is er een tool ontwikkeld met als input de verkregen data uit de enquête. De tool geeft een inzicht in de kansverdelingen voor verschillende woonalternatieven gebaseerd op de faciliteiten en geeft eveneens een inzicht in de kansverdeling voor de optie ‘geen van beide’. Alle mogelijke combinaties kunnen gecreëerd worden, hetgeen resulteert in een vergelijking van 2304 unieke woonalternatieven met eveneens 2304 unieke woonalternatieven. De tool kan waardevol zijn voor vastgoedbeheerders- en ontwikkelaars, beleidsmakers, de overheid en meerdere belanghebbenden om verschillende woonalternatieven te reviewen en een inzicht te krijgen in de geschatte kansen dat die woonalternatieven daadwerkelijk gekozen zullen worden door de onderzoeksdoelgroep.

CHAPTER 1 | RESEARCH FRAMEWORK

1.1 INTRODUCTION

This Master Thesis is divided into six chapters with each their own contribution to the graduation project as a whole. In order to understand the scientific explanation of the literature and methods it is recommended to read the entire report. To gain insight into the topic and overall results of the thesis, it is recommended to read the chapters 'Summary' and 'Conclusions and Recommendations'.

The research will focus on the estimation of both the residential preferences and willingness-to-pay (WTP) for housing-related and building-related facilities of young people, including students, young professionals, and expats. The definition of housing-related and building-related facilities in this research is: facilities and amenities both within the dwelling and within the building in which the dwelling is located. The type of facilities will be determined later on in the research.

To start, the definitions of each group that is part of the target group should be clear. The following definitions will be used in the research context:

- Student: *"One who is enrolled in a school, college, or university* (The Free Dictionary, 2017)*."*
- Young professional: *"Someone who, although he or she may be employed full-time, is within five years of graduation from a full-time Bachelors, Masters or PhD program (or ABD, post-docs) and is under the age of 35* (IAEE, 2017)*."*
- Expat: *"A person who has citizenship in at least one country, but who is living in another country and has the intention to go back towards its country of origin within a few years* (Business Dictionary, 2017)*.*

The investments in Purpose-Built Student Accommodation, PBSA, has seen a rapid growth and expansion at a global scale the last two years (Barnes, Tostevin & Tikhnenko, 2016). PBSA can be described as accommodations for young people that offer on-site management, maintenance, administration, and letting services. PBSAs are characterized by properties with all-in rents including basic rent, energy costs, maintenance costs, cleaning costs, and costs for making use of several facilities the building has to offer (Barnes et al., 2016). The inhabitants of PBSAs are mainly students, but also young professional and expats increasingly live in PBSAs (Barnes et al., 2016). If other young people than students live in PBSAs, such as young professionals and expats, then the projects are called 'hybrid projects' (Barnes et al., 2016). Records were achieved in both the UK and the USA and some European markets has seen enormous growth as well, mainly the Netherlands and Germany. A total of $14.9 billion was globally invested and 2015 can be seen as the best year regarding investments in the student housing sector so far (Barnes et al., 2016). The niche market of PBSA is increasingly seen as an interesting market for real estate developers and investors due to the relative high yields that are

achievable in combination with low vacancy rates due to the growth of young people seeking for self-containing accommodation (Barnes et al., 2016). Figure 1 shows the global investment amounts in PBSA divided over the US, UK, and Western Europe.

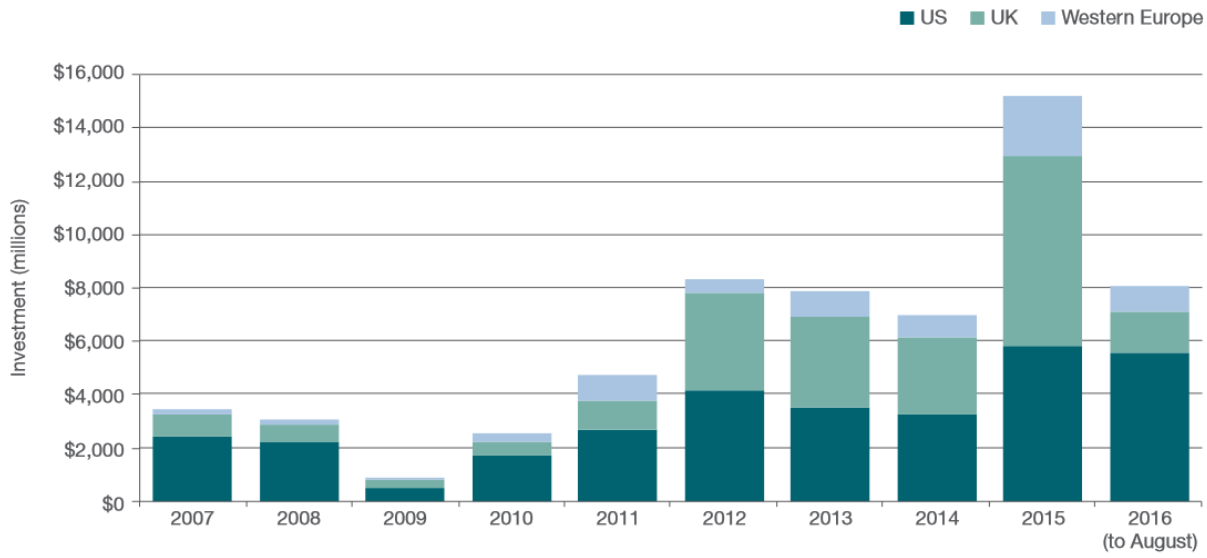

Figure 1: Global investments in PBSA (Barnes et al., 2016).

The rapid increase of investments levels on both global and national scale is a trigger for real estate developers to develop attractive housing accommodations for young people. Since 2012 municipalities intended to change zoning plans in order for developers to build or transform buildings into PBSA's. Consequently, the Dutch government eased some regulations regarding construction works for student purpose; they eased the rule of the minimum surface for new PBSA's from 18 square meter to 15 square meter (Barnes et al., 2016).

On the other hand, the number of international students, expats, and young professionals has experienced an enormous increase in the Netherlands and even their housing needs have changed last years (ABF Research, 2016; La Roche, Flanigan, & Copeland, 2010). According to Kences and ABF Research (2016), the number of students in the Netherlands will grow with 4%, or a quantity of 27,100 students, in the period 2016 – 2024. This growth will mainly be caused by the increase of university students. In addition, 64%, or 323,000, of the total student population in the Netherlands tends to move, of which 40% the upcoming year. More than a half wants to move to self-contained housing, mainly in University cities (ABF Research, 2016). Finally, 'Landelijke Monitor Studentenhuisvesting' (2016) even show that there is more supply than demand of rooms with shared facilities. However, in the short term there is need for approximately 3,900 self-contained properties with a rent of smaller than €400 per month and 46,400 self-contained properties with a rent of more than €400 per month in order to fulfil the wishes of only the students in the Netherlands; mainly in the cities of Amsterdam, Rotterdam, Groningen, and Utrecht (ABF Research, 2016).

Alongside the forecasted growth in the Dutch student population, the Netherlands has to deal with an increase in expats (PBL, 2014). Currently, approximately 57,000 expats are living and working in the Netherlands and the expectation is that this number will grow rapidly the upcoming years due to the good economic circumstances in the Netherlands compared to other countries (Savills, 2016).

Besides the student and expat population, the Netherlands has to deal with an increase in single-person households. This group of people has the same challenge as students, young professionals, and expats, namely: seeking for housing units that accomplish their needs and is still affordable (Barnes et al., 2016). The Netherlands is one of the most individualized countries in the world, amongst the Scandinavian countries and the group of young adults are most likely to have been affected by the individualization. Figure 2 shows the forecasted development of single-person households in the Netherlands (CBS, 2000).

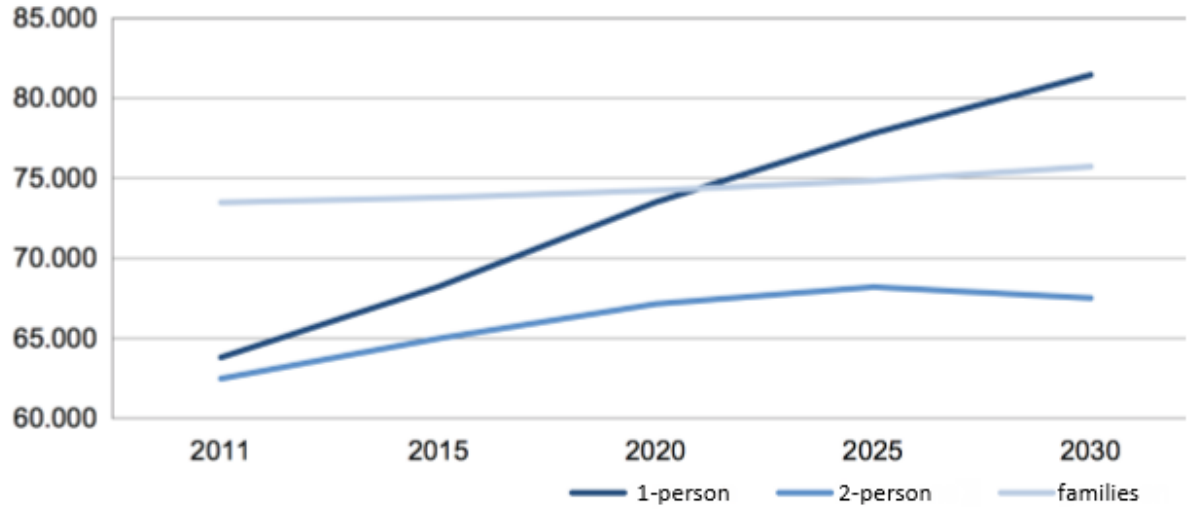

Figure 2: Development of single-person households in the Netherlands compared to other households (CBS, 2000).

So, the Netherlands is an attractive country for young people to live, learn, and work and according to forecasts there is demand for affordable housing with a high standard of quality and amenities for different groups of young people. This group consists of students, young professionals and expats, which could be single-person households or young couples. They are seeking for housing units that accomplish their needs and is affordable at the same time. Barnes et al. (2016) support the statement that the Netherlands is an attractive country, mainly for international students. As seen in figure 3, the Netherlands is the top European country by number of students enrolled in English Taught Programmes. In the Netherlands, the experience is that internationals often are willing to pay more for both their housing as their living than the Dutch population itself (Barnes et al., 2016).

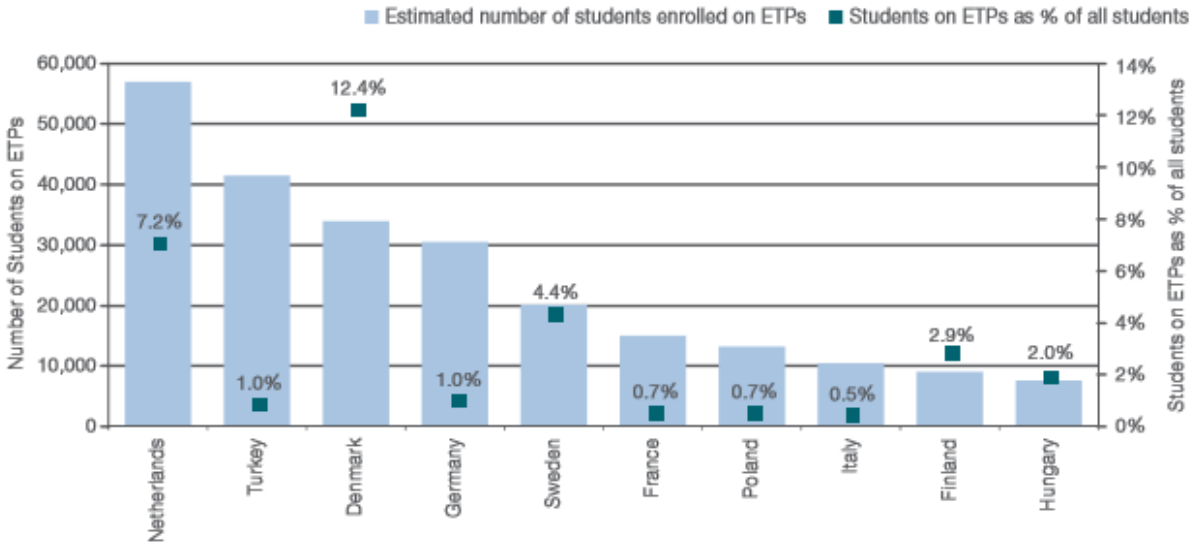

Figure 3: *"Top European countries by number of students enrolled in English Taught Programmes* (Barnes et al., 2016, p.9)."

1.2 RESEARCH PROBLEM

La Roche, Flanigan & Copeland (2010) mention in their study that young people of the millennial generation have higher expectations for their housing than their 'baby-boomer' parents; there have been taken place a shift in expectations. In their study they even figured out that the needs and desires of students regarding their housing have changed the last years more than any other period in the past (La Roche et al., 2010). Additionally, the forecasted enormous increase in the population of students, young professionals, expats, and single-person households will lead to a larger imbalance between the supply and demand of housing accommodation for these groups of people. As discussed in the introduction, in the short term there is need for approximately 3,900 self-contained properties with a rent of smaller than €400 per month and 46,400 self-contained properties with a rent of more than €400 per month in order to fulfil the wishes of only the students in the Netherlands; mainly in the cities of Amsterdam, Rotterdam, Groningen, and Utrecht (ABF Research, 2016). In order to meet the demand of affordable housing for the total young people population, the forecasted demand on both the short term as long term is enormously.

So, the forecasted increase in the young people population, their rapid changing housing needs, and therefore the imbalance between the demand for affordable and attractive housing solutions and the supply form the core problem of this research. When real estate developers, real estate managers, policy makers, urban planners, the Dutch government, and more stakeholders have a clear insight into the housing needs and preferences of young people, they are able to develop valuable real estate. This could lead to minimize vacancy, maximize profit, and maximize tenant satisfaction (Bullen & Love, 2011). Figure 4 visualizes the research problem and its scope.

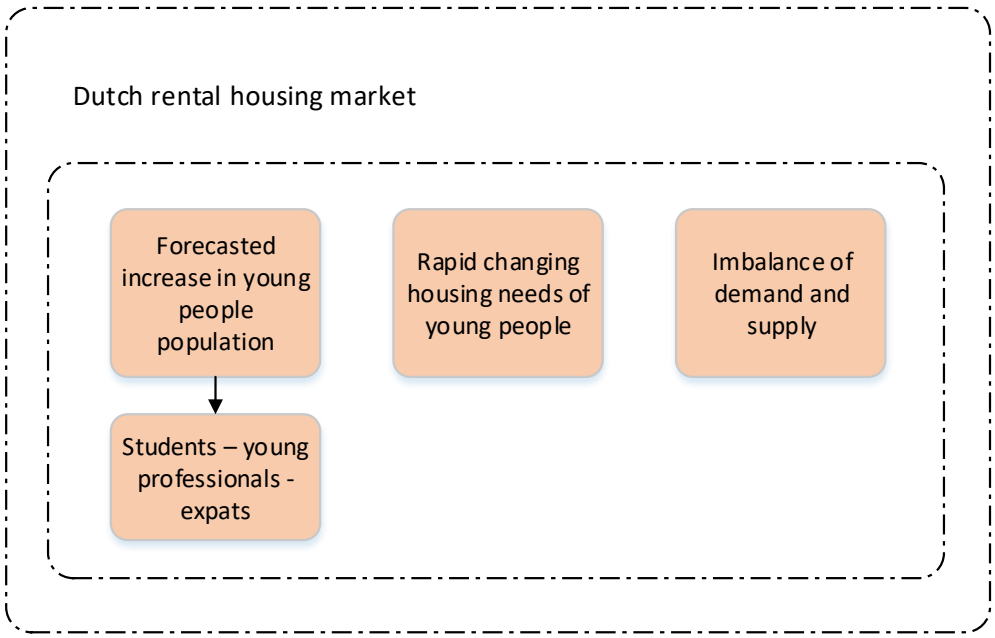

Figure 4: Research problem.

1.3 RESEARCH QUESTION

The main research question that will be answered within the graduation thesis is:

"What are the residential preferences and willingness-to-pay for both housing-related and building-related facilities of young people, including students, young professionals, and expats?"

Sub questions that will contribute to the main question within the graduation thesis will be:

- What are the residential preferences of young people, including students, young professionals, and expats according to literature? (Chapter 2)
- What are the differences in residential preferences between different groups of people varying in group nature, nationality, household composition, gender, and income? (Chapter 4)
- What amounts are young people willing to spend for housing-related and building-related facilities? (Chapter 4)
- Is there a possibility to develop a decision support tool that gives an insight into the residential preferences of young people and how could this tool be applied in practice? (Chapter 5)

1.4 RESEARCH APPROACH

In order to identify the preferences and WTP for housing and building facilities of the potential tenants, a discrete choice experiment (DCE) will be used; in order to draw conclusions from the choices made between different alternatives by the respondents, a Multinomial Logit Model (MNL) will be used. Furthermore, the WTP for facilities and services of the most successive alternative per group will be calculated based upon the outcomes of the DCE and MNL. So, the three phenomena that are of huge importance within the research its methodological context are DCE, MNL, and WTP.

The determination of choice preferences is important to predict which product or service is most likely to succeed based upon the opinion or preferences of potential users of that product or service (Louviere, Flynn & Carson, 2010). The first method that will be used in the research, DCE, is a stated preferences method and is based upon hypothetical situations (Louviere et al., 2010). Besides, a MNL is a derivative of a DCE and will always be used to analyse the data as obtained from the DCE (Louviere et al., 2010). The DCE method will be used within this research due to the high level of reality and the match with the research objective to get an insight into the preferences and WTP of young people. Furthermore, the combination of DCE, MNL, and the calculation of the WTP is a widely applied combination in different research fields (Louviere et al., 2010). The discrete choice experiments will be performed with the use of an online survey amongst the potential users of the real estate, namely students, young professionals, and expats. The online survey will be prepared in the TU/e survey system, called Berg, and the attributes of alternatives between the respondents should choose will be identified both upon literature review and an expert interview. This expert interview will take place in the company Holland2Stay with the management team.

Since the target group consists of three different types of people, they all should be approached. Due to the number of respondents that have a positive correlation with the quality of the research, it is important to find as many respondents as possible. Firstly, the current tenants of Holland2Stay will be approached by e-mail with a request to fill in the online survey; this is a group of approximately 3,000 people, consisting of the three different groups. Secondly, young people be approached via business parks in the potential cities on the one hand and friends and colleagues in my work and social environment at the other hand. Business parks can be a good solution to reach young professionals, because a lot of companies and employees are located over there. Examples are the Bio Science Park in Leiden, which is against one of the buildings that will be redeveloped by 2018, on which around more than 17,000 employees are working in more than 90 different companies; another example is the High Tech Campus in Eindhoven with about 10,000 employees. Finally,, the online survey will be promoted among friends, family, and social media channels.

Once the number of respondents is reasonable, the data will be cleaned and recoded. Afterwards, the data will be analysed using a MNL model, which is able to estimate the utility of each alternative among which the respondent could choose. So, the most successive alternative per group, or in other words the one with the highest utility, will be estimated (Vasilache, 2013).

When the data is collected and analysed, the WTP can be calculated. The WTP is a common objective in the use of discrete choice experiments; it is the derivation of measures designed to determine the amount of money the respondents are willing to pay in order to obtain some benefit from their choice. So, with this calculation, one gets an insight into the real price people are willing to pay for a certain level of a certain attribute that is part of the most successive housing alternatives. A deeper scientific insight into the DCE, MNL, and WTP methods will be obtained in the chapter 'Methodology'.

1.5 RESEARCH MODEL AND PROCESS

The first phase within the research is the literature study related to the residential preferences of young people to see what researches have already done and to identify the gap in literature.

For understanding and predicting the target group's preferences and associated WTP, a DCE will be applied. Therefore, the second part focuses on the scientific information related to DCE and its associated MNL and WTP. The results of the literature study in combination with an extensive expert interview will identify and verify the attributes and levels per attribute that will be used within the DCE. The DCE requires that a reasonable number of respondents make choices between different alternatives derived from several variations of potential market offerings. An estimation of the required numbers of respondents can be derived from the rule of thumb as proposed by Orme (1998). The equation and determination of the required numbers of respondents will be explained in the methodology chapter.

Once the online survey is prepared and filled in by a reasonable number of respondents, the data will be analysed using a MNL approach, which is a random utility model and is often used in combination with a DCE in which the respondents should make a choice between at least three alternatives. Other analyses that will be done as a function of the DCE are the estimation of the most and least preferred alternatives, a Random Parameters Model, a subgroup differentiation to see the differences between students, young professionals, and expats, and the estimation of young people's WTP for the attribute levels. In addition, the outcomes of the data analysis will be used at input for the generation of a decision support tool which enables stakeholders in the field of real estate to compare different housing alternatives with each other. The research model, which visualizes the just mentioned process, can be seen in figure 5.

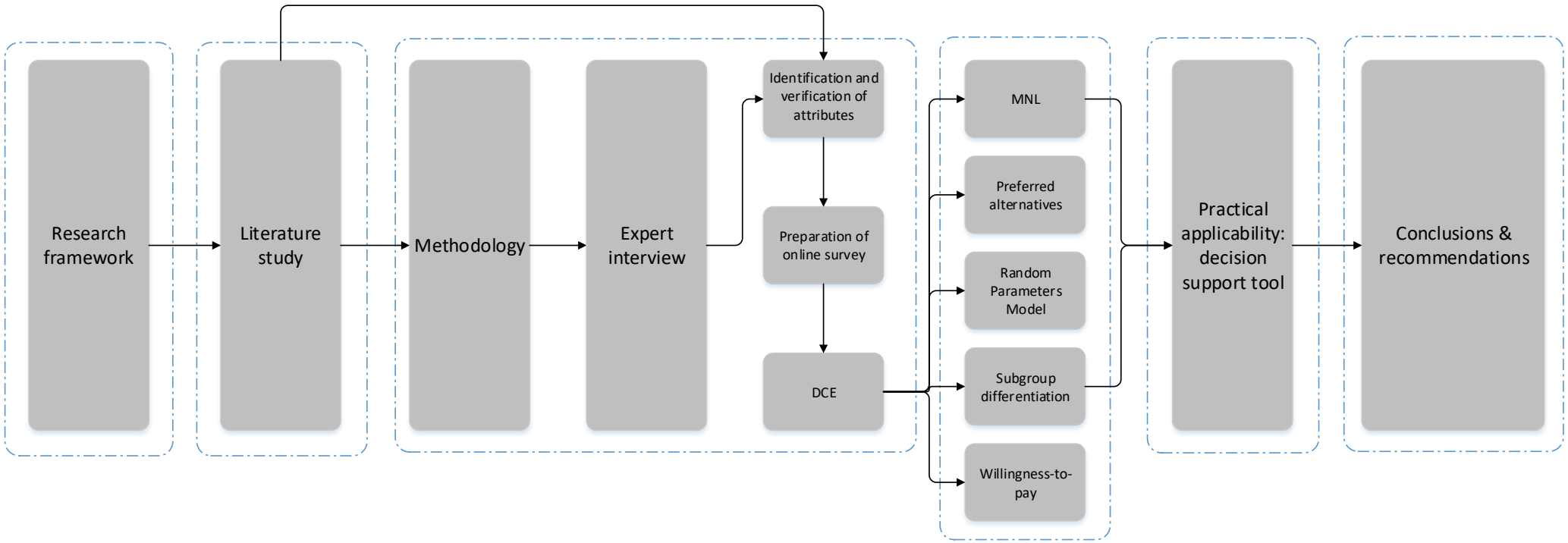

Figure 5: Research model.

1.6 EXPECTED RESULTS

This research should provide an insight into the preferences and WTP for housing and building facilities of young people, in which the WTP need to be expressed in €. Secondly, based upon the outcomes of the data, the aim is to create a generalized decision support tool. This generalized tool should be able to provide an overview of the different preferences of various groups of respondents and should even be ease in use, so that it could be use in future projects with a young people purpose.

The tool should be able to estimate the probabilities, based upon the outcomes of the data analysis, that a certain housing alternative will succeed per group of respondents. So, the probabilities that hold for students, young professionals, and expats. With this function, one is able to check the utility per housing alternative per group. The question here is: *What is the chance that group X will choose for alternative Y?*

The probabilities should be values between 0 and 1 and the exact equations that will be used within the tool will be explained in detail later on.

CHAPTER 2 | LITERATURE REVIEW

This chapter will give an extensive, scientifically underpinned, insight into the literature that is relevant for this research. The aim is to evaluate previous researches into the residential preferences and WTP for housing and building facilities of young people together with its applied methodologies. The literature review starts with an overview of the current and forecasted situation on the housing market for young people, followed by a description of the housing career and events in the lives of young people. Then, the focus will be on the factors that influence people's housing choice behavior and previous researches in the field of residential preferences for young people; students, young professionals, and expats separately. An illustration of the topics covered in the literature review can be seen in figure 6. The chapter will end with a schematic overview of the literature and an explanatory conclusion.

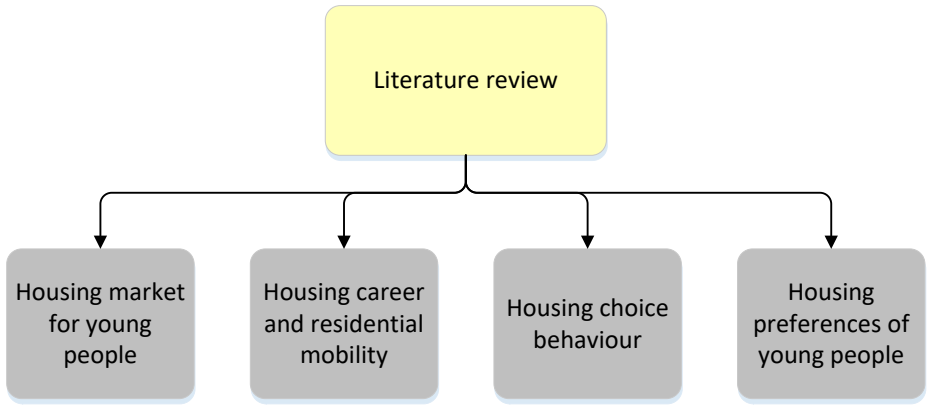

Figure 6: Topics covered in literature review.

2.1 ACCOMMODATION FOR YOUNG PEOPLE: AN OVERVIEW

According to Savills (2015), the situation that is taken place on the student housing market can best be described using four events, namely: the squeeze, the construction boom, the overbuilding, and the change. Firstly, young people are squeezed out of the open apartment market due to their limited monthly amount to spend. Therefore, they need to accept less living space in order to live in a property for a price they can afford. The open apartment market offers lots of apartments, but only are affordable for the wealthy students or students with wealthy parents. The reason for the shortage housing for students is not so much the increasing numbers of students, but rather the growth in rents; the current average student income is nowadays 7% higher than in 2010, but the residential rents are approximately 16% higher than in 2010 (Pink, Student housing - Part 1: The squeeze, 2015). This means that by the years students are obliged to accept less living space. Thus, due to their limited monthly income they are being squeezed out of the open apartment market. So, this trend asks for a specific niche market segment, namely affordable housing for young people, which is affordable for them and meets their residential preferences (Pink, Student housing - Part 1: The squeeze, 2015).

Secondly, many real estate developers have seen opportunities in the development of small, self-contained apartments with high standards due to the growing demand for these properties since the squeeze out of the open apartment market for young people. Over the last five years, the stock of PBSA has doubled its capacity and the expectation is that the stock will double again by the year 2020 due to the already high and even forecasted growing demand and development plans for such properties (Pink, Student housing - Part 2: The construction boom, 2015). Additionally, the current construction boom in student accommodation is taking place mainly in the high-price segment with all-in rents of more than €450 per month. Since there is a growing demand for fully furnished one-bedroom apartments or fully furnished studios, the all-in rent should exceed €450 per month in order for developers to achieve a reasonable yield (Pink, Student housing - Part 2: The construction boom, 2015).

Thirdly, a threat of the construction boom in the PBSA market is the potential possibility for overbuilding or saturation in some cities. According to many researchers there is demand for housing units that increasingly meet the needs of nowaday's young people who require more privatization and a higher standard of quality and luxury (ABF Research, 2016; Barnes, 2016; Angelo & Rivard, 2003). Pink (2015) calculated the supply/demand ratio and concluded that there could be saturation in the high-price segment for student housing. Only wealthy students or students with rich parents are able to live in such housing units. Hence, the potential overbuilding scenario should be taken into account and depends on students' willingness to pay for housing units and its associated amenities. Currently, students spend some 35% of their monthly income to their housing and the question is if they are willing to increase this percentage in order to live in a self-contained property.

Finally, as mentioned, the focus of developers is mainly on the high-price segment. However, Savills (2015) expect that student living may change into micro living in future, because students are far from the only group that come into consideration as potential tenants of small apartments or studios. The micro living concept in which there is a combination of accommodation for students and other type groups of young people, such as young professionals and expats, are called hybrid projects (Barnes et al., 2016). Such concepts are already on the market, for instance the project of GBI in Germany with its concepts of 'Smartments Students', 'Smartments Business', and 'Smartments Living', providing small apartments for a wide variety of target groups, consisting of students, young professionals, and young couples or families (Pink, Student housing - Part 4: The change, 2015).

2.2 HOUSING CAREER AND RESIDENTIAL MOBILITY

Besides the four main events that occur on the market , there are also events taking place in the housing career of young people. The explanation and shifts in the housing careers of people is a common scientific topic that is investigated by many researchers. In addition, the housing career of people affects their residential preferences at different stages in life. The different events that occur in the lives of people and their influence on housing decisions are called 'residential mobility' in literature. Residential mobility is a well-known topic in literature and some interesting researches could be pointed out in order to clarify the housing career of people. This section will focus on the housing career and residential mobility of people in general and consequently will zoom in to the housing career of the target group of this research, namely young people.

The study of residential mobility has a long tradition and is researched by different people, such as geographers, economists, psychologists, and urban planners. Most of the literature on residential mobility focus on the match and decision of household to houses. Hence, there is a lot of literature on the household attributes, the life course, and the educational and job career of people which determine the desire to move or choice for a particular dwelling in a particular area (Clark & Dieleman, 1996; Dieleman & Mulder, 2001; Strassman, 2001). Bernard et al. (2006) describe the life course of people as a set of four aspects: economic capital, social capital, health capital, and human capital. *"The life course perspective rests on four related principles: life is longitudinal, life is multi-faceted, lives are linked, and lives unfold in social contexts* (Bernard et al., 2006, p.4)*".*

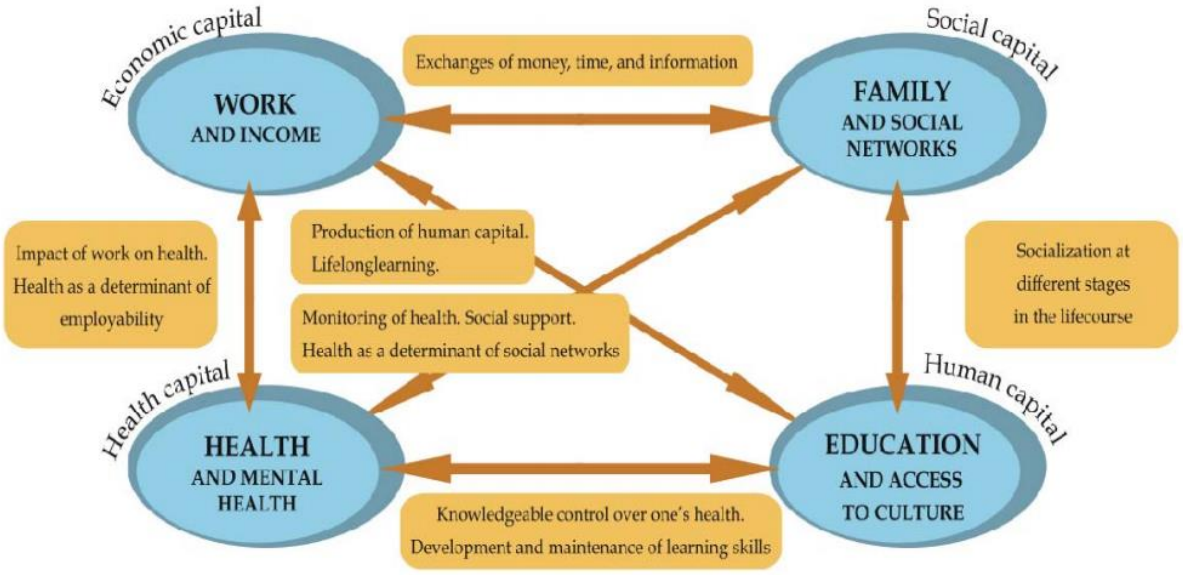

Figure 7: Life course described in four perspectives (Bernard et al., 2006).

The figure suggests that lives are dependent upon four major interrelated variables and that people make their own choices regarding every variable, which influence their lives (Bernard et al., 2006).

Additionally, four careers in people's life-cycle are distinguished in literature, namely educational career, labour career, family career, and housing career. A change in every life-cycle career has an impact on someone's housing decision. Every career step the housing choice will be reconsidered and will be changed if needed. Mainly the group of young people have to deal with a dynamic life with a conglomeration of events that have an impact on their housing decision (Coulter et al., 2010; Geist & McManus, 2008).

It has been widely investigated that movers are younger, at earlier stages of the life-cycle, and more often living in rental dwellings than non-movers. Additionally, it is well established that residential mobility is indeed high among young adults and young families and declines when the age increases. On average, the mobility rate of young adults aged under 35 is twice as high as adults between 35 and 44 years of age and five times higher than people older than 65. The high mobility rate of young people reflect new marriages, childbearing, job changes, divorce, and other important life events (Clark & Dieleman, 1996).

The high residential mobility rate of young people means that their lives are volatile due to the occurrence of different life events. The volatility of people's lives is visualized in figure 8, as proposed by Findlay, McCollum, Coulter & Gayle (2015) in their study to new mobilities across the life course. The figure is about three cohorts: people born in 1949, 1959, and 1969. For each of the cohorts, the highest mobility rates are observed during the late teens and the early twenties; this is the explanation of young people's volatile life during this life phase. As seen, with ageing, the mobility rate decreases (Findlay et al., 2015).

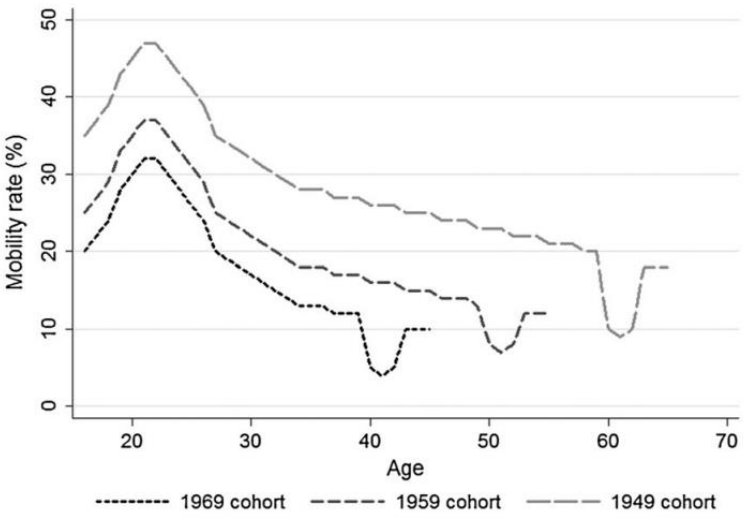

Figure 8: Mobility rates across age (Findlay et al., 2015).

In order to get a deeper insight into the peak in the mobility rate of young people, it is of importance to look into literature that focuses on the housing career of young people who most often leave the parental home during the most volatile time in their lives (Findlay et al., 2015). The next section will focus on the housing career of the target group of this research, namely young people.

2.2.1 HOUSING CAREER OF YOUNG PEOPLE

Young people leaving the parental home is an interesting occurrence in life for many reasons: *"(1) it is the main and often the first step to adulthood* (Schizzerotto & Lucchini, 2004)*, and (2) it has implications for important areas of policy* (Ermisch & Di Salvo, 1997)*, such as the demand for housing and the risk of poverty among young people".*

Life events such as enrolment in higher education, job change, union formation and the birth of a child bring with them a set of consequences. Life events imply or stimulate residential mobility, affect needs and preferences for a residential environment, influence the resources needed to occupy the desired housing, and impose restrictions on the search area for a dwelling (Deurloo et al., 1990; Kruythoff, 1991; Lelièvre and Bonvalet, 1994).

Furthermore, for most young people, the years from the late teens through the twenties are years of change and importance. Since this is the aging group of students, young professionals, and expats, it is interesting to explain this important phase in life, because the events taking place in this life phase, will form the foundation of young people's future. In this period, young people obtain education which is the foundation for both their potential income and occupational achievement for the rest of their adult work lives. For most people, the late teens through the mid-twenties is the most volatile period in life. This life phase is for many people a frequent change as in activities such as study, love, work, and worldviews (P. Martin, 1990). Today's young people in Western countries have to take into account different options when leaving the parental home in order to set up their independent household life. Some people leave home to live with friends and share facilities, some people would like to live on their own; others leave home to marry. Some leave home early, for example for study purpose, and others stay at their parent's home until they are graduated and sometimes have a few years of work experience to build up some savings in order to buy a dwelling later on. But, leaving the parental home is the start of young people's housing career.

Wang & Otsuki (2015) propose five residential types for young people, the providers and the housing nature, as seen in figure 9. The focus of the research to the WTP for both housing- and building facilities will be on the following combination from figure 9: market – tenancy – rent housing.

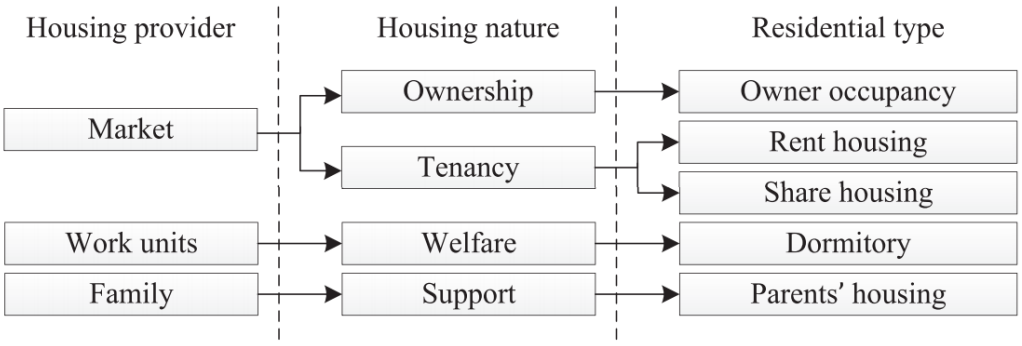

Figure 9: Residential types available for young people (Wang & Otsuki, 2015).

Iacovou (2010) distinguish two types of young people that leave the parental home. The first group consists of people who leave the parental home as a financial independent, meaning that this person takes care for his own finances. The other group of people are the ones that leave the parental home and make use of the incomes of their parents (Iacovou, 2010). Both of these seem to play a role in the decision to leave the parental home. As a consequence, young people with higher incomes or people with wealthy parents are able to leave the parental home earlier and become financial independent earlier, since they have more money to spend and are therefore able to afford expenses associated with living independently (Iacovou, 2010). Warner & Sharp (2015) found that the ability of young people to manage their independent life depends upon situations in the past related to school, family, sport, and their social lives. There is a positive correlation between the ability of young people to manage their independent lives and situations in their past (Warner & Sharp, 2015).

However, it is found that the decision of young people to leave the home varies across different countries. People living in Northern Europe countries are mainly characterized by early home-leaving due to weak family solidarities and family ties, while people living in Southern Europe countries are characterized by stronger family ties and therefore they more often leave the parental home later (Reher, 1998). Another reason that people living in Southern Europe countries leave the parental home later is that living in Southern Europe countries is less affordable than living in Northern Europe countries. Additionally, income seems to affect the decision to leave the parental home the most and is therefore the most significant determinant of home-leaving; having a job is also associated with the decision to leave the parental home (Iacovou, 2010). As can be extracted from literature, the relation between the income of young people and leaving the parental home varies by gender, by education, by job, and most important by country (Iacovou, 2010). This could be explained by the findings of different scientific papers with the topic of housing career of young people.

Firstly, Avery et al. (1992) found that young people with wealthy parents do often stay longer at the parental home, because wealthy parents often live in a nice and comfortable dwelling. This result is more or less the same as Manacorda and Moretti (2006) suggested. They found that there is a positive correlation between parental resources and the time young people will stay at the parental home; wealthy parents make use of their financial resources in order to keep their children at home as long as possible.

Secondly, Holdsworth (2000) found that in the UK the probability that young people leave the parental home for non-partnership reasons is higher when their parents have higher incomes. However, in Spain, young people leave the parental home later when their parents have above average incomes (Holdsworth, 2000).

As can be concluded from the several studies in the field of young people leaving the parental home related to incomes or wealthy status, the findings of the researches differ a

lot across countries. Some studies suggest that socio-economic status affects the choice for home-leaving significantly while others suggest that socio-economic status has less effect on leaving the parental home (Iacovou, 2010). However, most studies found that young people with higher incomes are able to leave the parental home easier even as young people with wealthy parents.

Another interesting study that creates evidence that the home-leaving event varies across different countries is the one of Schwanitz (2017). Her study focuses on the transition of young people to adulthood and leaving the parental home by applying a cross-national analysis among eight European countries. The results imply that there are indeed differences across countries. People leaving the parental home later than average are more likely to occur in Western and Eastern European countries rather than in Southern European countries. Additionally, the results imply that there are differences in home-leaving across male and female, as already suggested by Iacovou (2010). *"Men are much more likely to follow a path of late home leaving, longer stays in education, as well as slightly delayed partnership and family formation* (Schwanitz, 2017)*"*. Contrariwise, young women are more likely to follow trajectories that are family oriented. Overall, the life course trajectories of men are more unstable and diverse compared to women's trajectories (Schwanitz, 2017).

Wade & Dixon (2006) found that people's transition to adulthood may be extended by market trends. They stated that *"the decline in the labour market for young people, the growth of education, and the shortage of affordable housing for young people have resulted in a slower process of the transition to adulthood and extended the reliance of young people in their family* (Wade & Dixon, 2006, p.3)*"*, in the sense of staying at the parental home. This also have resulted in a weaker relationship between the different variables of transition, namely leaving home, becoming financial independent, gaining adult citizenship, and childbearing. Additionally, young people who are going through the early-life stages rapidly, are more vulnerable for unemployment and homelessness on both the short and long term. This can be explained by the gap between young people who extend their transitions and people who accelerate their transitions by leaving school early, leaving the parental home early or become parents in their teens for instance (Wade & Dixon, 2006). Researches have figured out that young people often experience a high degree of residential mobility (Biehal et al., 1999; Pinkerton & McCrea, 1999). The high residential mobility of young people is a result of their dynamic lives with housing decisions to make based upon their daily life activities. In this volatile phase of their lives, some young people make the choice to leave the parental home because this is necessary for their education or job and some make the choice to stay at the parental home if education or job is at a reasonable distance from the parental home; to save money and to prepare becoming financially independent (Wade & Dixon, 2006). However, this widely depends upon factors such as country, family ties, and income (Iacovou, 2010).

While Iacovou (2010) found that the most important determinant of leaving the parental home is income, other researchers found that the most important determinants of leaving the parental home are both socio-economic status and education (Furstenberg, 2008; Sobotka, 2008). The determinants socio-economic and income are quite similar, since they both refer to the financial ability to leave the parental home. Where income relies more on the finances of the young adult itself, socio-economic factors refer to both the income of the young adult and the financial resources of his or her parents (Iacovou, 2010; Furstenberg, 2008; Sobotka, 2008). The determinant education, however, refers to a shift in timing of live events. For instance, high educated people study longer than low educated people and this has a significant impact on the timing of live events such as marriage and childbearing. Besides, high educated people enter the labor market later than lower educated people.

Finally, the study of Warner & Sharp (2015) investigates the short- and long-term effects of live events on residential mobility of the young-adults group in the United States. They make use of longitudinal survey data that covers almost 30 years and that allow them to determine short-term effects and trends. The study implies that short-term effects on residential mobility are mainly influenced by marriage and homeownership. Additionally, divorce and incarceration carry for long-term instability in one's residential mobility. Young people, especially students, have an instable life due to the occurrence of many events simultaneously and this has a striking impact on their residential mobility on the short-term; once they are graduated and found a job, their life will become more stable due to obvious events that will take place such as marriage, childbearing, and homeownership (Warner & Sharp, 2015).

As could be concluded from the body of literature about the housing career and residential mobility of young people, the results of different studies are not similar and the way in which they differ depends upon the country, gender, income, welfare of parents, and education of the young people group.

2.3 INFLUENCING FACTORS OF CHOICE BEHAVIOR

Given the situation on the housing market for young people and young people's housing career, it is interesting to see how people make choices and which factors influence people's choice behaviour, since an important task in this research is the creation of a survey in which young people need to make a choice between different housing alternatives. Making choices and having preferences are both lifetime events; every person needs to make choices between different alternatives in every area and in every stage in their life. Molin et al. (1996) stated that *"choices are assumed to reflect preferences."* The world we live in is dynamic and therefore choices and preferences are shifting continuously. *"Both preferences and choices are considered as value-oriented and goal-directed activities* (Zachariah Zinas & Mahmud, 2012, p.283)".

"According to Azar (2011), one of the most common decision problems that consumers face is choosing between differentiated goods or services that differ in their quality and price. Such situations exist in almost any category of goods or services, ranging from the choice of cheese or a hotel room to the choice of a car or a house". The study of Azar (2011) identified concepts in consumer choice behavior. However, this study does not correspond to the built environment, the study is relevant to see how people make choices in general. For almost every decision, one need to choose between different alternatives varying in price and quality. A decision making concept, called 'relative thinking', occurs when people consider goods or services only taking into account relative price differences; *"also in situations where economic theory suggests that only absolute price differences matter.* (Azar, 2011, p. 183)*"* As can be extracted from the study, in four different scenarios, people have applied relative thinking three times when choosing between different products. So, they considered only relative price differences and did not pay attention to absolute price differences. One time, the behavior of 'partial relative thinking' occurred, taking into account both relative and absolute price differences. Another interesting finding is that the extra amount people are willing to pay for a preferred characteristic of a good is higher when the good's price is higher (Azar, 2011). In the field of housing choice behavior this implies the assumption that when the rental price of a dwelling is relative high compared to the market, people are willing to pay more for their preferred characteristics, such as amenities within the dwelling or the building (Unit, 2008).

The body of literature about the determinants or influencing factors of one's housing choice behavior is abundantly present. In literature, different influencing factors of housing choice behavior are distinguished. According to Wang & Otsuki (2015) housing decision is dependent upon three main aspects, namely: nature of household, housing attributes, and macroeconomic factors. The nature of household consists of e.g. age, gender, marital status, income, assets, children, job, educational background. The variables belonging to the nature of household could also be described as socio-demographic characteristics. Examples of housing attributes as discussed in literature are type room, area, size, location, and housing

expenditure. Examples discussed in literature being macroeconomic factors are among others social environment, housing policy, income tax, inflation, etc. (Wang & Otsuki, 2015)

Wang & Otsuki (2015) investigated the housing decision of young people in China with a focus on factors that influence their housing decision. The data was obtained from a questionnaire among young people in Beijing and a multinomial logit model was used to determine the choice among three residential types: owner occupancy, housing rent, and housing share. The proposed target group in their study consists of both students and people that have been graduated within five years; this last group can be interpreted as young professionals. Since this research is based upon rental units for young people, it is of interest to see the results of this residential type rather than the owner occupancy and housing share. The results of housing rent show that the most important independent variable is marital status, implying that the married people tend to choose housing rent rather than housing share. Another important independent variable is income, which shows that higher-income students and young professionals tend to choose housing rent of self-contained housing rather than housing share. So, marital status and monthly income are the key variables determining the choice of housing rent. Finally, the decision between housing rent and housing share of the young generation is strongly associated with money. (Wang & Otsuki, 2015)

Additionally, according to Koeleman (2014) housing decision is dependent upon the aspects dwelling, living environment, and household. Hence, the variables with the most impact on someone's decision to choose or not to choose for a dwelling are size and price; these variables influence the housing decision significantly (Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990). Besides the three influencers dwelling, living environment, and household, another variable that influence the housing choice of people is the one of socio-demographic characteristics (Geist, 2008). Finally, psychological variables, such as human values, seems to play a role in the housing choice behavior of people as well (Coolen et al., 2002).

Consequently, Mulder (1996) mentions in her study that size, type, price, location, and tenure of a dwelling are the most critical factors in the decision process. When investigating a topic within the field of both residential mobility or housing choice behaviour, revealed preference and stated preference research methods are mostly used (Mulder, 1996).

Based upon the various studies, the most important factors that influence people's housing choice behaviour are summarized in table 1, together with examples of variables covered by each influencing factor and references of papers that focus on the particular variables.

Table 1: Influencing factors of housing choice behaviour.

Influencing factor	Variables	Reference
Socio-demographic	Age – gender - marital status – income – assets – children - job	(Eppli & Childs, 1995; Robst, Deitz, & McGoldrick, 1999; Tan, 2008; VanderHart, 1994)
	Educational background	(Asberg, 1999; Ioannides & Rosenthal, 1994)
	Housing history	(Boehm & Schlottman, 2004; Ioannides & Kan, 1996; Kan, 2000)
Housing	Size – price – type - tenure	(Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990; Mulder, 1996)
	Housing expenditure	(Ermisch & Salvo, 1996; Robst et al., 1999)
	Housing location	(Boehm & Schlottman, 2004; Cho, 1997; Mulder, 1996)
Macro-economic	Income tax	(Fallis, 1983; Rosen, Rosen, & Holtz-Eakin, 1984)
	Inflation	(Follain, 1982)
	Macro-economic shifts	(Clark, Deurloo & Dieleman, 1994)
	Housing policy	(Bourassa & Yin, 2006, 2008)
Psychological	Human values	(Coolen et al., 2002)
	Housing market expectation	(Ho, 2006; Kraft & Munk, 2011)

2.3.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS

The terminology socio-demographic characteristics is in some papers about housing choice behaviour replaced by the terminology household attributes (Wang & Otsuki, 2015). However, the variables include specific characteristics of the potential inhabitants as seen in table 1. Several socio-demographic characteristics could be distinguished and used within a study to investigate one's housing choice behaviour. However, the most used variables are age, gender, income, job, and education (Wang & Otsuki, 2015). Results of studies that take socio-demographics into account show that people who choose to rent a dwelling basically have lower incomes and a lower educational background than people who have a dwelling in ownership (Boehm & Schlottman, 2004; Eppli & Childs, 1995). Additionally, people with children and more stability in their lives, such as income stability and relationship stability, more often own a dwelling instead of rent a dwelling (Tan, 2008). Furthermore, income is mainly considered as a characteristics that is able to close the gap between one's current housing situation and one's desired housing situation (Koeleman, 2014).

2.3.2 HOUSING CHARACTERISTICS

Many housing characteristics are distinguished in literature and almost every study uses another combination of different housing characteristics. However, as can be concluded from almost every study that take housing characteristics into account, the size and the price of a dwelling are the most decisive factors for people when choosing a dwelling (Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990; Mulder, 1996). Consequently, the location of the dwelling and the associated housing expenditures seem to be important determinants as well. Where young people rather would like to live in

urban areas and inner-city environments, middle-aged people and older people with children would like to live in cities as well, but spend more attention to the living environment, the neighbourhood, and the attendance of a garden or public green area (Boehm & Schlottman, 2004; Cho, 1997; Mulder, 1996).

2.3.3 MACRO-ECONOMIC CHARACTERISTICS

Since socio-demographic and housing characteristics are the most important determinants of housing choice decision, some studies take macro-economic characteristics into account as well (Wang & Otsuki, 2015). These characteristics cover issues within the social environment, such as income tax, inflation, macro-economic shifts, and housing policy. Results show that these characteristics mainly influence the choice for home-ownership and not or very less for housing rent (Bourassa & Yin, 2006, 2008; Wang & Otsuki, 2015). This has to do with the fact that income tax and macro-economic shifts affect issues around mortgages rather than rental prices (Bourassa & Yin, 2006).

2.3.4 PSYCHOLOGICAL CHARACTERISTICS

Finally, some researchers found that psychological characteristics could be influencers of housing choice decision as well (Coolen et al., 2002). However, the impact of this characteristic on housing choice behaviour is not yet investigated extensively, it seems to be a predictor of housing choice behavior as well (Koeleman, 2014). For instance, when people weigh different housing alternatives, they may be expected to simply their choice making process by disregarding housing attributes which are less important (Coolen et al., 2002).

To conclude, based upon the findings of the studies related to the determinants of housing choice behaviour, socio-demographic, housing characteristics, and psychological characteristics are the most important influencers of rental housing choice decision; macro-economic characteristics seem to have more effect on tenure choice (Bourassa & Yin, 2006). Since the socio-demographic, housing, and psychological characteristics have the most effect on one's housing choice behaviour, these characteristics need to be considered when generating the online questionnaire within this research.

Finally, besides the influencing factors of housing choice behavior, another important issue that covers the topic of housing choice behavior is context dependency. This phenomenon as proposed by Timmermans & van Noortwijk (1995) reflects the validity and reliability of housing choice models (Timmermans & van Noortwijk, 1995).

2.3.5 CONTEXT DEPENDENCY

Timmermans & van Noortwijk (1995) studied the context dependencies in housing choice behavior. Context dependency can be described as a substitution effect and could be for example decision background or choice set composition. The purpose of the paper is to examine whether elaboration of existing housing choice models improves their validity or not. The best known models or approaches for the identification of housing choice behavior and preferences as discussed in literature are: *"multidimensional scaling models, compositional attitude models, MNLs, and decompositional multiattribute preferences models* (Timmermans & van Noortwijk, 1995, p.185)*."* All these models suggest that housing choice is a linear function of housing attributes, and in some cases socio-demographics are taken into account as well. The conclusion of the research is that only a decompositional choice model is able to deal with context dependencies. Such a model is an extension of a multinomial logit model with the purpose to increase the scope and validity of the model. A decompositional choice model provides more reliable results compared to a MNL, because it tests whether the utility of a choice is not only dependent upon its own attributes, but also on the attributes of other alternatives within the choice set. So, with a decompositional choice model one can generate unbiased estimates, called context effects. (Timmermans & van Noortwijk, 1995)

To continue the issue of context independencies of discrete choice models, the study of Oppewal & Timmermans (1991) investigated context effects of choice models. A discrete choice experiment only deals with utility functions about the main effects of the attributes of the alternatives. Therefore, such models are limited in that models assume independence of context. However, the decision context is important and affect the decision-making process and therefore the results. Firstly, the choice background is important. Preferences or utility functions can only be valid if some requirements are met, because backgrounds affect people's evaluation. For instance people's choice for housing attributes could depend upon factors as mortgage or tax. Secondly, the composition of the choice set affect the utility function as well. For example, because the size of the choice set which can lead to precipitate decisions of the consumer or the similarity of some attributes. Such effects can violate the MNL model. Most models do not account for such effects when specifying the utility function and therefore the validity of basic discrete choice models could be doubtful. For that reason, MNL models could be incorporated by extending the specification of the utility function with the background and choice set composition effects. (Oppewal & Timmermans, 1991)

2.4 YOUNG PEOPLE'S RESIDENTIAL PREFERENCES

In order to get an insight into the residential preferences and the building expectations of the young people target group, it is of importance to look into researches in this field. Many researchers have focused on the topic of residential preferences. However, a limited number of researches give an insight into the residential preferences of young people, consisting of students, young professionals, and expats. In order to get an understanding of which housing facilities young people prefer, is it desirable to look into the definition of housing facilities. According to Melnikas (1998) and Olujimi & Bello (2009), *"housing facilities can be defined as rooms furnished with sophisticated amenities, suitable to house social activities and indicative of a certain lifestyle."* Of course, the major object is a dwelling, but the desire for social cohesion may explain why people ask for some building facilities. The inclusion of different housing-related and building-related facilities are able to fulfil the needs of young people by not only providing a room, but all practical, social, and physical facilities that contribute to the well-being of people as well (Melnikas, 1998).

2.4.1 STUDENT'S RESIDENTIAL PREFERENCES

Angelo & Rivard (2003) have identified a total of six key trends in the student housing market in the USA with the use of expert interviews; the six trends are visualized in figure 10. The first trend is privatize, which is about the shift in ownership from the government to private parties who build, manage, and maintain the PBSA's instead of the government itself. The second trend is live and learn which refers to a residential learning community or a university residence hall, which are well-known concepts in the USA. A residential learning community can be seen as a village with a student purpose only. It is quite similar to the on-campus living concept in Europe, but then with more facilities closely located to each other, such as residences, support, services, events, etc. These residential learning communities have a positive impact on the social cohesion between students. The third trend, safe and secure, is mainly seen as an important trend for international students who are unknown in the city in which they are going to study. Cities can have the reputation of being big, bad, and dangerous places. The Boston University has embedded a 24/7 security guard into the on-campus building with 817 residents and according to the Boston University's housing director, the $300 daily expense is really worth it. The fourth trend is called go green and is seen as a trend in student housing as well due to the characteristics of green buildings. They are money-saving on the long term, politically correct, and environmental friendly. Besides, living in a green building or green environment seems to have a positive impact on the well-being of people. The fifth trend of privacy suggest that privacy and independency is an important driver for students according to their housing. Increasingly, students prefer to live in accommodations in which they have their own room with all daily facilities incorporated, such as a kitchen, bath room, bedroom, and living space. The last trend is luxury, which means that students increasingly expect facilities in the building they live in, such as a pool, hot tub, sport facilities, cinema, etc. The experts interviewed in the research explain that the attendance of such facilities within the building stimulates the social interaction between the inhabitants. (Angelo & Rivard, 2003)

"Overall, students want housing and amenities that are used to leading busy academic, extracurricular, cyber, and social lives (Miller, 2007, p. 1)*."*

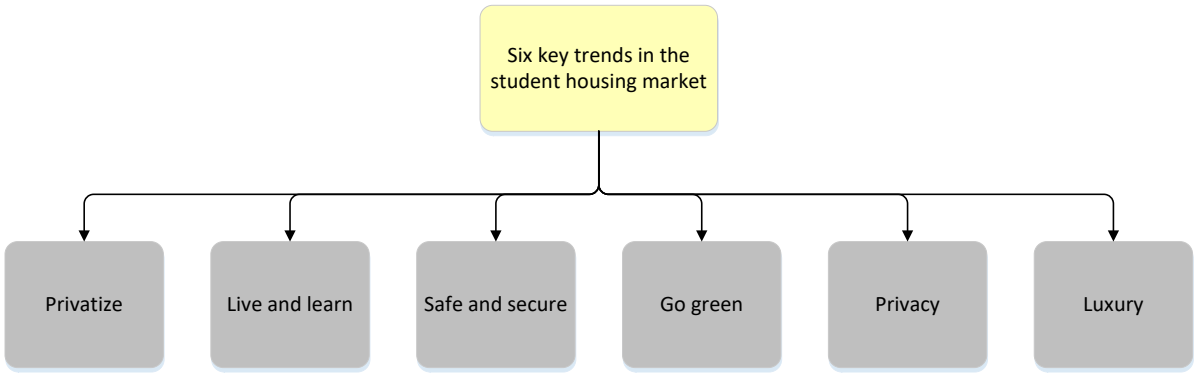

Figure 10: Six key trends in the student housing market (Angelo & Rivard, 2003).

Another study in the field of student's residential preferences is the one of La Roche et al. (2010). They identified the changing trends, preferences and needs of students according to their housing. A total of 325 undergraduate students of the Longwood University in Virginia, USA, were asked to fill in a survey with the aim to determine the residential preferences of the students with a quantitative research method. The results indicate that students increasingly expect more privacy and state-of-the-art amenities. The results even suggested that there is no difference in the residential preferences of male and female, since the results amongst them were quite similar. Only 3.2% of the respondents said that they like traditional dormitory living. A half of the respondents would like to live on-campus and the other half would like to live off-campus. Furthermore, the study indicates that 24.8% of the respondents found that costs are a large or deciding factor on their housing decision; 41% of the respondents found that costs do not play a decisive role in their housing decision. The results of the 'preferred amenities' indicate that students prefer to have a double bed, private room, private bath room, private kitchen, on-site laundry facilities, internet access, fitness facilities, and on-site parking. They care less about the proximity to campus and on-site-dining. (La Roche et al., 2010)

In the study of The University of Nottingham (2008) a survey was performed to identify the residential preferences of students at Notthingham's Universities, UK. A total of 5,310 responses were received, which is a large number and therefore the results are reliable. A quantitative research method was used to analyse the data. Since the research is very broad, taking into account a lot of aspects, only a few results are relevant for this research project. The results suggest that students expect on-site management when living in a larger housing accommodation, which include mainly technical but also financial management. Besides, they expect value for their money in the sense of 'new facilities'. A striking factor in their choice for living space is the opportunity for social cohesion and the creation of new friendships. Additionally, they require a good internet/television/telephone connection within the building together with a safe living environment. (Unit, 2008)

According to a study from the Mistoria Group, a global real estate agent, a 59% of students are looking for high-quality student accommodation with private facilities. This group is mainly looking for a luxurious property close to the university, close to everyday amenities such as shops and restaurants, and with the inclusion of fast broadband. The Graduate Management Admission Council (2016) investigated in their report 'What Students Seek Survey 2016' that price is the most important factor for students while choosing their student accommodation. However, this does not mean that students go for the cheapest property, on the contrary. The trend is that students are willing to pay more for their accommodation, every year again (GMAC, 2016). A significant quantity of students, 77%, want to have the inclusion of bills within their rent, since they are paying quite a lot. Within their all-in rent they require the right to make use of common rooms, gym facilities, laundries, etc. What they want is the following: "*maximizing the comfort while keeping responsibilities to a minimum* (GMAC, 2016)*."*

Hall (2009) created an empirical model for the determination of international student satisfaction. *"The purpose of his paper is to examine the differences in student perceptions of the level of satisfaction related to educational and non-educational services among four groups of international postgraduate business students from China, India, Indonesia and Thailand undertaking study in Australia* (Hall, 2009)*."* A postgraduate could be both a master's degree or a doctorate. The data, 573 responses, was obtained from an online survey and the methodology includes a combination of structural equation modelling, multivariate analysis of variance (MANOVA), and analysis of variance (ANOVA). A total of 7 variables that are significant predictors of student satisfaction were identified, including: accommodation, safety, education, social, technology, economic factors, and image. The most important results of the study imply that, in contrary to other studies, international students want accommodation at a minimum standard of comfort at reasonable cost. So, where other studies concluded that there is a growing trend in students that want state-of-the-art amenities and luxury housing, this study imply that students want to live in accommodations with a minimum comfort level. Besides, the study imply that safety is a major concern to international students and their parents, due to the fact that parents have no control over their children studying abroad. (Hall, 2009)

2.4.2 YOUNG PROFESSIONAL'S AND EXPAT'S RESIDENTIAL PREFERENCES

Besides the residential preferences of students, the group of young professionals and expats play an important role as well. However, compared to the literature quantity about students' residential preferences, there is less literature about the residential preferences of young professionals and expats.

Rugg & Quilgars (2015) conducted an extensive literature review on the subject of young people and housing in the UK, focusing on both young professionals and expats. The article discusses some recent market and policy responses to the housing market for young people and evaluates if the policies will improve the housing situation for young people over the next five years. An innovative intervention in the UK is the concept of 'Fizzy Living'. This concept can best be described as a niche market for young people that traditionally need to stay in the open rental market which offers apartments that are hard to afford for young people. It is an initiative launched in 2012 by a housing association in London and consist of one – to three-bedroomed apartments with lots of attention paid to the building related facilities and brand of the concept with the slogan *"life's too short to put up with shonky landlords."* The target group for the apartments is young professionals and the monthly rents are set at 40 percent of net incomes of an average graduate income. The facilities include a TV/media package, on-site parking, gym facilities, laundry and cleaning services, and on-site property management; together with very flexible lease contracts. The future ideas with the concept from an investor-perspective are higher rents in combination with a higher standard of amenities within and related to the building in order to improve the quality of life of young people. (Rugg & Quilgars, 2015)

A study focusing on the residential preferences of only expats is the one of the Dutch Planbureau voor de Leefomgeving, PBL (2014). This study focuses on the living and working location of expats in the Netherlands and the reason why they live and work at the location they do. According to literature, expats are often attracted to urban regions due to the high level of amenities (Glaeser et al., 2001; Clark et al., 2002). Besides, they like the diversity and social climate of urban areas and they prefer to live in an apartment rather than a house (Florida, 2002). However, most literature conclude that expats choose for a certain location because of their work and their current social relations, and not because of the amenities (Musterd & Murie 2010; Martin-Brelot et al., 2010). Additionally, Kotkin (2000) found that the housing and location preferences of expats depend upon the sector they are working in; people working in the creative industry would prefer to live in cities, while people working in the technical sector do not have a strong preference for urban areas. So, there is no one-size-fits-all policy for the fulfilment of the housing needs of expats (Servillo et al., 2011). Therefore, PBL (2014) focuses on the differences in residential preferences between the Dutch population and the international population, the expats. A distinction is made between the young Dutch high-educated population, expats, and internationals who want to live for many years in the Netherlands. The expats are interpreted as high-educated young people that live and work in the Netherlands for a maximum of three years. The research is

conducted in the regions of Amsterdam and Eindhoven with the use of an online survey. A total of 1,835 people responded and a stated preferences method was used. The objectives of the questionnaire were location aspects, satisfaction, living environment, and dwelling type.

Regarding the location aspects, the affordability of expats' dwelling is an important aspect, as well as a calm living environment and nearby the city centre. They prefer to live in a dwelling with low costs. Furthermore, expats would like to live in an urban area rather than high-educated Dutch people would like to.

The results of the satisfaction show that expats as well as the high-educated young Dutch population are not satisfied with the affordability of living space in Amsterdam and Eindhoven. They are even more satisfied with the attendance of amenities close to their living space.

The results of the living environment show that expats based upon their first preference are not more or less focused on urban living than internationals who are living longer in the Netherlands than expats. The results of the dwelling type indicate that expats prefer to life in a small apartment in the city centre rather than a house in the suburbs.

Finally, 35% of the expats would like to live in an apartment and 31% would like to live in a detached house. However, there is a huge price difference between an apartment and a detached house and due to the fact that expats pay much attention to the affordability of their dwelling, it seems that an apartment is the most successive dwelling type. (PBL, 2014)

Another interesting study regarding the residential preferences of expats is the one of Koeleman (2014) in which the housing choice behavior and the residential preferences of expats in Eindhoven are investigated. The outcomes of a survey among 137 expats living in Eindhoven were analysed using a quantitative analysis. The results of the residential preferences show that most expats (54%) are willing to pay €350 - €650 per month for their housing, excluding service costs and utilities. 28% of the expats want to pay €650+ per month for their housing. Most expats (71%) prefer to live in a dwelling that is completely furnished and only 9% stated that he or she prefers a housing situation without any type of furnishing. Most of the expats prefer to live in a studio apartment, followed by two-bedroom apartment or a student room. Besides, more than a half of the respondents would like to live in the inner-city. According to the preferences of amenities, almost all expats share the opinion that living both close to supermarkets and work/study is very important. (Koeleman, 2014)

2.5 CONCLUSION

Literature about residential mobility of young people, the influencing factors of housing choice behavior, and residential preferences provide some interesting insights and an overall overview on relevant papers for this thesis. Literature shows that PBSA's are a trending topic on the housing market for young people, which implies that young people increasingly wants a living space with an all-in rent, including the basic rent of the property, the right to make use of different kind of facilities within and around the building, and other contingency costs. Additionally, the housing market for young people can be described as a niche market, since young people form a special group on the housing market, due to the fact that they are squeezed out of the open apartment market, because of the limited amount of money they can spend on accommodation.

Table 2 provides an overview of the main findings per group and per topic as discussed in the literature review. When a paper focuses on a specific target group including students, young professionals, or expats, that specific group is mentioned in the table. Papers that do not focus on students, young professionals, or expats separately are accommodated within the term 'young people'; this could be a combination of one or more groups for instance.

Table 2: Main findings literature review divided per group and per topic.

Group	Topic	Findings	Source
Students	Market overview	Student living will change into micro living, which means different groups of young people in one building.	(Pink, Student housing - Part 4: The change, 2015)
	Residential preferences	Six key trends in the student housing market: privatize, live and learn, safe and secure, go green, privacy, luxury.	(Angelo & Rivard, 2003)
	Residential preferences	Price is not a decisive factor as long as the accommodation and its amenities meets the needs and preferences.	(La Roche et al., 2010)
	Residential preferences	Students increasingly expect on-site management when living in larger accommodations.	(Unit, 2008)
	Residential preferences	Luxurious, high-quality accommodation together with privacy and state-of-the-art amenities and the possibility to create new friendships are very important factors in student's housing choice.	(La Roche et al., 2010; Unit, 2008; GMAC, 2016)
	Residential preferences	The trend is that students are willing to pay more for their housing and associated amenities compared to a few years ago and they prefer monthly all-in rents rather than rents excluding service costs, energy costs, and other additional costs.	(GMAC, 2016)
Young professionals	Residential preferences	The 'Fizzy Living' concept in the UK is an innovative concept especially for young professionals and expats with housing and amenities within one building and monthly rents of 40% of the average net income of the target group.	(Rugg & Quilgars, 2015)
Expats	Residential	Expats prefer to live in an apartment within the	(PBL, 2014)

	preferences	city centre and the affordability of their dwelling is their most decisive decision factor.	
	Residential preferences	Most expats are willing to pay €350 - €650 for their dwelling as basic rent; so, without electricity costs and costs for amenities. Besides, expats really prefer a dwelling that is completely furnished.	(Koeleman, 2014)
Young people in general	Housing career and residential mobility	The life of people is most volatile between the late teens and mid-twenties due to the occurrence of many different shifts in activities such as love, work, study, childbearing, etc.	(Findlay et al., 2015)
	Housing choice behavior	The most common decision problem for people is choosing between goods or services that differ in price and quality.	(Azar, 2011)
	Housing choice behavior	Variables that influence housing decision are: nature of household, housing attributes, macroeconomic factors, living environment, and psychological variables.	(Wang & Otsuki, 2015; Coolen et al., 2002; Geist, 2008)
	Housing choice behavior	Size and price are the most influential factors of housing choice behavior.	(Koeleman, 2014)
	Housing choice behavior	Housing choice is strongly associated with money; young people with higher-income prefer self-contained housing rather than shared housing.	(Wang & Otsuki, 2015)
	Housing choice behavior	When the rental price of a dwelling is high compared to the market, people are willing to pay more for their preferred characteristics, such as amenities within the building.	(Unit, 2008)

So, as can be concluded from the literature review, the trend in rental housing for young people can be described as the rising preference of accommodation that maximizes comfort and privacy while keeping responsibilities to a minimum (GMAC, 2016). Additionally, the preference to have nice amenities in the building in order to enjoy the luxury and social cohesion is a growing trend as well (La Roche et al., 2010; Unit, 2008; GMAC, 2016). Still, the price and the size of the dwelling are decisive factors when choosing a dwelling and the WTP for housing of young people is in a growing trend; since they have higher housing expectations regarding few years ago, they are aware of the fact that this go together with higher rents. The rapid changing trends and expectations of young people regarding their housing is the most important lesson learned from the literature review.

Regarding the inputs for this research, the studies focusing on the influencers of housing choice behaviour and the different kind of amenities taken into account are of importance. When creating the online survey as a function of the DCE, the variables household nature, housing attributes, living environment, macroeconomic factors and psychological factors need to be considered. Besides, some interesting building facilities or amenities that should be considered in the DCE are a common area, gym, media room, game room, hot tub, pool, and on-site property management (Barnes et al., 2016; Rugg & Quilgars, 2015; Angelo & Rivard, 2003).

Additionally, an important note to the application of the DCE is to take into account that there are possibilities to provide more reliable results when dealing with context dependencies (Timmermans & van Noortwijk, 1995). In that case, an extension of a basic MNL should be added that holds for context dependencies and is able to generate unbiased estimates. Then, the most successive estimated preferences are not only based upon the respondent's opinion, but also on other attributes within the alternatives.

Finally, there is quite a lot of literature focusing on residential preferences for students. However, the quantity of literature that focuses on residential preferences of both young professionals and expats is scarce. Consequently, literature combining the residential preferences and WTP for facilities or amenities within residences for young people is scarce as well. Additionally, since housing decision and preferences are found to vary among different countries and regions, the results of various papers do not directly apply to the housing market for young people in the Netherlands (Wang & Otsuki, 2015). So, due to the scarcity of literature to the WTP of young people for building-related or housing-related facilities this research could be considered as innovative and could be relevant for different stakeholders in the field or real estate.

CHAPTER 3 | METHODOLOGY

This chapter introduces the research method DCE and its application within the research. Furthermore, an expert interview will be conducted and described in order to select the right attributes and levels needed for the creation of the different choice alternatives among which the respondents need to choose.

3.1 INTRODUCTION

Basically, there are two broad modeling approaches for estimating residential preferences of people: the revealed housing choice models and the stated housing choice models. The basic concepts of both methods are illustrated in figure 11.

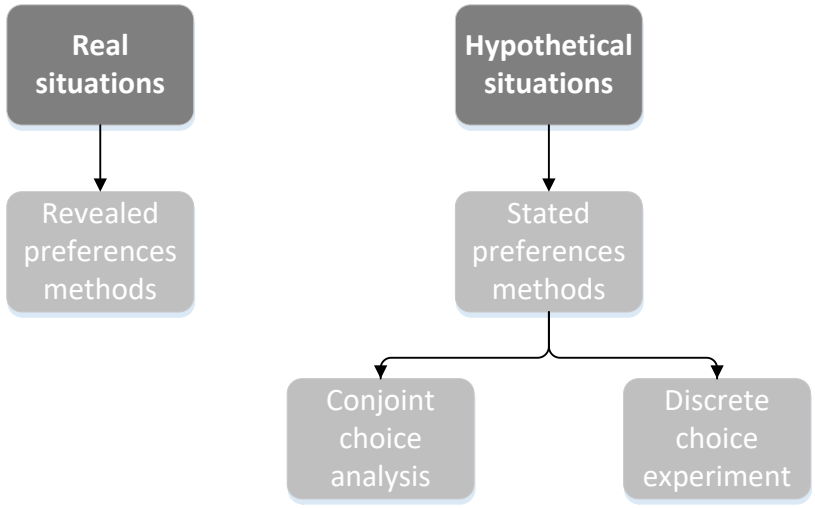

Figure 11: Revealed preferences versus stated preferences (Hensher, Rose & Greene, 2005).

The revealed preferences method differ from the stated preferences method in terms of collection of data (Hensher et al., 2005). Revealed preferences use market-based data to obtain information about preferences and therefore this method can only be used in real situations. The revealed preferences method uses data out of choice experiments and is mainly used in economic researches, for example to identify the most preferred products or services for consumers. The stated preferences method offers researchers a significant benefit over revealed preferences methods, because the researcher can ask about intended policy or alternatives. Stated preference methods are mainly used in order to understand the acceptance and/or willingness of people to choose a certain product or service (Hensher et al., 2005). The topic in this research will be investigated by using a stated preference method, because the benefit to ask about preferred alternatives provides real estate managers with the benefit to improve their future transformation projects based upon the residential preferences of young people.

Given that the method will be a stated preference method, a choice between a conjoint choice analysis or a discrete choice experiment need to be made. They are both stated preferences elicitation methods, which are extensively used in the fields of economics,

marketing, and transportation, and have proved to be the two best stated preferences methods the last thirty years (Louviere et al., 2010). *"The 2 methods appear to be likewise, but they differ substantially, and several of the ways in which they differ have significant implications for economic evaluation and related applications* (Louviere et al., 2010, p.58)." Louviere, Flynn & Carson (2010) mention that the two methods are closely related and that some researches in the past have confused the methods. The difference between the two techniques is that conjoint analyses focus on the evaluation of a series of hypothetical and real services by potential users, and discrete choice experiments is a somewhat newer technique where potential users are asked to choose one or more alternatives from a series of competing alternatives. Therefore, discrete choice experiments are based upon a more realistic task that people perform in their daily lives: choosing a product or service from a group of competitors or series (Louviere et al., 2010). Discrete choice experiments are best suitable when one wants to have an insight into the choices between different choice sets in order to estimate the most successive alternative (Timmermans, 1995). Besides, they are successfully applied in many more researches related to housing topics (Aufhauser et al, 1986; Quigley, 1985; Huff and Waldorf, 1988; Clark and Onaka, 1985). The reason that a DCE will be chosen over a conjoint analysis in this study is that a DCE has a better fit with the main question of this research. Where in conjoint analyses the attributes are evaluated independently from each other, a DCE allows one to let respondents consider attributes simultaneously by providing them with choice sets including two or more alternatives. In the case of estimating the residential preferences of young people it is more realistic to provide respondents with choice sets consisting of alternatives consisting of various attributes rather than asking respondents to the attractiveness of attributes independently from each other.

In order to estimate the most successive alternatives of young people regarding housing facilities, it is important to clarify the procedure of a DCE. A clear step-by-step plan of a DCE procedure as proposed by Hensher et al. (2005) can be seen in figure 12.

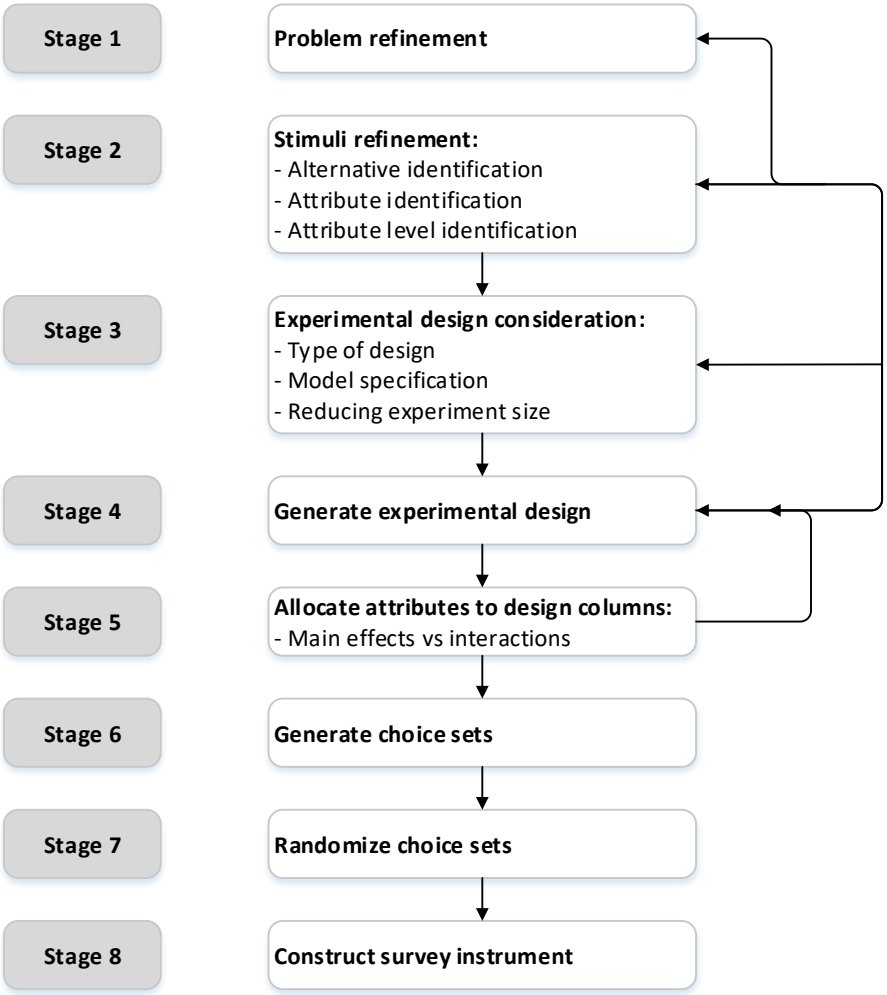

Figure 12: Process for a discrete choice experiment (Hensher et al., 2005).

First, the research problem should be clarified. In this case, the research focuses on the residential preferences of young people, including students, young professionals, and expats. The scope of the research includes the shift in housing needs of young people and the estimation of the WTP for housing and building facilities in order for real estate developers or managers to minimize vacancy, maximize profit, and maximize tenant satisfaction.

The next stage in the DCE procedure is the stimuli refinement which is about the identification of alternatives, attributes, and attribute levels. There are various possible options for identification in this stage. In this research, the attributes and its levels will be identified based upon literature review and an expert interview. Various attributes as used in literature will be discussed in the expert interview in order to make a distinction between the relevant and irrelevant variables for the research. Besides, the purpose of the expert interview is that more relevant variables will be identified. An important decision that need to be made within this stage is the determination of the number of attribute levels per attribute; not every attribute needs to consist of the same number of levels.

Once the alternatives, attributes, and attribute levels are identified, the next step is to consider the experimental design. At this point, the type design will be chosen and the model will be specified. Important decisions for the researcher in this stage are the consideration of using a full factorial design or a fractional factorial design and whether the numbers of levels of the attributes should be reduced or not. The difference between a full factorial design and a fractional factorial design is that a full factorial design tests all different combinations of attributes and their alternatives and a fractional factorial design only tests a subset (Hensher et al., 2005). In many researches a fractional factorial design is applied, since a full factorial design is too comprehensive; for instance, if there are six attributes with three levels each, a full factorial design will test 729 (3^6) combinations. A fractional factorial design will only test a fraction of the total number of treatment combinations included in the full design. The limitation of a fractional factorial design however is that it only allows for estimation of main effects and not for interaction effects. Additionally, the coding format need to be decided; a distinction in coding format is made between orthogonal coding, dummy coding, and effect coding.

Stage 4 and stage 5 are applied simultaneously and refer to the generation of the experimental design. The combinations of attribute levels within the alternatives need to be created and the attributes need to be allocated to design columns. Therefore, it is recommended to code the attribute levels with effect coding (Hensher et al., 2005).

Subsequently, the choice sets are generated and should be randomized in order to receive reliable data from the respondents. *"It is advisable to add a base alternative (such as 'none of these') to each choice set to set the unit of the utility scale and retain the orthogonality properties of the design. The respondent's task is then to choose from each choice set the alternative they are most likely to choose in the real world."* (Zachariah Zinas & Mahmud, 2012) When adding the option 'none of these' respondents are not forced to select an alternative that do not completely meet their preferences. So, adding a 'none of these' option will take care for more reliable results (Hensher et al., 2005).

Once the choice sets are generated and randomized, the final task is to distribute the survey amongst the target group of the research. At this point, the researcher requests respondents to express their preference for each of the choice sets. An important note to the generation process of the survey is that the alternatives, attributes, and levels should be very clear in order for the target group to understand. This is a crucial note, since the input of the respondents is necessary in order to answer the research questions. Once a clear survey with proper choice sets is generated and distributed amongst the target group, the next step is to collect and clean the data. As a consequence, the cleaned data is able to be analysed according to the MNL; *"the preference measures will be decomposed into the utilities associated with each attribute level, given some a priori specified utility function. It should be mentioned, however, that in many cases the estimated utilities will be biased because the*

main effects are not independent from the interaction effects." (Zachariah Zinas & Mahmud, 2012)

A requirement when applying a MNL is that there should be more than two alternatives within the choice sets; otherwise a Binary Logistic Model should be used. According to Kemperman (2000), when using a MNL, the choice probabilities can be estimated assuming that:

- The random components are independently and identically distributed (IID);
- The alternatives among which respondents can choose are independent from irrelevant attributes (IIA);
- The choice probabilities of the alternatives depend only on the differences in the utilities of the different alternatives and not on their actual value;
- The choice probability is a value between 0 (when the utility of the alternative is very low related to the other alternatives) and 1 (when the utility of the alternative is very high related to the other alternatives).

An additional requirement for the application of a MNL has to do with the minimum sample size. There is a rule of thumb to estimate the minimum sample size required to generate a reasonable and reliable research. The rule of thumb as proposed by Johnson and Orme (2003) can be described using the following equation:

$$\boldsymbol{N > 500\ \frac{c}{t*a}} \qquad \textbf{(1)}$$

In where:

N is the required sample size
c is the highest number of levels for any of the attributes
t is the number of choice sets
a is the number of alternatives within the choice sets, not taking into account the option 'none of these' if applicable

The number 500 intended in the equation is seen as a minimum threshold for researchers, but the minimum sample size for discrete choice experiments should be 200 (Johnson & Orme, 2003). It would however be better to have 1000 or more representations per main effect level (Vasilache, 2013). When taking this into account, the formula changes to N > 1000 $\frac{c}{t*a}$, which is an optimization of the formula as intended by Johnson & Orme (2003).

Hensher et al. (2005) state that MNL is the most applied model for discrete choice modeling and is based upon Random Utility Theory, RUT. This theory assumes that people basically choose what they prefer, and where they don't do, this can be explained by random factors. The formula of the RUT as proposed by Thurstone (1927) is:

$$\boldsymbol{U_i = V_i + \varepsilon_i} \qquad \textbf{(2)}$$

In where:

U_i is the overall utility

V_i are the observable, systematic contributions

ε_i is the stochastic error component or the unobserved random contributions

Hence, the RUT proposes that individuals are considered to choose between a group of alternatives, or choice sets. They make this choice on the basis of the alternative that maximizes their personal net utility, subject to legal, social, environmental, and budgetary restrictions (Thurstone, 1927).

The functional relationship between the utility of an alternative and the variables and socio-demographic characteristics is clarified with the following equation:

$$\boldsymbol{V_i = \beta_{0i} + \beta_{1i} f(X_{1i}) + \beta_{2i} f(X_{2i}) + \beta_{3i} f(X_{3i}) + ... + \beta_{Ki} f(X_{Ki})} \quad \textbf{(3)}$$

In where:

V_i is the systematic utility of an alternative, existing of the sum of part worth utilities

β_{0i} is the alternative-specific constant which is related to only the unobserved sources of utility and does therefore not take into account any of the measured attributes

β_{Ki} is the weight associated with attribute X_k and alternative *i*

X_{Ki} is the value of attribute level *k* of alternative *i*

The estimates can predict the probability that a certain alternative *i* will be chosen from a complete choice set. The equation for the determination of the probability is:

$$\textbf{P(i)} = \frac{Exp(total\ utility\ alternative\ i)}{Exp(total\ utility\ alternative\ i) + Exp(total\ utility\ alternative\ j) + Exp(total\ utility\ 'none\ of\ these')} \quad \textbf{(4)}$$

The predicted probability is always valued between zero and one and the choice with the highest probability is expected to be chosen.

Once the survey is generated, data is collected, and the MNL is performed, the next step is to calculate the WTP of each attribute level for the full sample. According to Hensher et al. (2005) choice modeling is regarded as the most suitable method for estimating the WTP of consumers, or in this case potential tenants of the real estate. The WTP provides an overview of the amount of money young people are willing to pay in order to obtain benefit from a specific facility within their dwelling or within the building. WTP calculations give some meaningful insights and are considered useful for several reasons. Firstly, policy makers could make use of it in order to obtain a general overview of how much people value some goods or services. Secondly, WTP measures can be good inputs for economic evaluations such as cost-benefit analyses. Finally, WTP measures could be used for comparison of rankings for competitive reasons. (Hanley et al., 2003)

The WTP can be calculated with the equation:

$$\textbf{WTP}_j = \frac{\beta(part\text{-}worth\ utility\ j)}{\beta(total\ utility\ price\ attribute)} * range\ price\ attribute \quad \textbf{(5)}$$

Finally, in a typical stated choice experiment, the main objective of the researcher is to compute unknown parameters β. Log-likelihood (LL) is defined in such a way that it maximized the prediction obtained by the model. LL function are often used to estimate the model from choice experiment. Using NLOGIT software package MNL model computes the log likelihood function for the model to be estimated. However, it only calculates the LL values for the constant only model and the optimal model. In order to calculate the LL for the null model i.e. the model with all predictors set to zero, a manual computation is required. MNL considers that the choice observations are independent over all decision makers and choice situations presented in the experiment. Additionally, the more restrictions are added in the MNL model, the lower the LL. The equations that determine the log likelihood $LL\beta$ for the estimated model and the log likelihood $LL0$ are as follows:

$$\boldsymbol{LL(\beta) = \sum_{n=1}^{N} \sum_{i} y_{ni} \ln(P_{ni})} \qquad \textbf{(6)}$$

In where:
LL(β) is the log likelihood of the proposed model with the estimated parameter of β;
N is the total sample size used in the model;
yni is the choice of one individual n made for an alternative i which can be 1 or 0;
Pni is the probability of the individual n choosing alternative i.

$$\boldsymbol{LL(0) = \sum_{n=1}^{N} \sum_{i} \ln \frac{1}{j}} \qquad \textbf{(7)}$$

In where:
LL(0) is the log likelihood of the null model with all parameter of β=0;
N is the total sample size used in the model;
J is the total number of alternatives in choice set t for individual n.

Log likelihood ratio is the prominent way of testing the performance of the estimate model when compared with the null model. The mechanism behind log likelihood ratio is, it should improve with the addition of parameters in the model. In other words the estimated model should show significant improvement in the ratio when compared to the null model where all the parameters are set at zero. And this improvement decides if the model is good for interpreting results. The equation for the Log Likelihood ratio is:

$$\boldsymbol{D = -2\,(LL_0 - LL_\beta)} \qquad \textbf{(8)}$$

In where:
D is the log likelihood ratio;
LL_0 is the null-model log likelihood, with all the parameter zero;
LL_β is the proposed model log likelihood, with the estimated parameters of β.

3.2 EXPERT INTERVIEW

An expert interview with the management team of the graduation company Holland2Stay is carried out in order to verify the outcomes of the literature review regarding the identification of the attributes and attribute levels. The main goal of the expert interview is to define the attributes and attribute levels more clearly based upon the expertise and experience of people that are active in the real estate sector.

An expert interview is an interview type in which open questions are asked to a person that is an expert in his or her field of activity (Flick, 2006). According to Stake (1995) an expert interview is the main road to multiple realities and the selection of the right expert(s) is crucial.

The most important findings of the expert interview regarding the discussion and verification of the relevant attributes as found in the literature review are: in order to collect data of proper quality not all influencing factors of people's housing choice behaviour can be considered; this will make the choice sets too comprehensive and this will result in data of unreasonable quality (Bogers, personal communication, 2017). The most important attributes that need to be included within the choice sets are size and price; this is also suggested in many scientific studies. Additionally, the division of the dwelling should be included in the choice sets as well in order to estimate the importance and WTP for a separate bedroom. The housing-related attributes washing machine, dishwasher and furniture have been extensively discussed in literature and should be included as well; another important suggestion is the inclusion of an insurances package within the monthly all-in rent price. This package includes a residence contents insurance, liability insurance, and annual travel insurance and should be included, because the experience is that young people, mainly international people, increasingly prefer monthly rents in which the most as possible costs are included. Regarding the building-related facilities, a common area and a common gym and sauna, which can be seen as leisure facilities, are widely discussed in literature and the inclusion of these facilities should not be excluded from the choice alternatives (Bogers, personal communication, 2017). Finally, bike sharing is an upcoming phenomenon which contributes to the trending topic of sharing economy. Since the bike sharing concept is quite new, it is not yet discussed in literature. However, real estate managers of student accommodations are increasingly providing this service (Bogers, personal communication, 2017).

3.3 EXPERIMENTAL DESIGN

Now that the literature review is conducted, the process of the methodology is explained, and the expert interview has taken place, the experimental design should be generated. Firstly, the fixed and influential attributes will be identified. Secondly, the experimental design will be considered in order to generate and randomize the choice sets.

3.3.1 STIMULI REFINEMENT

According to Louviere et al. (2010) there is no standard way of identifying attributes and their associated levels. The researcher is free to decide which attributes to choose and which levels to choose. However, it is advisable to explain each attribute and its levels in order for the respondents to have the same interpretation of each attribute. Both fixed attributes and influential attributes should be distinguished (Louviere et al., 2010). In this research, both the fixed and influential attributes will be identified based upon the literature review and expert interview.

Fixed attributes

Several attributes remain constant during the survey, they are called fixed attributes. The attributes that remain constant within this research are summarized in table 3.

Table 3: Fixed attributes.

Fixed attribute	Level	Label	Explanation
Market	1	Rental market	The properties are on the market with the purpose to be rented out from the perspective of this research its target group; however, from an investor-perspective they can be bought.
	2	~~Buy market~~	
Location	1	Dutch university cities	The fixed locations of the buildings are Dutch university cities such as Eindhoven, Amsterdam, Rotterdam, Utrecht, Delft, Groningen, Breda, Den Bosch, Wageningen, etc.
	2	~~Other cities~~	
	3	~~Village~~	
Furnishing	1	~~Unfurnished~~	The level of furnishment of the properties is fully furnished: all needed furniture and inventory is present within the studio/apartment.
	2	~~Partial furnished~~	
	3	Fully furnished	
Housing privacy	1	~~Shared facilities~~	The properties are self-contained, which means that they are equipped with a living room, kitchen, bathroom, and toilet.
	2	Self-contained	
Distance to city centre	1	≤ 3 km	The distance to the city centre in kilometre.
	2	~~> 3 km < 6 km~~	
	3	~~≥ 6 km~~	

The target group of this research, young people, is often not able to buy a dwelling due to their limited incomes and savings and therefore they need to focus on the rental market when searching for an accommodation (McKee, 2012). Given this, the research is limited to only the rental market.

Most of the successful transformations of vacant buildings into housing units take place in urban areas (Geraedts & van der Voordt, 2003). Besides, urban areas, especially university cities, attract young people due to the high level of amenities, good public transport options, jobs, parties, and the idea to live in a city (Rugg & Quilgars, 2015). Therefore, the research is limited to only buildings located in Dutch university cities.

In the Netherlands, many international students are enrolled in universities and a growing number of expats is seeking for interesting job opportunities. Besides, a growing number of Dutch students is looking for affordable and luxury housing within their university city (ABF Research, 2016). Basically, only a few young people are able to afford a complete new furniture and inventory for their living space. Besides, the study of Koeleman (2014) points out that an average of 71% of expats living in Eindhoven and Amsterdam prefer furnished housing accommodations. Given this, the study will focus on fully furnished studios and apartments only, consisting of a complete furniture combined with all needed inventory in people's daily lives.

Since young people increasingly expect affordable housing with a high level of privacy and a high standard of amenities, the housing units will be self-contained, equipped with all daily needs and amenities (Miller, 2007; Angelo & Rivard, 2003). In addition, J Turner Research (2012) show in their research among 11,195 student respondents that a private room, bath room, and kitchenette is the most important apartment feature besides the price.

Finally, the distance to a city centre is important during people's consideration between different housing alternatives (Scheiner & Kasper, 2003). Young people rather would like to live near to the city centre than older people, due to the high level of amenities and public transport options close by (ABF Research, 2016; PBL, 2014; J Turner Research, 2013). Therefore, the level of the attribute 'distance to city centre' is fixed at 3 km or smaller.

Influential attributes

Housing choice decisions are complex and according to literature lots of aspects influence young people's housing choice. Based upon literature review and the validation of an expert in the field of real estate the most important influential attributes are identified. Table 4 presents the most important influential attributes along with its attribute levels.

Table 4: Influential attributes.

Group	Influential attribute	Abbreviation	Level	Label	Explanation
Housing characteristics	Size	SIZ	1	25 sqm	The size of the dwelling in square meter.
			2	35 sqm	
			3	45 sqm	
	Price: monthly all-in rent	PRI	1	€750	The monthly all-in rent price in € without housing allowance. The all-in rent includes the basic rent, energy costs, cleaning costs, caretaker costs, furniture and equipment costs, and costs for making use of the building facilities.
			2	€850	
			3	€950	
	Dwelling division	DWE	1	Separate bedroom	The division of the dwelling, whether there is a separate bedroom or not.
			2	No separate bedroom	
Housing-related facilities	Washing machine	WAS	1	Yes	Presence of an in-unit washing machine.
			2	No	
	Dishwasher	DIS	1	Yes	Presence of an in-unit dishwasher.
			2	No	
	Furniture	FUR	1	Simple design furniture	The luxury level of the furniture. The simple design furniture could be interpreted as standard furniture and the luxury design furniture is more stylish.
			2	Luxury design furniture	
	Insurances package	INS	1	Yes	Insurances package including residence contents insurance, liability insurance, and annual travel insurance.
			2	No	
Building-related facilities	Common area	COM	1	Yes	The attendance of a common area available for tenants that could be used as meeting point or work place.
			2	No	
	Bike sharing	BIK	1	Yes	Bike sharing service with reparation included.
			2	No	
	Leisure facilities	LEI	1	Yes	Attendance of a common gym and sauna within the building.
			2	No	

The first and second influential attributes, size and price, are the two most decisive factors when making a choice between different housing alternatives (Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990; Mulder, 1996). This is the reason that they should not be exceeded within the choice sets. However, according to La Roche et al. (2010) price is not a decisive factor as long as the housing and its corresponding facilities and amenities fully meet the preferences of the inhabitants. In that case, people are willing to pay more for their dwelling (La Roche et al., 2010). The levels of the attributes size and price are determined based upon current market prices and are made sure to be comparable with each other (Holland2Stay, 2017; Barnes et al., 2016). Besides, they are based upon literature. J Turner Research (2012) found that almost every student rated the importance of the dwelling size as extremely important. Additionally, many studies found that price is the most decisive aspect for young people when selecting a dwelling (J Turner Research, 2012, 2013, 2014; Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989).

The size will vary between 25 square meter and 45 square meter with a jump of 10 square meter between each attribute level in order to keep the attribute levels comparable (Kemperman, 2000). A range from 25 square meter to 45 square meter is chosen in order to provide the complete target group with different size alternatives. Where students more often would like to live in studio apartments of more than 20 square meter, graduated people, like young professionals or expats, would like to live in apartments preferably with an apart bedroom and a size of at least 45 square meter (Barnes et al., 2016; Holland2Stay, 2017; ABF Research, 2016; PBL, 2014). So, in order to make the housing alternatives attractive for the complete target group of the research, a division of 25, 35, and 45 square meter properties is chosen.

The second influential attribute, price, is an important factor for young people when selecting a dwelling as mentioned earlier. Additionally, a 'price' attribute must be included within a discrete choice experiment in order to potentially measure WTP (Hensher et al., 2005). From a market point of view, the price per square meter of studio's and small apartments vary between €18 and €30, depending upon the size of the dwelling (CBS, 2000; Holland2Stay, 2017). However, this price is a guideline basic rent price, not including energy costs and any extra services such as caretaker costs or furniture costs (CBS, 2000). Generally, the following rule holds: the smaller the dwelling, the higher the price per square meter (CBS, 2000; Holland2Stay, 2017). The monthly rent prices as included in the choice sets in this research will vary between €750 and €950 with a jump of €100 to the next attribute level and could be considered as the monthly all-in rent price including: basic rent, energy costs, caretaker costs, furniture and equipment costs, cleaning costs for common areas, and costs for making use of the building facilities. The decision for a monthly all-in rent is made because young people wanting to pay an all-in rent rather than a basic rent with extra service costs is growing (Barnes et al., 2016). Besides, GMAC (2016) found in their study that 77% of the young people group want to have the inclusion of bills within their monthly rent.

Within their all-in rent they require the right to make use of serval building facilities (GMAC, 2016). An important note to the monthly all-in rent price is that this price does not include the deduction of housing allowance. The right of a person to receive housing allowance in the Netherlands is dependent upon the age, the financial situation of a household and the amount of the basic rent of a dwelling and could increase up to €300 per month, dependent upon the yearly income and savings of a person (Holland2Stay, 2017). In 2017, a person has the right to receive housing allowance if both his or her savings are smaller than €25,000 and the gross yearly income is smaller than €22,200 for one-person households and smaller than €30,150 for multi-person households (Holland2Stay, 2017). So, housing allowance is mainly attractive for lower income people, such as students and starters on the labor market, since their income and savings mostly do not exceed these boundaries. Additionally, one should be at least 18 years old in order to receive housing allowance; when a person is between 18 and 23 years of age, the maximum basic rent should not exceed €414,02 per month. When a person is 23 years of age or older, the maximum basic rent should not exceed €710,68 per month in order to keep the right to receive housing allowance (Belastingdienst, 2017). To conclude, if a person has the right to receive housing allowance, the monthly housing costs for that person will decrease substantially, with a maximum of €300.

Another influential attribute that correspond to the group housing characteristics apart from the size, price, is the division of the dwelling. The options are a dwelling with a separate bedroom or a dwelling in which there is no separate bedroom, which is called a studio. A studio is a self-contained small apartment which combines living room, bedroom, kitchenette, and bad room into a single room (Barnes et al., 2016). Research show that student increasingly prefer self-contained housing units (Barnet et al., 2016; La Roche et al., 2010). However, due to their limited monthly income, most of the students cannot afford apartments with an apart bedroom; only those who are getting support from their parents of family (Avery et al., 1992; Iacovou, 2010). Besides, graduate people, like young professionals and expats, prefer apartments with an apart bedroom (J Turner Research, 2012, 2013). Consequently, they have a job and a higher and more stable income than students, making them able to better afford apartments with a bedroom than students. Given this, between apartments with a separate bedroom and studios will be distinguished within the choice sets.

Additionally, the housing-related and-building related facilities are identified based upon the outcomes of the literature review and the validation with an expert. The housing-related facilities that will be included within the choice sets are a washing machine, a dishwasher, a distinction between two types of furniture, and an insurances package in order to calculate the WTP for these facilities. J Turner Research (2013) found that an in-unit washing machine is the most important facility of an ideal apartment for both students and young professionals; a 79% of the respondents ranked an in-unit washing machine as the most important facility (J Turner Research, 2013). Additionally, a study in which a dishwasher and/or insurances package is included is not found.

Furthermore, the building-related facilities that are most discussed in literature are a common area, gym, media room, game room, hot tub, pool, and on-site property management (Barnes et al., 2016; Rugg & Quilgars, 2015; Angelo & Rivard, 2003). These attributes are discussed in the expert interview as well and some of them will be included within the choice sets as they are proposed to be reasonable facilities to incorporate in a building with a young people purpose (Bogers, personal communication, 2017). As a result, a total of three building-related facilities will be included within the choice sets, namely a common area, bike sharing including service, and leisure facilities; the leisure facilities will consists of a gym and sauna. When including these facilities within the choice sets with a yes or no option, the WTP for these attributes could be calculated as well. Both a common area and a gym are often incorporated in studies with a housing preference purpose (J Turner Research, 2012, 2013; Rugg & Quilgars, 2015; GMAC, 2016). The results of previous studies suggest that young people, both students and graduates, prefer a gym and study area the most in relation to other facilities such as a reading room, game room, theatre, and café (J Turner Research, 2012, 2013). However, a bike sharing facility in a housing accommodation could be considered as a new and innovative concept since no scientific paper with a residential preferences purpose is found in which this facility is included. But, the concept itself has already been applied in different student accommodations in the USA and the UK since 2016 (Zagster, 2017). According to MacCleery, Norris & McMahon (2016) *"through supporting bike infrastructure, real estate managers can play a significant role in creating healthier, more sustainable communities. They can also help position their projects and communities in a marketplace that increasingly values active transportation."* Additionally, bike sharing provides clean, convenient, and cost-effective transportation and offers young people a solution to get around the city at low-cost and low-stress, because a reparation serviced will be included (Zagster, 2017).

Finally, all attribute levels are chosen in such a way that they are comparable with each other, since this is a requirement of a DCE (Hensher et al., 2005; Kemperman, 2000). The size makes a jump of 10 square meter when proceeding to the next level and the price makes a jump of €100 when proceeding to the next level. The other attributes are comparable with each other by containing two opposite levels, such as yes and no or simple design and luxury design.

To conclude, the attributes and its levels that will be used within the discrete choice experiment are identified based upon literature review and are verified based upon an expert interview. To be more precise, seven out of a total of ten attributes are underpinned with literature and the other three are identified based upon the expert interview, since they were found by experts to be important attributes. So, some attributes as identified by the expert are not yet included within other researches with residence choice as purpose, implying that this research is innovative in that sense.

3.3.2 EXPERIMENTAL DESIGN CONSIDERATION

The first issue that needs to be considered is the type of design, namely the choice between a full factorial design and a fractional factorial design (Hensher et al., 2005). A full factorial design covers all possible combinations, L^M, where L is the number of attribute levels and M the number of attributes. In this case, there are 2,304 possible treatment combinations, based upon the following calculation: $2^8 * 3^2$. This is related to the fact that there will be eight variables with two levels and two variables with three levels. When choosing a full factorial design that covers all possible treatment combinations, it is possible to estimate all main and interaction effects. However, from a practical viewpoint it is unreasonable to provide the respondents with so many choice sets; in that case, it will take way too long for the respondents to finalize the survey (Kemperman, 2000). Therefore, a fractional factorial design will be chosen. Where a full factorial design covers all main effects and interaction effects, in a fractional factorial design some of the interactions except for main effects are ignored. In scientific terms, a fractional factorial design is generated from a full factorial design by choosing a so called alias structure. This structure determines which effects are intended and confounded with each other. So, the obvious advantage of a fractional factorial design is that the number of treatment combinations can be greatly reduced. In a fractional factorial design, both main effects and interactions should be distinguished (Hensher et al., 2005). The interaction effects only hold a small amount of variance in response data (Hensher et al., 2005). For this reason, the results do not differ significantly when only taking into account main effects (Hensher et al., 2005; Kemperman, 2000).

A main effect is the effect of a single independent variable on a dependent variable, ignoring all other independent variables. In general, there is one main effect for every independent variable in a study (Hensher et al., 2005). Besides, an interaction is a statistical effect and occurs when the effect of one independent variable on the dependent variable changes depending on the level of another independent variable (Hensher et al., 2005). In this research, the dependent variable is the choice variable, in this case the housing choice. The definition of housing choice in this research is the behavioural intention of young people to move, or in other words, their willingness to move . Additionally, the independent variables in this research are the choice-specific attributes size, price, dwelling division, washing machine, dishwasher, furniture, insurances package, common area, bike sharing, and leisure facilities.

According to Hensher et al. (2005) in almost all cases the following generalizations hold about significant effects:

- Main effects explain the largest amount of variance in response data, mostly 80 percent or more;
- Two-way interaction effects explain the next largest amount of variance, mostly between 3 and 6 percent;

- Three-way interaction effects explain the smallest proportion of variance, mostly 2 to 3 percent;
- Higher order terms account for a very small proportion of variance.

So, where full factorial designs cover all main effects, two-way interactions, three-way interactions, and higher order interactions, a fractional factorial design has the disadvantage that is does not estimate all the effects and therefore some effects become confounded, because they are not distinguishable from each other (Kuhfeld, 2010).

When applying a fractional factorial design, researchers should best seek for a design that is both orthogonal and balanced (Kuhfeld, 2010). In fractional factorial designs that are orthogonal, the parameter estimates within the linear model are uncorrelated. Simply, this means that the attributes are statistically independent from each other. Besides, a design is balanced when each attribute level occurs equally often (Kuhfeld, 2010). When the design is balanced, the variance in the parameter estimates is minimized. If a design is both orthogonal and balanced, it is called an orthogonal array.

Additionally, most researchers do not generate treatment combinations and choice sets themselves (Kuhfeld, 2010; Hensher et al., 2005; Kemperman, 2000). Researchers often make use of specific software containing computational algorithms to generate treatment combinations for fractional factorial designs in such a way that at least all main effects are covered. An example of such a software package is SAS. This software tool enables researchers to generate treatment combinations based upon the desired number of attributes, attribute levels, and choice profiles within a choice set (SAS, 2017).

The first important step in the experimental design consideration is to make sure that all attributes vary independently (Hensher et al., 2005). This means that a design needs to be generated in which there are no correlations between all attributes. When there are no correlations between the attributes intended in the design, the effects could be estimated independently and any effect can be assigned to one single attribute, without confounding with the effects of other attributes within the design (Kemperman, 2000). The attributes and attribute levels of this research were implemented within the SAS software tool and were tested on correlation as seen in table 5. As seen, there are no correlations between the attributes, implying that the design is orthogonal (Kuhfeld, 2010).

Table 5: Correlation matrix of the design attributes (SAS, 2017).

	SIZ	PRI	DWE	WAS	DIS	FUR	INS	COM	BIK	LEI
SIZ	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
PRI		1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
DWE			1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
WAS				1,00	0,00	0,00	0,00	0,00	0,00	0,00
DIS					1,00	0,00	0,00	0,00	0,00	0,00
FUR						1,00	0,00	0,00	0,00	0,00
INS							1,00	0,00	0,00	0,00
COM								1,00	0,00	0,00
BIK									1,00	0,00
LEI										1,00

The second issue that needs to be considered is the amount of treatment combinations that the fractional factorial design will cover. Generally, the generation of choice sets and alternatives that capture treatment combinations of the fractional factorial design rely on procedures that use search algorithms to automatically generate alternatives. As mentioned, SAS is able to generate the treatment combinations of a fractional factorial design. In the example with eight attributes with two levels and two attributes with three levels, the smallest fraction consists of 36 treatments combinations, where all the main effects can be estimated independently (SAS, 2017). So, the design size of 36 treatment combinations is the size for an efficient orthogonal design. *"The fraction is obtained by assuming an additive utility function with only main effects* (Kemperman, 2000, p.95)*"*. So, interaction effects are assumed non-significant and therefore ignored. This assumption is mostly reasonable because main effects explain the largest amount of variance in response data (Kemperman, 2000; Hensher et al., 2005). The division of the attribute levels over the 36 treatment combinations can be found in table 6.

The third issue that needs to be considered in the experimental design is the decision to use or not to use the option 'none of these' (Hensher et al., 2005). This option gives the opportunity for the respondents to select this option if none of the other alternatives satisfy their preferences. For the respondent, this implies that they are not forced to select one of the alternatives that consist of the different attribute levels. Hensher et al. (2005) recommend to include this option, since this does not mean for the respondents that they need to select an alternative that does not satisfy their preferences. As a result, including the option 'none of these' will not lead to over-estimated results (Hensher et al., 2005). So, the option 'none of these' will be included within the choice sets represented in the online survey.

Table 6: Treatment combinations for the experimental design (SAS, 2017).

Treatment combination	Block	Run	Attribute									
			SIZ	PRI	DWE	WAS	DIS	FUR	INS	COM	BIK	LEI
1	1	1	1	1	1	2	1	2	2	2	2	1
2	1	2	1	3	1	2	1	2	1	2	1	2
3	1	3	3	1	2	1	2	2	1	2	1	1
4	1	4	2	2	2	1	1	2	1	1	2	1
5	1	5	1	1	1	1	1	1	1	1	1	2
6	1	6	1	3	2	2	2	2	2	1	1	2
7	1	7	3	2	2	2	1	1	2	1	1	1
8	1	8	3	1	1	2	2	1	1	1	2	1
9	1	9	3	3	2	1	1	1	2	2	2	2
10	1	10	2	2	1	1	2	2	2	1	2	2
11	1	11	2	3	1	1	2	1	2	2	1	1
12	1	12	2	2	2	2	2	1	1	2	2	2
13	2	1	2	1	2	1	2	2	1	2	1	1
14	2	2	2	2	1	2	1	2	1	2	1	2
15	2	3	1	2	1	1	2	2	2	1	2	2
16	2	4	3	1	2	2	2	2	2	1	1	2
17	2	5	3	3	1	1	1	1	1	1	1	2
18	2	6	2	3	1	2	2	1	1	1	2	1
19	2	7	1	3	2	2	2	1	1	2	2	2
20	2	8	3	1	1	2	1	2	2	2	2	1
21	2	9	1	2	1	1	2	1	2	2	1	1
22	2	10	3	3	2	1	1	2	1	1	2	1
23	2	11	1	2	2	2	1	1	2	1	1	1
24	2	12	2	1	2	1	1	1	2	2	2	2
25	3	1	1	1	1	2	2	1	1	1	2	1
26	3	2	3	2	1	1	2	1	2	2	1	1
27	3	3	1	3	2	1	2	2	1	2	1	1
28	3	4	2	1	1	1	1	1	1	1	1	2
29	3	5	1	1	2	1	1	1	2	2	2	2
30	3	6	3	2	1	2	1	2	1	2	1	2
31	3	7	2	1	2	2	2	2	2	1	1	2
32	3	8	2	3	1	2	1	2	2	2	2	1
33	3	9	2	3	2	2	1	1	2	1	1	1
34	3	10	1	2	2	1	1	2	1	1	2	1
35	3	11	3	3	1	1	2	2	2	1	2	2
36	3	12	3	2	2	2	2	1	1	2	2	2

As seen in table 6, the total of 36 treatment combinations are divided into three blocks of twelve choice sets. The reason for this is that 36 choice sets are too many for one respondent and it could cause burden (Kemperman, 2000). Therefore, the process will be as follows: each respondent sees twelve choice sets and therefore in total three respondents complete one design. Additionally, from the table one can extract that the design is balanced, implying that each attribute level of each attribute appears equally in the design as a whole. Consequently, table 6 is used as a basis for the design generation that will be implemented within the online survey system. The design is generated using Microsoft Excel and makes sure that all treatment combinations as presented in table 6 are compared to each other the same number of times. Only the two options 'alternative A' and 'alternative

B' are considered within the design generation; the option 'none of these' is excluded in the design generation. However, it will be included within the online survey. A random example of a choice set within the online survey is represented in figure 13.

Attribute	Alternative A	Alternative B	None of these
Size	25 sqm	35 sqm	
Price: monthly all-in rent	€850	€850	
Dwelling division	No separate bedroom	No separate bedroom	
Washing machine	Yes	No	
Dishwasher	Yes	No	
Furniture	Luxury design furniture	Simple design furniture	
Insurances package	No	No	
Common area	No	Yes	
Bike sharing including service	Yes	No	
Leisure facilities	Yes	No	
Your preference		**X**	

Figure 13: Random example of a choice set.

So, each respondent will be provided with a total of twelve choice sets; each choice set is a unique combination of two alternatives derived from table 6. As input, a sheet in Microsoft Excel is created consisting of 1,260 choice sets of the 36 profiles. This sheet is created by separately setting the 36 profiles against each profile, indicating that there are 35 * 36 = 1,260 choice sets. In order to take care that there is not a single choice set in which alternative A and alternative B are the same, the 36 profiles are set against 35 profiles. Finally, each time a questionnaire is started, the survey system will randomly pick twelve unique combinations which are represented as choice sets to every single respondent.

Another important consideration is the type of coding format that will be used in order to prepare the data for the analysis (Kemperman, 2000; Hensher et al., 2005). The data has to be coded to fit the analysing method. Three types of coding can be distinguished, namely dummy coding, effect coding, and orthogonal coding (Kemperman, 2000). The coding schemes of the three coding types for 2, 3, and 4 level attributes are presented in appendix A. *'Regardless of the coding scheme used, the overall model fit is the same. The regression equation and its interpretation however differ* (Kemperman, 2000, p.98)*'*. Both dummy coding and effect coding have the same advantage that non-linear effects in the attribute levels may be measured. Hensher et al. (2005) suggest that effect coding is the best coding scheme for DCEs because with effect coding there is no disruption of the base attribute level with the grand mean of the utility function. This means that the results of effect coded data also show the utility of the base attribute level, while with dummy coding the utility of the base attribute level is assumed to be zero. Additionally, Bech & Gyrd-Hansen (2005) suggest that dummy coding and effect coding are functionally equivalent. *'However, researchers must be aware that interpretation of a statistically significant constant term is problematic when dummy coding is used in a design which includes a fixed comparator. In such cases effect coding should be applied, because this coding format can estimate the effect of all*

levels and all estimates are estimated uncorrelated with the intercept.' (Bech & Gyrd-Hansen, 2005, pp. 1082)

Finally, when taking into account equation (1) to calculate the sample size for a reliable research, the minimum number of respondents needed based upon the design experiment is 63 respondents, since 500 * $\frac{3}{12*2}$ = 63; the highest number of levels for any of the attributes is 3, the number of choice sets is 12 and the number of alternatives within the choice sets is 2, not taking into account the option 'none of these'. However, according to Vasilache (2013) it would be better to have a 1000 representations per main effect level. So, when replacing the 500 in equation (1) with 1000, the minimum number of respondents is 125. But, the minimum sample size for discrete choice experiments should be 200 according to Johnson & Orme (2003). Given this, the minimum number of respondents needed is 200 instead of the calculated 125.

To conclude, the experimental design that will be used for the research is an orthogonal and balanced design with a fraction of 36 treatment combinations; this number of treatment combinations is selected to run an efficient orthogonal design. The treatment combinations are divided into twelve choice sets per respondent, implying that three respondents complete one design. Additionally, the initial data will be coded using effect coding.

3.3.3 ONLINE SURVEY GENERATION

The online survey is generated using the Berg Survey System 2.2, which is the online questionnaire system of the Built Environment department of the Eindhoven University of Technology. According to Kemperman (2000) surveys should not be too long, too difficult or too unclear in order to receive data from reasonable quantity and quality. Therefore, the following aspects need to be taken into consideration when creating an online survey: (1) make the instructions simple for the respondents; (2) try to avoid that respondents interpret your information differently; (3) give the respondents at least one choice set example for practice; (4) inform respondent about the aim of the research, and (5) explain the attributes and the levels that are used within the choice sets (Kemperman, 2000).

The online survey consists of an introductory page followed by a page with socio-demographic questions, a page with questions about the current living situation, a page with an explanation of the attributes, a page with an example choice set and finally the 12 choice sets itself. The socio-demographic questions and questions regarding the current living situation are processed within the so called 'main survey' and the choice sets are processed within the so called 'sub survey'. The complete online survey with screenshots of each page can be found in appendix B and is generated while keeping into account the five design tips as proposed by Kemperman (2000). The inclusion of socio-demographic questions is an important aspect of an online survey (Kemperman, 2000). Firstly, such questions able the researcher to see who is filling in the survey and if the right target group is reached. This gives the researcher the possibility to judge the gathered information on its quality based upon the aim of the research. Secondly, if the data is of good quantity, the researcher is able to differentiate between different sub groups (Kemperman, 2000). This segmentation could offer more specific insights which you would have missed by only looking at the aggregate data. Especially in this research the differentiation between students, young professionals, and expats is important. Therefore, a substantial set of socio-demographic questions is added to the questionnaire.

Most socio-demographic questions as discussed in different papers include questions about gender, age, nationality, education, and income (Opoku & Abdul-Muhmin, 2010; Kemperman, 2000). In addition, studies in the field of housing decisions almost always include questions about the current housing situation (Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990; Mulder, 1996). Besides, in order to differentiate between students, young professionals, and expats, the question 'to which group do you belong?' is included as well. This question reflects the researcher to see if the right target group is reached.

The page with the socio-demographic questions includes group, gender, age, nationality, education, and income.

The page with the questions about the current living situation of the respondent includes household composition, type dwelling, dwelling size, and the rent price of the dwelling.

CHAPTER 4 | RESULTS

4.1 DATA COLLECTION

The survey was open for public use during two weeks, from April 24, 2017 to May 8, 2017 and the respondents were reached in several ways:

- A total of approximately 3,000 young people were approached by e-mail using an e-mail marketing system called Mailchimp. This e-mail system is able to send out lots of e-mails simultaneously.
- Companies from different Dutch business parks were contacted, such as the High Tech Campus in Eindhoven and the Bio Science Park in Leiden; in the companies located on these business parks lots of young professionals and expats are working.
- The online survey was promoted among friends, family and social media channels.

A total of 888 people opened the survey from which 540 people completed and submitted the survey, which implies an overall response rate of 60,8%. The minimum amount of respondents was set at 200, so the actual number of respondents is good.

Since the target group of this research is set at students, young professionals, and expats, the data from the respondents who are part of another group should be removed. This amount of people is a total of 27 respondents. So, the data that will be used for the DCE consist of 513 persons, including only students, young professionals, and expats.

4.1.1 DESCRIPTIVE STATISTICS

Firstly, some general information from the respondents is derived from the dataset. This general information is obtained from the results of the socio-demographic questions and the questions regarding the current living situation. Table 7 presents the gender of the respondents sub-divided per group of the respondents who completed the survey. As can be seen, a total of 320 students, 110 young professionals, and 83 expats completed the survey. In addition, more male than female completed the survey. This could be explained by the database that is used for approaching the respondents; this database consists of slightly more male than female.

Table 7: Gender of the respondents divided into the sub-groups of the main target group.

Gender	Students	Young professionals	Expats	Total
Male	179	70	55	**304**
Female	141	40	28	**209**
Total	**320**	**110**	**83**	**513**

Additionally, the age groups of the 513 respondents are presented in table 8; as seen, the majority of the sample is from the age groups 22 – 25 years old and 26 – 29 years old, implying that around 70% of the respondents is between 22 and 29 years of age.

Table 8: Age of the respondents.

Age	18-21 y/o	22-25 y/o	26-29 y/o	30-33 y/o	> 33 y/o
Total	75	192	163	54	29

The rest of the socio-demographics of the respondents and the information about their current living situation can be found in appendix C.

Another interesting point is that the option none of these is chosen in 25,54% of the cases; this implies that it was a good decision to incorporate the none of these options and it even implies that young people are quite often not impressed by the provided housing alternatives as included in the survey.

4.2 DATA PREPARATION

Where the original data is used for deriving the descriptive statistics, the execution of the MNL requires a clean and recoded dataset. As discussed in section 3.3.2, the data is coded using effect coding; this effect coding is needed for testing the data on non-linear effects (Hensher et al., 2005). The original data consist of two sets; one set with the choice sets data (sub survey) and another set with data about the socio-demographic questions and the questions regarding the current living situation (main survey). Both data sets are coded using effect coding. The effect coding for every variable can be seen in appendix D. As seen, some variable levels of the main survey data are combined. This is done due to the fact that some levels had to deal with a very low response rate.

In order to determine the effect coding of the attribute levels, the level which is estimated as closest to the actual situation of most people, is considered to be the base level. The base level could be seen as a comparison group and should be chosen because then the impact of an attribute level compared to the base level could be identified (Hensher et al., 2005). This means that the other level or levels is/are most important. A base level is coded with -1, -1, and has a lower chance on a significant value (Hensher et al., 2005).

4.3 DATA ANALYSIS

The econometric software package NLOGIT 5.0 was used to estimate the MNL model. NLOGIT is a software package that is trusted worldwide by analytics experts and institutions for over 25 years and could therefore be considered as a good tool for this research. Firstly, the data of all respondents will be analysed. This part consists of an evaluation of the model in order to test the goodness of fit of the model. Additionally, the MNL of all respondents' data presents the influence of each attribute level on young people's willingness to move by means of a coefficient, which is the part-worth utility estimate.

Secondly, a ranking of the 36 alternatives of the fractional factorial design will be created based upon the part-worth utilities of the full sample. This ranking represents both the most preferred alternatives and least preferred alternatives.

Thirdly, a Random Parameter Logit model, a RPL, will be performed to test the differences in choices among the respondents. MNL assumes homogeneity in preferences of the respondents, meaning that the coefficients are giving the average preference of the respondents. However, every single person is unique and has his/her own preferences. Such variations of differences in choice can be checked with the use of the RPL.

Fourthly, different sub group differentiations will be made in order to see the part-worth utilities, and thus the influence on the willingness to move of different groups of people varying in socio-demographic characteristics. The representation of the separate part-worth utilities per group able the researcher to have an indication of the differences in preferences between the different sub groups.

Finally, the WTP per attribute level will be calculated, so that one can see the amount of money young people are willing to spend for different facilities within their housing unit or within the building.

4.3.1 MULTINOMIAL LOGIT MODEL - FULL SAMPLE

In order to determine if the MNL performs well, the goodness of fit of the model should be analysed. Table 9 shows the performance of the full sample model including all respondents; the performance of the model is expressed in terms of the Log Likelihood and the R-squared. Log Likelihood ratio statistics provide the opportunity to test the performance of the attributes in the model using the collected discrete choice data. Comparison is made between the null model, the constant only model and the optimal model to determine the Log Likelihood ratio test. In the null model, the complete data is set to zero and the probability that any option among three given option is selected is given by dividing data equally (0.33) for all three options. In the constant only model, only the constant which represents one choice alternative is included. In addition, the optimal model is the one with all the variables from the survey included providing more context to the model and giving the most optimal likelihood. Finally, the rho-squared value explains the fit of the model as well. According to Louviere et al. (2010) a model can be considered usable if the rho-squared value is above 0,1. However, preferably the rho-squared should be between 0,2 and 0,4 (Louviere et al., 2010; Hensher et al., 2005) . As seen, the rho-squared is 0,1399 and could therefore be considered as acceptable, since this value is above the boundary of 0,1.

Both the Log Likelihood of the constant only model and the optimal model are calculated by the NLOGIT software. The Log likelihood of the null model can be obtained by multiplying the number of observations (6156) with the natural log of the probability of selecting each choice; in this case this is 0,33, since there are three choice options. So, the Log Likelihood for the null model is:

LL(0) = 6156 * ln(0,33) = -6824,92709.

As seen in table 9, the Log Likelihoods of both the constant only model and the null model are lower compared to the optimal model, implying that the optimal model performs better than both the constant only model and the null model.

Table 9: Overall model performance.

Goodness of fit	Model all respondents
Observations	6156
LL optimal model	-5741,30397
LL constant only model	-6674,9026
LL null model	-6824,92709
R^2	0,1399

Since the model performance is considered to be reliable, the results as obtained by the software will be discussed. All parameters are estimated which has resulted in the NLOGIT output as presented in table 10. The coefficients as generated by the software are the main effects and can be seen as the effect of a single independent variable on the dependent variable, ignoring all other independent variables. In general, there is one main effect for every independent variable in a study (Hensher et al., 2005). In this research, the dependent variable is the behavioural intention of young people to move. Additionally, the independent variables in this research are the choice-specific attributes size, price, dwelling division, washing machine, dishwasher, furniture, insurances package, common area, bike sharing, and leisure facilities. So, the part-worth utility estimates provide an insight into the influence of each attribute level on young people's willingness to move by showing a coefficient that can both be both positive or negative. Thus, a positive coefficient has a positive influence on young people's willingness to move; for a negative coefficient the opposite holds. Both the code that is used and the output that is generated by the NLOGIT software can be seen in appendix E.

Additionally, the stars behind the coefficients explain the significance level. The significance level should be read as follows: a significance at 1 percent level, or 0,01, means that we incur a probability (P) or chance of 1 percent of being wrong, because we know that 1 percent of similarly conducted experiments will show a statistical significance just by chance alone, even if no real difference or effect exists (Louviere et al., 2010). In general holds, the smaller the P level, the less chance we have for a wrong conclusion. Thus, the more certain we can be of the difference that we find from the data. In addition, the significance level could easily be translated into the confidence level; the confidence level is equivalent to 1 minus significance level. So, if the significance level is 1 percent, or 0,01, the corresponding confidence level is 99 percent. Finally, table 10 shows the standard errors of the parameter estimates. A standard error is a measure of the so called dispersion, or variability, in the predicted coefficients in a regression (Louviere et al., 2010).

Table 10: Output NLOGIT - part-worth utilities per attribute level of the model including all respondents.

Attribute Sample size N = 513	Label	Part-worth utility	Standard error
Constant		0,26679***	0,03093
Size	25 sqm	-0,64239***	0,03183
	35 sqm	0,10150***	0,02919
	45 sqm	0,54089	N/A
Price: monthly all-in rent	€750	0,78178***	0,02938
	€850	0,08318***	0,02876
	€950	-0,86496	N/A
Dwelling division	Separate bedroom	0,31776***	0,02100
	No separate bedroom	-0,31776	N/A
Washing machine	Yes	0,32561***	0,02099
	No	-0,32561	N/A
Dishwasher	Yes	0,12870***	0,02073
	No	-0,12870	N/A
Furniture	Luxury design furniture	0,02329	0,02059
	Simple design furniture	-0,02329	N/A
Insurances package	Yes	0,08955***	0,02068
	No	-0,08955	N/A
Common area	Yes	0,01805	0,02066
	No	-0,01805	N/A
Bike sharing	Yes	0,07608***	0,02068
	No	-0,07608	N/A
Leisure facilities	Yes	0,04637**	0,02063
	No	-0,04637	N/A

Note: ***, **, * → significance at 1%, 5%, 10% level.
N/A = Not Applicable.

In order to have a better overview of the part-worth utilities, figure 14 shows a graph with the part-worth utilities of each attribute level and hence the effect of each attribute level. An important note to figure 14 is that the attributes with a non-significant outcome are excluded from the graph, since the coefficients of these attributes are considered unreliable. The non-significance of the attributes furniture and common area could be explained by their coefficients that are very close to zero; this means that those facilities seem to have a very small influence on young people's willingness to move.

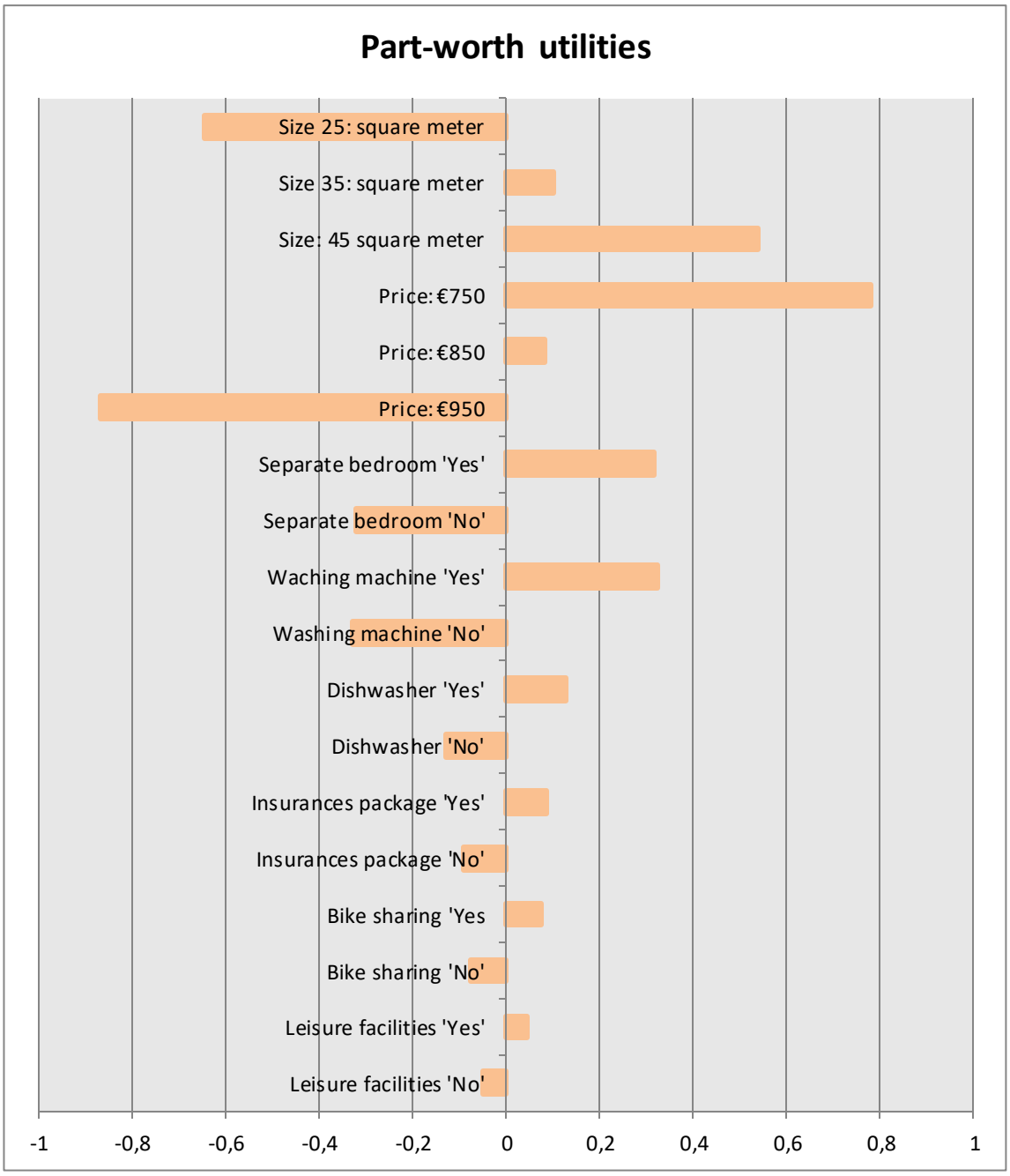

Figure 14: Visualization of the part-worth utilities of the model including all respondents; only attribute levels with a significant outcome.

From both table 10 as figure 14, conclusions can be drawn regarding the influence of the attribute levels on the dependent variable willingness to move of young people. The graph in figure 14 should be interpreted as follows: each bar visualizes the strength of influence on young people's behavioural intention to move; the longer the bar, the stronger the influence. For instance, the presence of a separate bedroom shows an influence of 0,31776 and the absence of a separate bedroom shows an influence of – 0,31776. This implies that the influence of the attribute dwelling division can be considered as 0,63552, which is calculated as the sum of the absolute values of the coefficients. Thus, when we assume the situation that a dwelling does not have a separate bedroom and this would be improved to

the presence of a separate bedroom, it means that the influence of this change on young people's willingness to move is valued 0,63552. The same holds for the other attributes with 2 levels. In case of attributes with three levels, size and price in this research, the influence of the attribute should be calculated the same way. So, if a 25 square meter housing unit will be optimized to a 45 square meter housing unit the influence on young people's willingness to move will be the absolute difference between the part-worth utilities of these attribute levels, which is equal to 1,18328. These values however only give the influence; in order to draw conclusions from the importance of the attributes, the relative importance can be calculated, which is done in table 11 and will be discussed later in this section.

As seen, size and price seem to be the most influential attributes, since the part-worth utilities of the levels of these attributes have the most positive and most negative influence on young people's willingness to move compared to the influence of the other attribute levels. Besides, these parameter estimates are also highly significant. This is completely in line with several studies about the residential preferences of young people (Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990; Mulder, 1996; J Turner Research, 2012, 2013, 2014). Those studies found that both size and price are the most decisive factors for people when considering and choosing a housing unit. Additionally, PBL (2014) also found that size and price are very important factors for expats when considering different housing options. Another possible explanation for the result that size and price seem to affect the willingness to move of the respondents most is that those attributes were the first two attributes in the choice sets as presented to the respondents and therefore these attributes would probably be considered firstly. However, La Roche et al. (2010) found that price is not a decisive factor for young people as long the amenities and facilities related to the building or dwelling meet the preferences. So, the results of that study are contradictory to the results as suggested in this study. As expected, the marginal utility for the monthly rent decreases with increasing rent levels: higher rents result in lower utility levels. In addition, the marginal utility for size increases with increasing size levels: more size results in higher utility levels. So, the highest monthly rent price of €950 has the most negative influence and the smallest dwelling size of 25 square meter has an extreme negative influence as well. Furthermore, both utilities are highly significant. This result is not surprising, since it can be assumed that people always seek for housing with the lowest price and the highest surface. However, this choice will be made in relation to the quality and level of facilities of which they can make use (J Turner Research, 2012, 2013, 2014). On the other hand, both the lowest monthly rent price of €750 and the highest surface of 45 square meter have the most positive influence.

Consequently, the attributes dwelling division, washing machine, dishwasher, insurances package, bike sharing, and leisure facilities are highly significant and the presence of these facilities seem to have a positive influence as well. The influences of the highly significant attribute levels presence of a separate bedroom, washing machine, dishwasher, and insurances package are valued more positive than the attribute levels presence of bike

sharing and leisure facilities. This implies that housing-related facilities, or facilities for private use, are more important for young people than building-related facilities, or facilities for common use. So, the results show that young people prefer facilities for private use over facilities for common use.

With regard to the housing-related facilities we can say that the presence of both a separate bedroom and washing machine have an almost equal positive influence. In addition, the presence of a dishwasher positively influences the willingness to move of young people as well, but less positive compared to a separate bedroom and a washing machine. When looking at the attribute insurances package, it can be concluded that this attribute still has a positive influence, but seems to be the least important housing-related facility for young people. Finally, the two significant attribute levels presence of both bike sharing and leisure facilities have a slightly positive influence, but does not seem to affect the willingness to move of young people that much.

To conclude, price seems to be the most decisive factor for young people when considering different housing alternatives, followed by size. Apart from size and price, the presence of a separate bedroom and a washing machine for private use seem to influence young people's willingness to move positively as well. Consequently, facilities for private use are more important for young people than facilities for common use.

Based upon the parameter estimates, the relative importance of each attribute could be calculated. The relative importance of the attributes provide an insight into the importance of each attribute in terms of percentages. Again, only the significant attributes should be taken into account in order to draw reliable conclusions. The way to identify the relative importance is to calculate the absolute differences between the coefficients of the highest and the lowest level of each attribute (Hensher et al., 2005). Thus, the relative importance can be calculated by dividing this range by the sum of all ranges. For example, the range of the size attribute should be calculated by counting the absolute value of the coefficient of 25 square meter with the value of the coefficient of 45 square meter, i.e. 0,64239 + 0,54089 = 1,18328. The sum of all ranges is equal to 4,86113, so the relative importance of size is calculated by dividing 1,18328 by 4,79816, which is equal to 24,66 percent. The calculations of the ranges of the other attributes are shown in table 11. Figure 15 visualizes the relative importance of the significant attributes in terms of percentages in a graph.

Table 11: Range calculation of the significant attributes.

Attribute	Attribute range	Relative importance
Size	1,18328	24,66%
Price	1,64674	34,32%
Dwelling division	0,63552	13,25%
Washing machine	0,65122	13,57%
Dishwasher	0,25740	5,36%
Insurances package	0,17910	3,73%
Bike sharing	0,15216	3,17%
Leisure facilities	0,09274	1,93%
Total	4,79816	100%

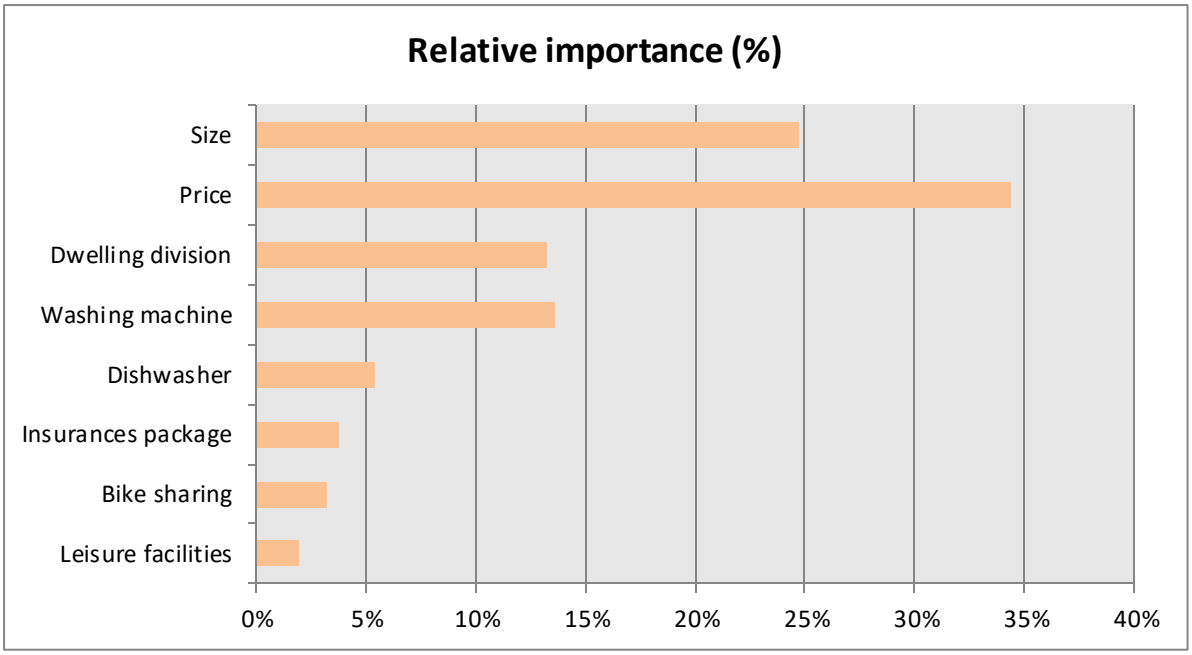

Figure 15: Relative importance of the significant attributes for the full sample.

Figure 15 provides insights into the relative importance of the significant attributes in terms of percentages. The relative importance shows the strength of each significant attribute. The higher the percentage, the more important the attribute for young people when considering and comparing different housing alternatives. The figure clearly shows that price is by far the most important attribute, followed by size. As already mentioned, this result is in line with many scientific researches (Dieleman, 2001; Lee & Waddell, 2010; Lindberg et al., 1989; Louviere & Timmermans, 1990; Mulder, 1996; J Turner Research, 2012, 2013, 2014). The attributes dwelling division and washing machine for private use are equally important and are respectively the third and fourth ranked attributes. This implies that the presence of a separate bedroom and the presence of an in-unit washing machine are the most important facilities to young people when making a housing decision apart from size and price. Additionally, the presence of a dishwasher, insurances package included in the monthly rent, the possibility to share bikes, and leisure facilities have a collective relative importance of 14,19 percent. This means that these facilities together are almost equal important as the dwelling division on its own, which has a relative importance of 13,25 percent and an in-unit

washing machine, which has a relative importance of 13,57 percent. Where the studies of J Turner (2012, 2013, 2014) show that the presence of leisure facilities within the accommodation is very important to young people, the results here show the opposite. Additionally, the limited importance of an insurances package included in the monthly rent could be explained by the reason that almost all people have already arranged this themselves and want their insurances independent from the rent price of their housing. The last significant attribute, bike sharing, is not very important at all. While MacCleery et al. (2016) and Zagster (2017) suggest that bike sharing contributes to a healthier, more sustainable community and cost-effective way of transportation, it does not seem to affect the behavioural intention of willingness to move of young people that much. A possible explanation for this could be that young people already have their own bike and are satisfied with that; probably they do not want to share bikes as it could be easier to take their own bike.

Another explanation for the division of the relative importance of the attributes could be that the relative importance of the attributes has almost the same order than the order in which the alternatives in the choice sets were provided to the respondents in the survey. It is already found in literature that respondents might apply simplified decision strategies such as choosing an alternative based on one or a few attribute only (Hensher et al., 2005; Louviere et al., 2010). However, such strategies may especially be used by lower educated respondents (Louviere et al., 2010). It is also found that some people base their decisions on one high priority attribute, which seems to be price in this case (Timmermans & van Noortwijk, 1995). Thus, such decision making strategies could reflect a strong preference for one specific attribute or it may be a way to avoid complex and time-consuming decision making. So, the reason that dwelling division and washing machine are estimated to be more important for young people when considering different housing alternatives could be explained by the division of the attributes over the choice alternatives. Hence, the results of the relative importance suggest that the higher the attribute was placed in the choice alternatives, the more important the attribute, except for price; this is the most important attribute and was the second attribute shown to the respondents in the choice alternatives.

Finally, the estimates as presented in table 10 and used for the calculation of the relative importance are the part-worth utilities for the full sample. They do not reveal any information with respect to covariates. Hence, it would be interesting to see the differences in the relative importance of attributes among people with different socio-demographic characteristics. Therefore, section 4.3.4 will focus on the differentiation of sub groups in order to see the differences in preferences between different groups of people.

4.3.2 PREFERRED ALTERNATIVES

Based upon the part-worth utilities, the total utility per alternative could be calculated. The total utility is the sum of all part-worth utilities of the variables included in the choice sets plus the coefficient of the constant. The total utility is calculated for every of the 36 alternatives that are part of the fractional factorial design and is related to the full sample size, including all respondents. Based upon the total utilities of the alternatives, a ranking system could be created in order to extract the most and least preferred alternatives. Table 12 presents the total utilities of the alternatives included in the fractional factorial design, its ranking, and the top 3 most and least preferred alternatives. Additionally, the alternatives out of the top 3 most and least preferred alternatives are expressed in terms of their attribute levels and are highlighted in grey. The ranking however is based on a total utility estimation of the full sample and is only based on the alternative-specific coefficients and not on the individual-specific coefficients.

Table 12: Total utilities and ranking of the alternatives included within the fractional factorial design.

Ranking	Total utility	Alternative from fractional factorial design
#1	2,08274	28
35 sqm - €750 – separate bedroom – washing machine – dishwasher – luxury design furniture – insurances package – common area – bike sharing – ~~no leisure facilities~~		
#2	1,63927	3
45 sqm - €750 – ~~no separate bedroom~~ – washing machine – ~~no dishwasher~~ – simple design furniture – insurances package – ~~no common area~~ – bike sharing – leisure facilities		
#3	1,55409	8
45 sqm - €750 – separate bedroom – ~~no washing machine~~ – ~~no dishwasher~~ – luxury design furniture – insurances package – common area – ~~no bike sharing~~ – leisure facilities		
#4	1,54971	20
#5	1,44367	26
#6	1,33885	5
#7	1,19988	13
#8	1,08963	30
#9	1,07986	24
#10	0,87539	17
#11	0,75231	16
#12	0,7489	10
#13	0,65024	14
#14	0,64262	4
#15	0,45043	7
#16	0,37081	25
#17	0,36643	1
#18	0,33597	29
#19	0,31292	31
#20	0,26039	21
#21	0,24015	35
#22	0,13387	22
#23	0,09113	36
#24	0,05614	11
#25	0,00501	15
#26	-0,10127	34
#27	-0,12749	9

#28	-0,34826	12
#29	-0,53204	18
#30	-0,53642	32
#31	-0,73285	23
#32	-0,9371	33
#33	-1,04179	2
#34	-1,19075	27
25 sqm - €950 – no separate bedroom – washing machine – no dishwasher – simple design furniture – insurances package - ~~no common area~~ – bike sharing – leisure facilities		
#35	-2,04029	19
25 sqm - €950 – no separate bedroom – no washing machine – no dishwasher – luxury design furniture – insurances package - ~~no common area~~ – ~~no bike sharing~~ – ~~no leisure facilities~~		
#36	-2,07771	6
25 sqm - €950 – no separate bedroom – no washing machine – no dishwasher – simple design furniture – no insurances package - common area – bike sharing – ~~no leisure facilities~~		

Since size and price are found to be the most important attributes for young people when making a housing decision, it does not come as a surprise that the three least preferred alternatives are the ones with the smallest surface of 25 square meter in combination with the highest monthly rent price of €950. Reversely, it could be expected that the top three most preferred alternatives are the ones with the biggest surface of 45 square meter in combination with the lowest monthly rent price of €750 with almost all facilities included. This is the case, except for the number one most preferred alternative which is a middle sized apartment of 35 square meter with a monthly rent price of €750, a separate bedroom, washing machine, dishwasher, luxury design furniture, an insurances package, common area, bike sharing and no leisure facilities. So, from table 12 one can conclude that a middle sized apartment with a monthly rent price of €750 and seven out of eight facilities included is preferred over a 45 square meter apartment with a rent price of €750 and only five out of eight facilities included.

Furthermore it can be seen that the total utility of every lower ranked alternative only make small jumps of 0,1 or 0,2. However, the difference between the total utility of the most preferred alternative and the second most preferred alternative is almost 0,5, implying that alternative 28 from the fractional factorial design is by far the most preferred alternative among young people.

4.3.3 RANDOM PARAMETERS MODEL

To test for preference heterogeneity in responses, a Random Parameter Logit model, RPL, specification is used in this analysis. The RPL model confirms heterogeneity in respondent's preferences for housing-related and building-related facilities, as reflected in statistically significant standard deviations of the normally distributed random parameters. The RPL model includes only choice-specific attributes, namely: size, price, dwelling division, washing machine, dishwasher, furniture, insurances package, common area, bike sharing, and leisure facilities. A model can be heterogeneous because it can be assumed that people try to avoid complexity in general and therefore make their decision between two alternatives mostly based upon the attributes that are important to them, so not taking into account all attributes (Louviere et al., 2010). In addition, two types of differences across choice makers could be distinguished, namely observable and unobservable differences (Hensher et al., 2005). The observable ones are usually socio-demographics and the unobservable ones are called the random effects; in this case choice-specific attributes. The random coefficients can be given different distributions such as normal, lognormal, triangular, or uniform distribution (Hensher et al., 2005). With the normal distribution, some individuals will have negative parameters and others positive parameters, with the proportion of each group empirically determined by the mean and standard deviation of the distribution (Train, 1998). As Hensher et al. (2005) argue, none of the distributions has all the desirable properties, and the selection of one over another is still an area of current research. Although a normal distribution of the random parameters is the most common assumption.

In a rough way, the standard deviation could be considered as a measure of the extent to which the respondents agree or disagree with each another. A small standard deviation thus suggest that the respondents are in more agreement with one another than would be the case with a larger standard deviation. In addition, the significance of the parameters on the standard deviations of the choice-specific coefficients shows whether taste differences vary significantly across the young people population Hensher et al., 2005).

Table 13 shows both the coefficients gathered from the MNL and from the RPL. In addition, the standard deviation and its significance level are included in table 13. Not unexpectedly, the fixed coefficients of the MNL were consistently smaller than those for the RPL, a result which has been well documented in other applications (Train, 1998). Since the estimated standard deviations of the coefficients for the choice-specific attributes are almost all found to be significant, this would seem to indicate that these parameters do indeed vary considerably in the population. Part of this variation in preferences could perhaps be captured by socio-demographic characteristics of the respondents which are not included in the model. However, in a RPL model of appliance choice, Train (1998) found considerable variation still remained even after including demographic variables. This would suggest that preferences vary considerably more than can be explained by observed characteristics of people. Concrete, the heterogeneity in respondent's preferences is tested for a total of twelve attribute levels; as a result, the choices for nine attributes levels were found to be

significantly heterogeneous. Heterogeneity is confirmed in respondent's preferences for size of 25 square meter, monthly rent prices of both €750 and €850, separate bedroom, washing machine, dishwasher, luxury design furniture, insurances package, and leisure facilities. Respondent's preferences are most heterogeneous for the size of 25 square meter, the price level of €750, the presence of a bedroom, and the presence of a washing machine. This means that the respondent's choices regarding these attributes contain most differences in preferences among the population. The standard deviations of these attribute levels vary from 0,52503 to 0,79272 and are highly significant. These values and their high significance levels indicate that preferences indeed varied in the population for these attribute levels; the relatively large standard deviations represent an important variation in the population.

The heterogeneity in respondent's preferences for size level and price level could be explained by the differences in income among the population, since the three main groups of the research are in different life stages and have to deal with different incomes caused by their profile, varying from student to employee or entrepreneur. Since there may be differences in income, one would expect that the ones with a higher income can afford and therefore prefer more living space. This statement will however be tested in the next section which focuses on the residential preferences of different sub groups.

Overall, the estimates in the RPL model reveal significant standard deviations for the attributes size, price, dwelling division, washing machine, furniture, insurances package, and leisure facilities, thus supporting unconditional unobserved heterogeneity for these attributes.

Although the estimates in table 13 indicate the parameters indeed varied in the population and therefore preferences were heterogeneous, we did not assess to what extent this variation could be explained by individual characteristics of the respondents. Therefore, the next section focuses on the segmentation of different groups varying in socio-demographic characteristics.

Table 13: Random parameters model.

Attribute	Label	MNL coefficients	RPL coefficients	Standard deviation RPL	Hetero-/homogeneous
Sample size N = 513					
Constant		0,26679***	0,15640***	N/A	N/A
Size	25 sqm	-0,64239***	-0,85575***	0,62079***	Heterogeneous
	35 sqm	0,10150***	0,14900***	0,14250	Homogeneous
	45 sqm	0,54089	0,70675	N/A	N/A
Price: monthly all-in rent	€750	0,78178***	1,03848***	0,79272***	Heterogeneous
	€850	0,08318***	0,11975***	0,19711***	Heterogeneous
	€950	-0,86496	-1,15823	N/A	N/A
Dwelling division	Separate bedroom	0,31776***	0,41194***	0,53798***	Heterogeneous
	No separate bedroom	-0,31776	-0,41194	N/A	N/A
Washing machine	Yes	0,32561***	0,42131***	0,52503***	Heterogeneous
	No	-0,32561	-0,42131	N/A	N/A
Dishwasher	Yes	0,12870***	0,17099***	0,29109***	Heterogeneous
	No	-0,12870	-0,17099	N/A	N/A
Furniture	Luxury design furniture	0,02329	0,03143	0,18720***	Heterogeneous
	Simple design furniture	-0,02329	-0,03143	N/A	N/A
Insurances package	Yes	0,08955***	0,11231***	0,13148*	Slightly heterogeneous
	No	-0,08955	-0,11231	N/A	N/A
Common area	Yes	0,01805	0,03580	0,12406	Homogeneous
	No	-0,01805	-0,03580	N/A	N/A
Bike sharing	Yes	0,07608***	0,10173***	0,02962	Homogeneous
	No	-0,07608	-0,10173	N/A	N/A
Leisure facilities	Yes	0,04637**	0,07528***	0,14714*	Slightly heterogeneous
	No	-0,04637	-0,07528	N/A	N/A

Note: ***, **, * → significance at 1%, 5%, 10% level.
N/A = Not Applicable.

4.3.4 MULTINOMIAL LOGIT MODEL - SUBGROUP DIFFERENTIATION

As mentioned, an analysis of different sub groups will provide useful insights into the differences in residential preferences and therefore the nature of heterogeneity can be tested. Since one of the research sub questions is about the residential preferences between different groups of people varying in type group, nationality, household composition, gender, and income, these subgroups will be differentiated. The sub groups are differentiated by filtering the full sample size. The limitation to this methodology however is that this method does not allow the researcher to test statistically whether the differences between the groups are significant. So, the part-worth utilities of the different subgroups only give an indication of the differences in preferences, but cannot be used for testing whether the differences are significant. The model performance of the separate fifteen models is shown in table 14 by presenting the Log Likelihood of the constant only model, the Log Likelihood of the null model, the Log Likelihood of the optimal model and the R-squared.

The part-worth utilities and their associated level of significance of the fifteen different samples can be seen in table 15. In addition, the table shows the sample size, N, of every sub group. In order to have a visualization of the differences in preferences between the groups, the relative importance is calculated based upon the range of each attribute. Table 16 shows the relative importance expressed in percentages for every attribute and every sub group. Finally, figure 16 to figure 20 represent a bar chart of the relative attribute importance. An important note here is that the calculation of the relative importance of the attributes is based upon the range of both the significant and the non-significant part-worth utilities; this means that the figures with the relative importance only provide an indication of the differences in preferences.

Table 14: Model performance separate subgroup models.

Subgroup	Goodness of fit				
	Observations	LL constant only model	LL null model	LL optimal model	R^2
Students	3840	-4142,7213	-4257,2645	-3533,66721	0,1470
Young professionals	1320	-1425,5599	-1463,4347	-1212,86878	0,1492
Expats	996	-1093,1235	-1104,2280	-960,96243	0,1209
Male	3648	-3954,8648	-4044,4012	-3387,58496	0,1434
Female	2508	-2719,9636	-2780,5259	-2342,87639	0,1386
Western	4224	-4600,5436	-4682,9909	-3984,54422	0,1339
Non-Western	1932	-2066,9770	-2141,9362	-1743,46546	0,1565
One-person household	4668	-5041,6457	-5175,2371	-4324,39603	0,1423
Couples	1104	-1201,4265	-1223,9635	-1040,77780	0,1337
Other households	384	-421,8359	-425,7264	-350,10570	0,1700
Income <€1500	3288	-3588,3316	-3645,2827	-3109,65719	0,1334
Income €1500 - €2500	1212	-1316,2162	-1343,6991	-1121,56768	0,1479
Income €2500 - €3500	444	-443,6615	-492,2462	-344,32499	0,2239
Income > €3500	228	-240,7529	-252,7751	-202,30752	0,1597
Income: prefer not to say	984	-1054,5552	-1090,9240	-894,37684	0,1519

As seen in table 14 the Log likelihoods of both the constant only models and the null models are lower compared to the Log likelihoods of the optimal models; this holds for all of the fifteen sub models. This means that the optimal model performs better than the constant only model and the null model. In addition, the lowest Rho-squared is 0,1209 from the expats model and the highest Rho-squared is 0,2239 from the model including people with an income between €2500 and €3500. So, all Rho-squares are higher than 0,1, which is sufficient (Louviere et al., 2010). The NLOGIT outputs of the fifteen subgroup models as well as the run code that is used can be seen in appendix F.

Table 15: Part-worth utilities subgroup differentiation.

		Group			Gender		Nationality		Household			Income				
Attribute	Label	Students	Young professionals	Expats	Male	Female	Western	Non-Western	One-person households	Couples	Other households	Income < €1500	Income €1500-€2500	Income €2500-€3500	Income > €3500	Income: prefer not to say
Sample size		N = 320	N = 110	N = 83	N = 304	N = 209	N = 352	N = 161	N = 389	N = 92	N = 32	N = 274	N = 101	N = 37	N = 19	N = 82
Constant		0,34188***	-0,00297	-0,5975	0,26261***	0,27360***	0,18511***	0,45626***	0,32205***	0,18594***	-0,1639	0,13885	0,18666***	0,99097***	0,74397***	0,43119***
Size	25 sqm	-0,57936***	-0,83195***	-0,7398***	-0,59526***	-0,71254***	-0,63997***	-0,65073***	-0,60639***	-0,72672***	-0,88835***	-0,65578	-0,71864***	-0,72006***	-0,56001***	-0,49649***
	35 sqm	0,05529	0,16023**	0,21236***	0,09769**	0,10755**	0,09247***	0,12037**	0,09637***	0,10875	0,1801	0,13742	0,06379	0,09462	-0,08029	0,0599
	45 sqm	0,52407	0,67172	0,52744	0,49757	0,60499	0,5475	0,53036	0,51002	0,61797	0,70825	0,51836	0,65485	0,62544	0,6403***	0,43659
Price: monthly all-in rent	€750	0,84100***	0,85466***	0,55302***	0,82879***	0,72271***	0,76946***	0,81071***	0,80526***	0,71168***	0,81849***	0,7691	0,65685***	1,12601***	0,89679	0,84794***
	€850	0,10945***	0,03362	0,05471	0,08075**	0,08354*	0,07846**	0,09842*	0,10631***	0,0164	-0,11569	0,04804	0,22316***	0,14781	-0,0107	0,04024
	€950	-0,95045	-0,88828	-0,60773	-0,90954	-0,80625	-0,84792	-0,90913	-0,91157	-0,72808	-0,7028	-0,81714	-0,88001	-1,27382	-0,88609	-0,88818
Dwelling division	Separate bedroom	0,28366***	0,42447***	0,37424***	0,28737***	0,3662***	0,30362***	0,34842***	0,32965***	0,30017***	0,25398***	0,33168	0,30664***	0,26374***	0,27134**	0,36301***
	No separate bedroom	-0,28366	-0,42447	-0,37424	-0,28737	-0,3662	-0,30362	-0,34842	-0,32965	-0,30017	-0,25398	-0,33168	-0,30664	-0,26374	-0,27134	-0,36301
Washing machine	Yes	0,33971***	0,26081***	0,37787***	0,36332***	0,27308***	0,3414***	0,29353***	0,31937***	0,32755***	0,43369***	0,32949	0,37183***	0,17088**	0,28325***	0,35283***
	No	-0,33971	-0,26081	-0,37787	-0,36332	-0,27308	-0,3414	-0,29353	-0,31937	-0,32755	-0,43369	-0,32949	-0,37183	-0,17088	-0,28325	-0,35283
Dishwasher	Yes	0,1109***	0,20782***	0,11634**	0,15803***	0,09248***	0,13586***	0,11678***	0,12763***	0,11947**	0,19965**	0,14464	0,02681	0,12066	0,24872**	0,19019***
	No	-0,1109	-0,20782	-0,11634	-0,15803	-0,09248	-0,13586	-0,11678	-0,12763	-0,11947	-0,19965	-0,14464	-0,02681	-0,12066	-0,24872	-0,19019
Furniture	Luxury design furniture	0,02288	0,00513	0,04429	0,02785	0,01576	0,01967	0,03566	0,03725	-0,09461**	0,22623**	0,05617	0,05747	0,07257	-0,00622	-0,13469**
	Simple design furniture	-0,02288	-0,00513	-0,04429	-0,02785	-0,01576	-0,01967	-0,03566	-0,03725	0,09461	-0,22623	-0,05617	-0,05747	-0,07257	0,00622	0,13469
Insurances package	Yes	0,11345***	0,09484**	-0,03358	0,08124***	0,10053***	0,08912***	0,09096**	0,09007***	0,08178	0,16393*	0,08759	0,09201	-0,02599	0,15323	0,17754***
	No	-0,11345	-0,09484	0,03358	-0,08124	-0,10053	-0,08912	-0,09096	-0,09007	-0,08178	-0,16393	-0,08759	-0,09201	0,02599	-0,15323	-0,17754
Common area	Yes	0,0293	-0,06661	0,0754	0,02413	0,01061	0,00915	0,03853	0,03166	-0,00176	-0,09729	0,0225	0,04018**	-0,03589	0,1257	-0,01356
	No	-0,0293	0,06661	-0,0754	-0,02413	-0,01061	-0,00915	-0,03853	-0,03166	0,00176	0,09729	-0,0225	-0,04018	0,03589	-0,1257	0,01356
Bike sharing	Yes	0,07421***	0,0224	0,13001**	0,09029***	0,05296	0,05999**	0,1137***	0,08475***	0,08502*	-0,03214	0,05184	0,12413***	0,17768**	0,11843	0,06875
	No	-0,07421	-0,0224	-0,13001	-0,09029	-0,05296	-0,05999	-0,1137	-0,08475	-0,08502	0,03214	-0,05184	-0,12413	-0,17768	-0,11843	-0,06875
Leisure facilities	Yes	0,0737***	0,00855	0,01995	0,04989*	0,04567	0,1776	0,10753***	0,0385	0,06492	0,04358	0,0872	0,08512*	0,12489	0,11473	0,07299
	No	-0,0737	-0,00855	-0,01995	-0,04989	-0,04567	-0,1776	-0,10753	-0,0385	-0,06492	-0,04358	-0,0872	-0,08512	-0,12489	-0,11473	-0,07299

Note: ***, **, * → significance at 1%, 5%, 10% level.

Table 16: Relative importance of subgroups.

	Group			Gender		Nationality		Household			Income				
Attribute	Students	Young professionals	Expats	Male	Female	Western	Non-Western	One-person households	Couples	Other households	Income < €1500	Income €1500 - €2500	Income €2500 - €3500	Income > €3500	Income: prefer not to say
Size	22%	28%	27%	22%	28%	23%	23%	23%	27%	27%	24%	27%	23%	21%	17%
Price	36%	32%	24%	35%	32%	32%	33%	35%	29%	25%	32%	30%	42%	32%	32%
Dwelling division	11%	16%	16%	12%	15%	12%	13%	13%	12%	8%	13%	12%	9%	10%	13%
Washing machine	14%	10%	16%	15%	11%	13%	11%	13%	13%	14%	13%	15%	6%	10%	13%
Dishwasher	4%	8%	5%	6%	4%	5%	4%	5%	5%	7%	6%	1%	4%	9%	7%
Furniture	1%	0%	2%	1%	1%	1%	1%	2%	4%	8%	2%	2%	3%	0%	5%
Insurances package	5%	3%	1%	3%	4%	4%	4%	4%	3%	5%	4%	4%	1%	5%	7%
Common area	1%	2%	3%	1%	0%	0%	1%	1%	0%	3%	1%	2%	1%	4%	1%
Bike sharing	3%	1%	5%	4%	2%	2%	4%	3%	3%	1%	2%	5%	6%	4%	3%
Leisure facilities	3%	0%	1%	2%	2%	7%	4%	2%	3%	1%	4%	3%	4%	4%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

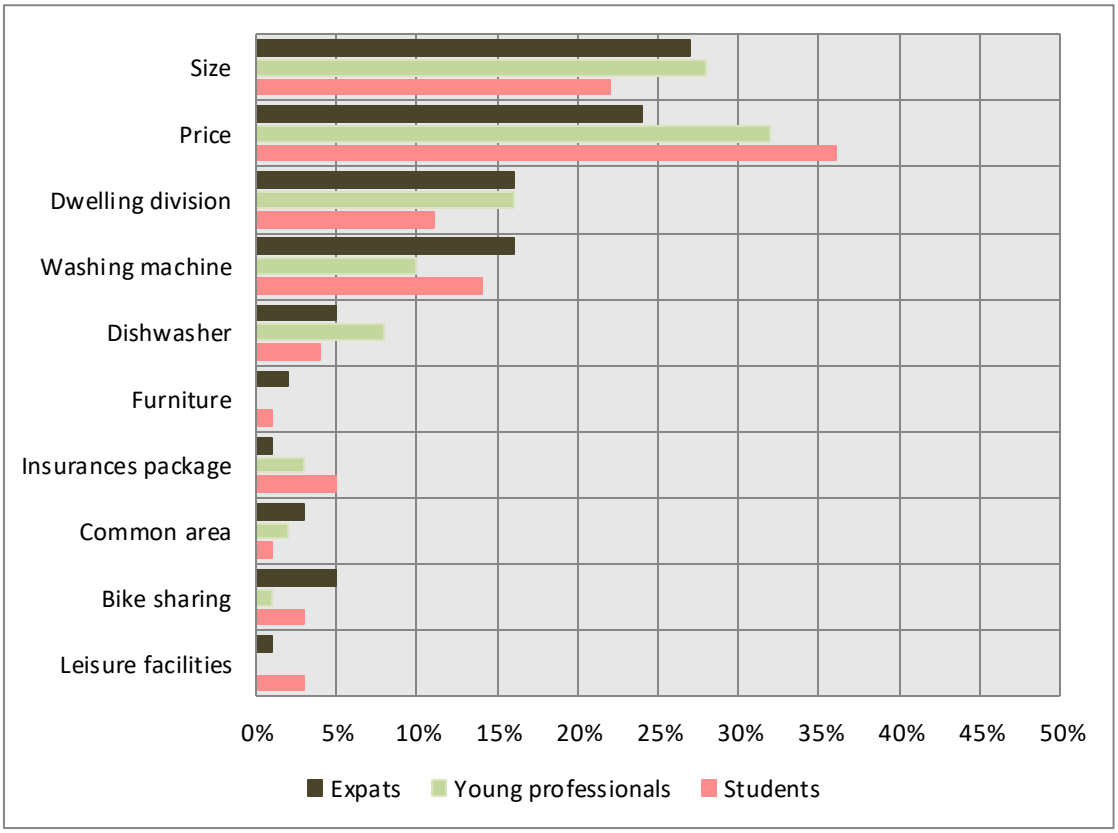

Figure 16: Relative attribute importance of different groups.

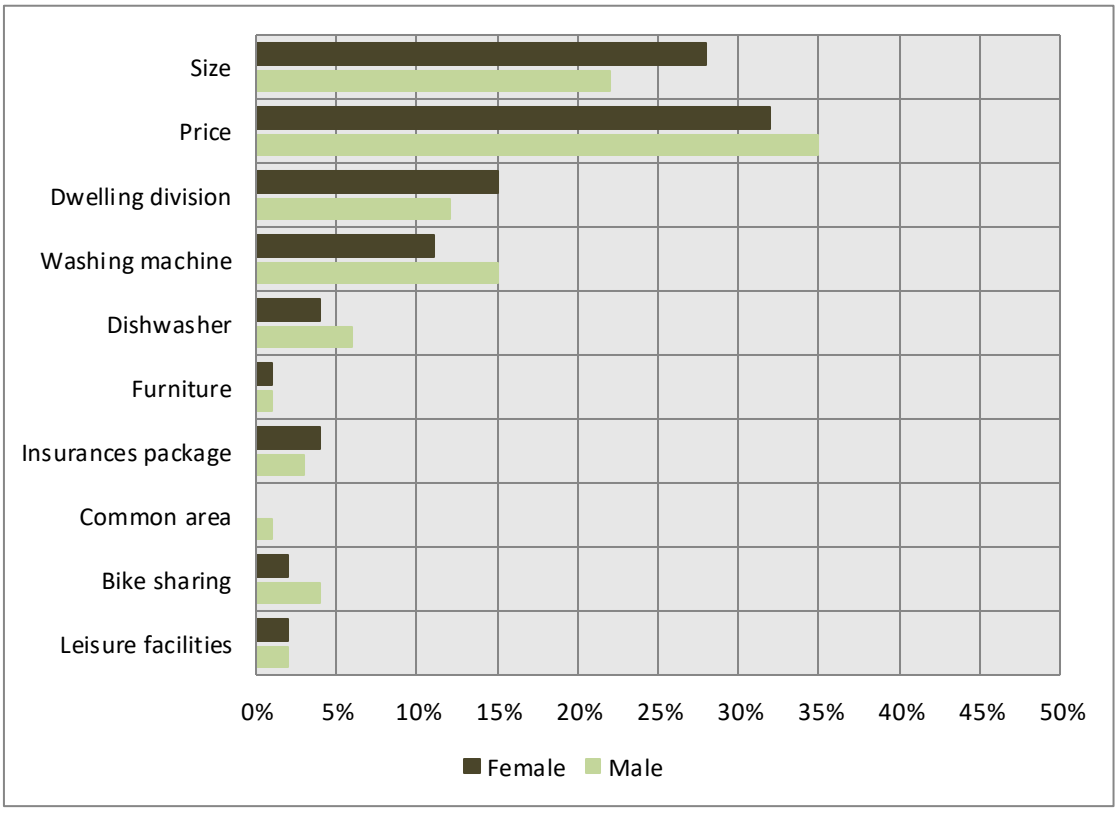

Figure 17: Relative attribute importance of different genders.

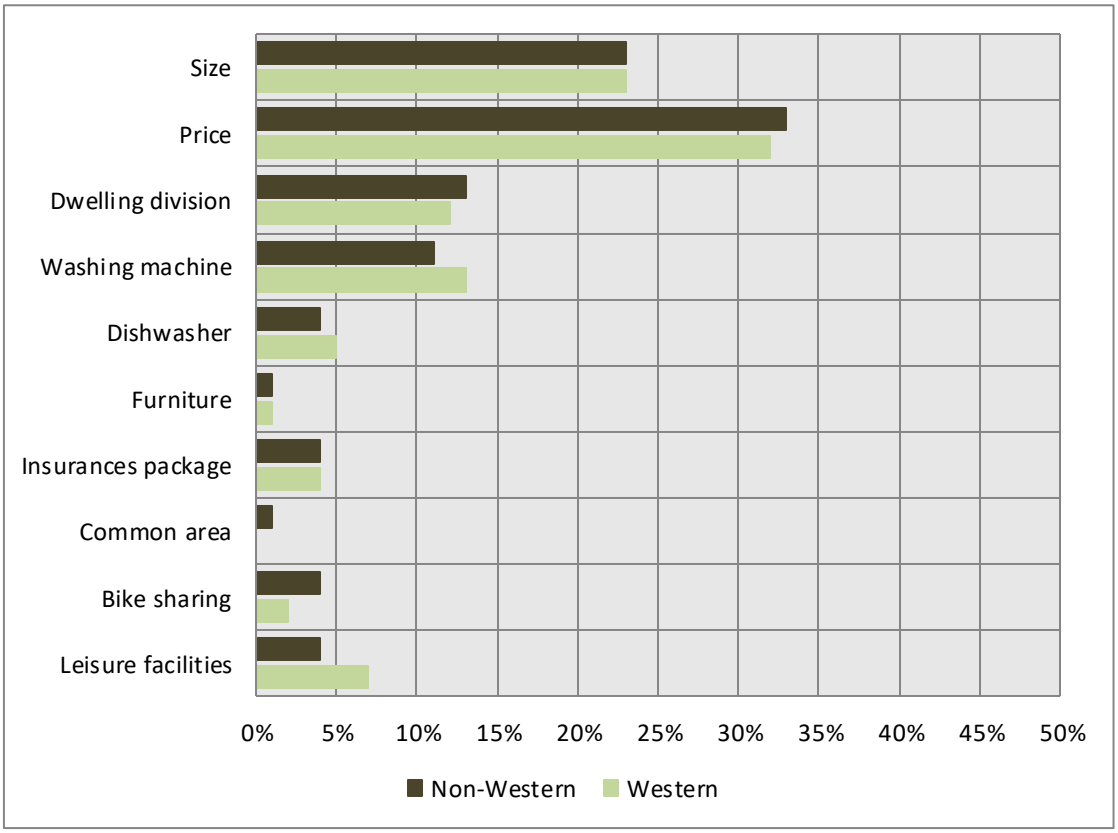

Figure 18: Relative attribute importance of different nationalities.

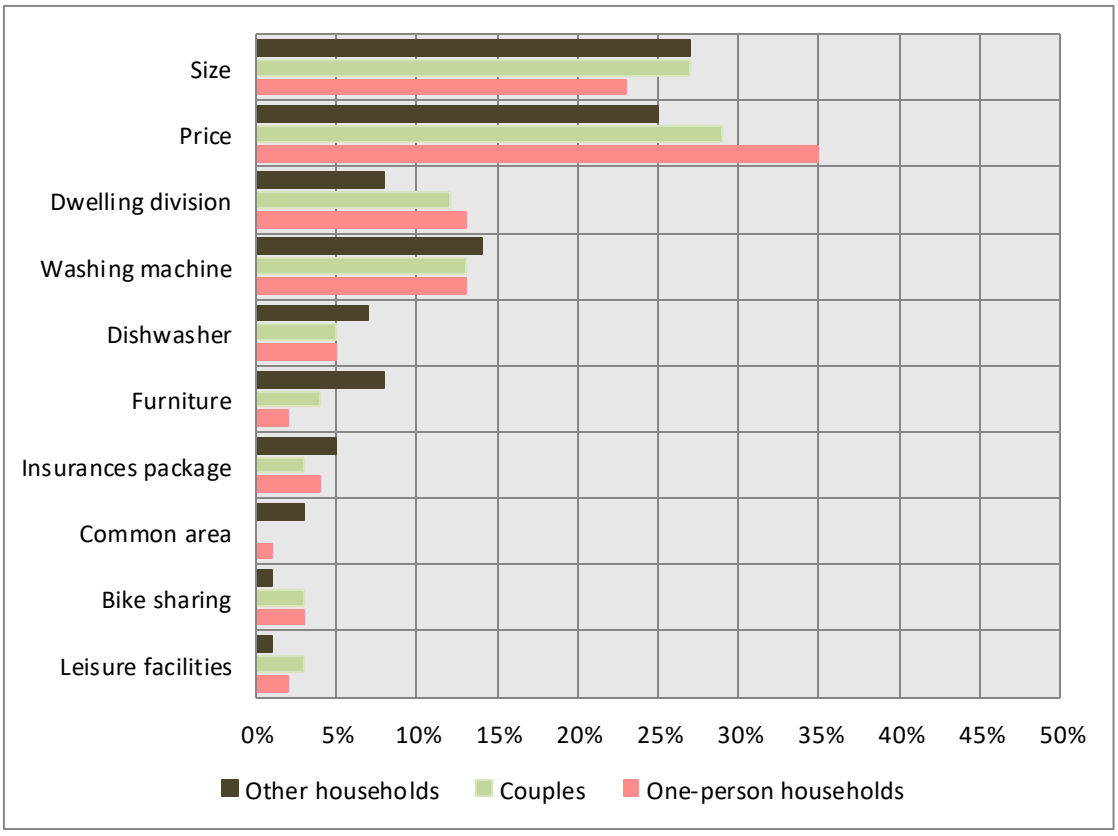

Figure 19: Relative attribute importance of different household groups.

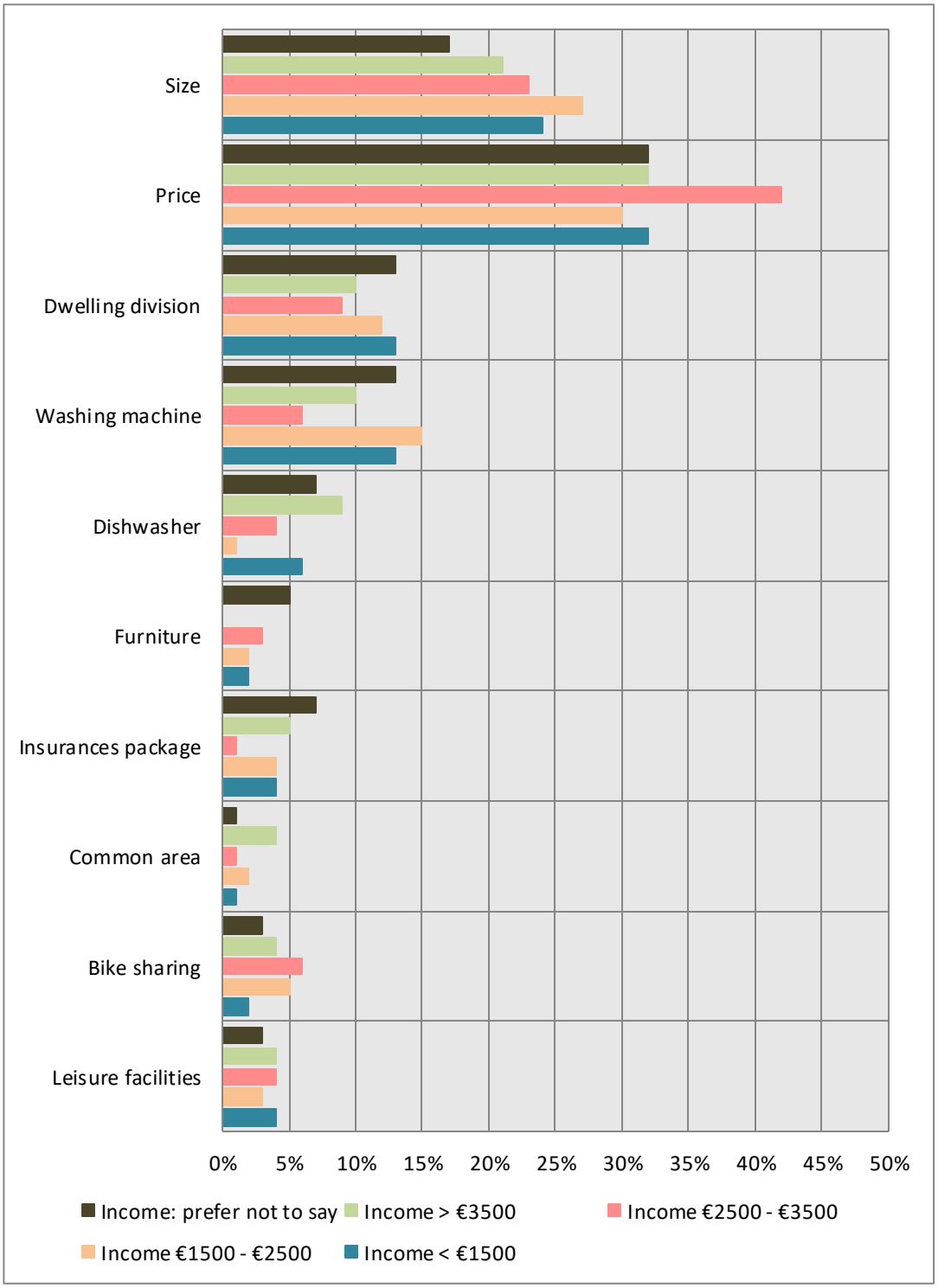

Figure 20: Relative attribute importance of different income groups.

Differences in preferences – group nature

Figure 16 gives an indication of the differences in preferences between students, young professionals, and expats. For all of the groups size and price are the most important attributes; size is less important for students compared to young professionals and expats while price is the most important attribute for students compared to the other groups. This could be explained by the differences in income between the groups; where students usually have a significant lower income than young professionals and expats, they have less to afford and therefore price is more important to them and they have to be satisfied with less space. When looking at the dwelling division, it can be concluded that the presence of a separate bedroom is more important to young professionals and expats compared to students. In addition, a washing machine is more important to expats and students while a dishwasher is more important to young professionals. Finally, the attributes furniture, insurances package, common area, bike sharing, and leisure facilities each have a relative importance of 5 percent or less for all three of the groups, implying that these facilities are less important to students, young professionals and expats.

Differences in preferences – gender

Figure 17 gives an indication of the differences in preferences between male and female. As seen in the figure, size seems to be more important for female while price seems to be more important for male. In addition, the dwelling division, i.e. the presence of a separate bedroom is more important to female compared to male. Given this, it can be concluded that the look and the view of the apartment are more important for women than for men while the price aspect is more important for men. Besides, the presence of facilities seems to be more important to men; the presence of both a washing machine and a dishwasher within the housing unit has a significantly more positive influence on the willingness to move of men than women. The relative importance of the other facilities furniture, insurances package, common area, bike sharing, and leisure facilities is for both men and women smaller than 4 percent, implying that these facilities are less important. The influences of these facilities are distributed quite equal over the two gender groups. The only notable result is that bike sharing seems to be more important to men compared to women.

Differences in preferences – nationality

Figure 18 gives an indication of the differences in preferences between people originally coming from Western countries and people originally coming from non-Western countries. One can conclude that the differences in preferences between people from Western countries and non-Western countries are minimal. The relative importance per attribute of Western and non-Western people only varies between 0 percent and 3 percent. Therefore, one can conclude that there are almost no differences in preferences between people from Western countries and non-Western countries. This conclusion however is not statistically significant but is just an indication.

Differences in preferences – household groups

Figure 19 gives an indication of the differences in preferences between one-person households, couples, and other households. The results show that size is less important for one-person households compared to couples and other households and price is more important for one-person households when making a housing decision. This could be explained by the reasoning that one-person households mostly will have a lower income, since couples and other household types, like families, could have a collective income. Furthermore, the relative importance for the other attributes do not vary that much. The only noteworthy result is that the type of furniture and the presence of a dishwasher seem to be more important for other household types compared to one-person households and couples.

Differences in preferences - income groups

Figure 20 gives an indication of the differences in preferences between people with different monthly incomes, namely < €1500, €1500 - €2500, €2500 - €3500, > €3500 and people who do not want to tell their income. Overall the results show that the relative attribute importance is distributed quite equal over the different income groups. There are however some striking and surprising results. The results for the attribute size generally show that the lower the income, the more important the size, except for the people with an income below €1500. The size however seems to be most important for people with an income between €1500 and €2500 compared to the other income groups. Besides, one would expect that the higher the income, the less important the price. This is however not the case, since the results show that price is by far the most important attribute for the third income group, including people with a monthly net income between €2500 and €3500. Due to the high relative importance for the price attribute of the people with a monthly income between €2500 and €3500 the importance of the attributes dwelling division and washing machine is less compared to the other income groups. These attributes are least important to the people with an income between €2500 and €3500 compared to the other income groups. in addition, the presence of a dishwasher is most important for the people with an income higher than €3500. The importance of the remaining attributes is distributed quite equal, meaning that there are no big differences in preferences regarding these attributes.

4.3.5 WILLINGNESS-TO-PAY

In this section young people's willingness-to-pay (WTP) for each attribute will be estimated. The WTP estimates will be based upon the full sample. The estimated WTP per attribute and per attribute level gives an insight into the amount of money young people are willing to pay in order to obtain benefit from a specific facility within their dwelling or within the building. To estimate the WTP for the attributes, the utility outcomes have to be expressed in euros. Furthermore, the WTP of attribute *j* is calculated by the part-worth utility of attribute *j* divided by the utility parameter of the price attribute; this outcome should be multiplied by the range of the price attribute. In this case the range is €200, since the minimum price was set at €750 and the maximum price was set at €950. Thus, the equation for the estimation of the WTP is:

$$\mathbf{WTP}_j = \frac{\beta(part\text{-}worth\ utility\ j)}{\beta\ (utility\ parameter\ price)} * range\ price\ attribute$$

Table 17 shows the part-worth utilities of the price attribute levels as extracted from the full sample NLOGIT output. In addition, the total utility of the price attribute is calculated, because this value is needed for the calculation of the WTP.

Table 17: Price attribute utilities.

Price attribute	Part-worth utility	Utility parameter
Monthly all-in rent price		1,64674
€750	0,78178	
€850	0,08318	
€950	-0,86496	

Table 18 presents the WTP estimates for each of the attribute levels; based upon the those estimates, the WTP per attribute is estimated. For instance, the WTP for the attribute level separate bedroom 'yes' is €38,59 and the WTP for the attribute level separate bedroom 'no' is - €38,59. Therefore, the WTP for the attribute dwelling division is the sum of the absolute WTP estimates, namely €77,18. This means that when we assume the situation that there is no separate bedroom and this would be improved to the presence of a separate bedroom, young people are willing to pay an amount of €77,18 for this improvement. Additionally, this amount can also be seen as a reasonable return on invested capital for the realization of this improvement. All the other WTP estimates in table 18 should be interpreted in the same way. Finally, figure 17 visualizes the WTP estimates per attribute in a graph; only the WTP estimates for the significant attributes are included in table 18, since WTP estimates of non-significant attributes are found not to be reliable (Hensher et al., 2005). The non-significant WTP estimates in table 18 are highlighted grey, since no reliable conclusions can be drawn from those estimates.

Table 18: Young people's willingness-to-pay for both housing-related and building-related facilities.

Attribute	Level	Part-worth utility	WTP per attribute level	WTP per attribute
Size	25 sqm	-0,64239***	€ -78,02	
	35 sqm	0,1015***	€ 12,33	**€ 143,71**
	45 sqm	0,54089	€ 65,69	
Dwelling division	Separate bedroom	0,31776***	€ 38,59	**€ 77,19**
	No separate bedroom	-0,31776	€ -38,59	
Washing machine	Yes	0,32561***	€ 39,55	**€ 79,09**
	No	-0,32561	€ -39,55	
Dishwasher	Yes	0,12870***	€ 15,63	**€ 31,26**
	No	-0,12870	€ -15,63	
Furniture	Yes	0,02329	€ 2,83	€ 5,66
	No	-0,02329	€ -2,83	
Insurances package	Yes	0,08955***	€ 10,88	**€ 21,75**
	No	-0,08955	€ -10,88	
Common area	Yes	0,01805	€ 2,19	€ 4,38
	No	-0,01805	€ -2,19	
Bike sharing	Yes	0,07608***	€ 9,24	**€ 18,48**
	No	-0,07608	€ -9,24	
Leisure facilities	Yes	0,04637**	€ 5,63	**€ 11,26**
	No	-0,04637	€ -5,63	

Note: ***, **, * → significance at 1%, 5%, 10% level.

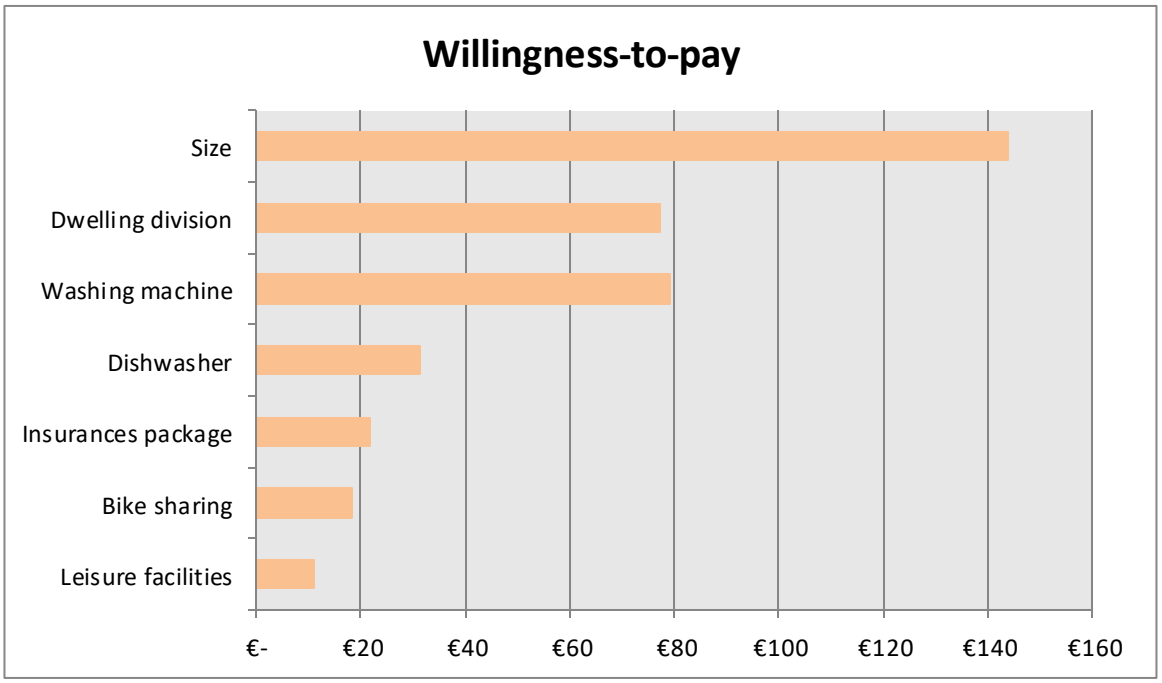

Figure 21: Young people's willingness-to-pay for housing-related and building-related facilities.

As can be interpreted from both table 18 and figure 21, the WTP estimates clearly and logically follow the relative importance estimates. This means that the higher the relative importance of the attribute, the higher the WTP for that attribute. Therefore, one can conclude that young people are willing to pay most for the size of the apartment. In

addition, young people are willing to pay an almost similar amount of money for the dwelling division and for a washing machine, while they are willing to pay relatively less for a dishwasher, insurances package, bike sharing, and leisure facilities compared to the dwelling division and a washing machine. As Turner (2012, 2013, 2014) already found in three studies to the residential preferences of young people, an in-unit washing machine is the most important attribute for them not taking into account size and price and the presence of leisure facilities within the accommodation is not important to them. This result corresponds with the WTP estimates of this study. In addition, an explanation for the relative less importance and therefore a lower WTP for an insurances package and bike sharing could be that these facilities are innovative facilities on the market and not yet applied often in young people accommodation.

Finally, the WTP estimates provide useful information for assessing economic viability of services and setting affordable tariffs for both housing- and building-related facilities. In addition, real estate managers could use the WTP estimates to relate the outcomes to the amounts they are willing to receive for the attributes.

Simulation example

The results of the WTP estimates can help us to determine different combinations of facilities, or facility packages, for young people that can afford a higher monthly rent and would like to upgrade their stay with more facilities.

The suggestion of the previous section that price is less important to young professionals and expats compared to students could be used by real estate developers to optimize the stay of these groups with the inclusion of more facilities within the monthly all-in rent. For instance, if we assume that young professionals and expats are willing to spend €100 more monthly rent than students, real estate developers could improve their stay by providing more facilities. Table 19 shows examples of the combinations of facilities for an amount of €100.

Table 19: Examples of facility packages with a monthly disposable amount of €100.

Monthly disposable amount	Facility package	Total WTP estimate for facility package
€100	Washing machine, insurances package	€ 100,84
€100	Separate bedroom, insurances package	€ 98,94
€100	Washing machine, bike sharing	€ 97,57
€100	Separate bedroom, bike sharing	€ 95,67
€100	Dishwasher, insurances package, bike sharing, leisure facilities	€ 82,75

CHAPTER 5 | PRACTICAL APPLICABILITY

Based upon the results of the different data analyses a decision support tool could be developed by integrating data from young people's residential preferences. Such a tool enables real estate managers, real estate developers, policy makers, the government, and more stakeholders to review and monitor different housing alternatives. The aim of the tool is to improve the understanding and use of the data to support decision makers, stakeholders in this case, by visualizing the probabilities different housing alternatives will be chosen by young people.

The tool is created in Excel and the maximum number of treatment combinations can be generated manually with the use of dropdown menus. So, every attribute level could be chosen from all attributes and could be compared with any other attribute level. This means that the tool could estimate the probabilities for a total of 2,304 different alternatives, based upon eight attributes with eight levels and two attributes with three levels. These 2,304 alternatives could be compared to another 2,304 different alternatives in such a way that the probabilities of both alternatives can be extracted and therefore the two different alternatives can be compared to each other. However, the two alternatives could only be compared with each other in respect with the option 'none of these'; this option is also included in the decision support tool, since it was also part of the survey. This option implies that young people do not want to move and prefer their current housing situation over the housing alternatives as shown in the choice sets. The utility of the not moving option is equal to the coefficient of the constant.

Additionally, the process of the creation of the tool is as follows: firstly, the part-worth utilities from the full sample model are combined into tables, one table for the first alternative, one table for the second alternative, and one table for the option 'none of these'. Secondly, a screen with the alternatives including all attributes and all attribute levels is made with the use of a dropdown menu; from this screen, the user of the tool can manually select every attribute level for all of the attributes. Thirdly, the total utilities of the selected alternatives are calculated with an IF – THEN function. This IF – THEN function automatically fills in the parameter estimates for the attribute levels that are chosen and set the other attribute levels of the same attribute to zero, so that those are not counted in the total utility. Finally, the probabilities are calculated based upon the exponential function of the total utilities and these probabilities are visualized in a graph as well. The probabilities are calculated with the use of equation (4):

$$\mathbf{P(i)} = \frac{Exp(total\ utility\ alternative\ i)}{Exp(total\ utility\ alternative\ i) + Exp(total\ utility\ alternative\ j) + Exp(total\ utility\ 'none\ of\ these')}$$

The probability, P(i), reflects the likelihood that alternative *i* will be chosen in comparison to the other alternatives (Kemperman, 2000). Mathematically, the probability that alternative *i* will be chosen is expressed as a value between 0 and 1. Notationally, the probability of alternative *i* is represented by P(i) and the higher the probability for an alternative, the more

likely young people are willing to choose that alternative compared to the other two alternatives in this case.

In a statistical experiment, the sum of the probabilities for all outcomes is equal to one. This means in this case that the sum of the three possible outcomes (i, j, none of these) is equal to one, or P(i) + P(j) + P(none of these) = 1.

Practically, the tool could be valuable for different kind of stakeholders that have affinity with housing accommodation for young people and could give them useful insights into young people's residential preferences. For instance, real estate developers or governments could use this tool for future (re)development projects. With the use of the tool they are able to see estimate probabilities in order to test the attractiveness of the potential housing alternatives they are willing to offer. In addition, stakeholders are able to extract the probability for the option 'none of these', which gives an indication of the probability that young people will not choose for one of the offered housing alternatives, and thus, are probably not willing to move to one of the offered housing alternatives. An overview of the complete decision support tool can be seen in appendix G.

5.1 SIMULATION EXAMPLE

In order to draw conclusions from the decision support tool it is of interest to see different simulations of alternatives along with their associated probability estimates. A total of four simulations are created as shown in table 20 to table 24. The four different simulations each consist of two alternatives and the option 'none of these'. The attribute levels of the alternatives within the simulations are created randomly, taking into account that different housing alternatives are compared to another, varying in size, price and presence/absence of different facilities.

Table 20: Simulation example 1.

Alternative I	Alternative II	None of these
25 square meter	45 square meter	
Monthly all-in rent price: €750	Monthly all-in rent price: €950	
No separate bedroom	Separate bedroom	
Washing machine	Washing machine	
Dishwasher	Dishwasher	
Simple design furniture	Simple design furniture	
Insurances package	Insurances package	
Common area	Common area	
Bike sharing	Bike sharing	
No leisure facilities	No leisure facilities	
Probability estimates		
32,55%	**38,67%**	**28,78%**

Table 21: Simulation example 2.

Alternative I	Alternative II	None of these
35 square meter	45 square meter	
Monthly all-in rent price: €850	Monthly all-in rent price: €850	
Separate bedroom	Separate bedroom	
Washing machine	No washing machine	
Dishwasher	Dishwasher	
Simple design furniture	Simple design furniture	
Insurances package	Insurances package	
No common area	No common area	
No bike sharing	Bike sharing	
No leisure facilities	No leisure facilities	
Probability estimates		
40,28%	**37,95%**	**21,76%**

Table 22: Simulation example 3.

Alternative I	Alternative II	None of these
25 square meter	35 square meter	
Monthly all-in rent price: €950	Monthly all-in rent price: €950	
No separate bedroom	No separate bedroom	
Washing machine	No washing machine	
Dishwasher	Dishwasher	
Simple design furniture	Simple design furniture	
Insurances package	Insurances package	
No common area	No common area	
No bike sharing	Bike sharing	
No leisure facilities	No leisure facilities	
Probability estimates		
12,79%	**16,34%**	**70,86%**

Table 23: Simulation example 4.

Alternative I	Alternative II	None of these
45 square meter	35 square meter	
Monthly all-in rent price: €850	Monthly all-in rent price: €750	
Separate bedroom	No separate bedroom	
Washing machine	No washing machine	
Dishwasher	Dishwasher	
Simple design furniture	Simple design furniture	
Insurances package	Insurances package	
No common area	No common area	
Bike sharing	Bike sharing	
Leisure facilities	No leisure facilities	
Probability estimates		
62,55%	**20,40%**	**17,05%**

Table 24: Simulation example 5.

Alternative I	Alternative II	None of these
35 square meter	35 square meter	
Monthly all-in rent price: €850	Monthly all-in rent price: €850	
Separate bedroom	No separate bedroom	
Washing machine	No washing machine	
Dishwasher	No dishwasher	
Luxury design furniture	Simple design furniture	
Insurances package	No insurances package	
Common area	No common area	
Bike sharing	No bike sharing	
Leisure facilities	No leisure facilities	
Probability distributions		
65,88%	**8,47%**	**25,65%**

The probabilities in the simulation examples in both table 20 and table 21 are distributed relatively equal over the three alternatives, meaning that there is no strong preference for one of the alternatives. In addition, the probabilities in table 22 and table 23 show a clear preference for one of the alternatives. One conclusion from the simulation examples is that the probabilities are distributed relatively equal in case the two housing alternatives consist of a balanced combination of size and price; this could be explained by the huge importance of these attributes. This means that when for instance the first level of size, 25 square meter, is combined with the first level of price, €750, compared to a housing alternative with a size and price of both level 2, 35 square meter and €850, or both level 3, 45 square meter and €950, the probabilities will be distributed relatively equal over the three alternatives, implying that there is no strong evidence that one of the alternatives will be chosen over the other alternatives. The presence and absence of different housing-related and building-related facilities however influence the probabilities as well, but more restricted than size and price do. For instance, the two housing alternatives in table 20 cost €30 per square meter and €21 per square meter respectively and the two housing alternatives in table 21 cost €24 per square meter and €19 per square meter respectively. As seen, there is no evidential preference for one of these alternatives, since the probabilities of the two alternatives and the 'none of these' option are relatively close to 33 percent.

In addition, the two housing alternatives in table 22 cost €38 per square meter and €27 per square meter respectively, which is higher than the housing alternatives in tables 20 and 21. Since size and price are found to influence the willingness to move of young people most, it does not come as a surprise that the probability for the option 'none of these' is here almost 71 percent. Furthermore, the simulation example presented in table 23 shows a preference for the first alternative with a probability of approximately 63 percent that young people will choose this housing alternative compared to both the other housing alternative and the option 'none of these'. The preferred housing alternative in table 23 costs around €19 per square meter and almost all facilities are present except a common area. So, a dwelling of 45 square meter with a monthly all-in rent price of €850 and almost all facilities included seems

to be an attractive housing alternative for young people in comparison with a 35 square meter studio with a price of €750 and only a few facilities included.

Besides, table 24 shows the probabilities of two housing alternatives with the same size and the same price. However, the first alternative includes all facilities and the second alternative includes none of the facilities. As seen, the first alternative holds the largest probability, namely 66 percent, implying that this alternative is the most preferred one in the comparison setting as presented in table 24. So, another conclusion is that both the housing-related and building-related facilities surely have an impact on young people's willingness to move, which was already found during the interpretation of the part-worth utilities. However, the facilities have a smaller impact than the size and price attributes. Therefore, it could be concluded that if the size attribute level 25 square meter is combined with price attribute level €950 the 'none of these' option will be the dominant one. On the other hand, if size attribute level 45 square meter is combined with price attribute level €750, that housing alternative will hold the largest probability. Only when the size attribute level is compared with the same price attribute level or one level higher or lower, the presence and absence of facilities play an important role in the housing choice behaviour of young people. Finally, the option 'none of these' was already found to be chosen by young people 25 percent of the time, implying that relatively often they are not impressed by the offered housing alternatives. During the simulation examples this becomes visible again.

CHAPTER 6 | CONCLUSIONS & RECOMMENDATIONS

Finally, the conclusions of this research are drawn in this chapter. The overall conclusion with an answer on the main question and the sub questions is given on the first sight. Afterwards, both the societal and scientific relevance of the research are discussed followed by the research limitations and the recommendations for further scientific research.

6.1 CONCLUSION

This research aimed to identify the residential preferences and willingness-to-pay of young people for housing-related and building-related facilities. Young people in this research includes students, young professionals, and expats. The corresponding main research question is:

What are the residential preferences and willingness-to-pay for both housing-related and building-related facilities of young people, including students, young professionals, and expats?

The main research question can be answered based on the following four sub questions:

- What are the residential preferences of young people, including students, young professionals, and expats according to literature?
- What are the differences in residential preferences between different groups of people varying in group nature, nationality, household composition, gender, and income?
- What amounts are young people willing to spend for housing-related and building-related facilities?
- Is there a possibility to develop a decision support tool that gives an insight into the residential preferences of young people and how could this tool be applied in practice?

In order to answer the main question first the four sub questions are answered.

<u>What are the residential preferences of young people, including students, young professionals, and expats according to literature?</u>

Literature shows that young people increasingly prefer housing accommodation that maximizes their comfort and privacy while keeping responsibilities to a minimum level (GMAC, 2016). Since the life of people is most volatile between the late teens and mid-twenties due to the occurrence of many different shifts in activities such as love, work, study, childbearing, etc., the impact on the housing market is huge due to many movements in a short time period; in every life stage people reconsider their housing options and make the decision to stay or to move based upon the following factors: nature of household, housing attributes, macroeconomic factors, living environment, and psychological variables (Wang & Otsuki, 2015; Coolen et al., 2002; Geist, 2008).

Luxurious, high-quality accommodation together with privacy and state-of-the-art amenities and the possibility to create new friendships are very important factors in student's housing choice (La Roche et al., 2010; Unit, 2008; GMAC, 2016). Literature suggest that students are willing to pay more for their housing and associated amenities compared to a few years ago and they prefer monthly all-in rents rather than rents excluding service costs, energy costs, and other additional costs. Consequently, young people prefer nice amenities within the building as well in order to enjoy the luxury and create new social contacts (La Roche et al., 2010; Unit, 2008; GMAC, 2016). The trend is that student living is changing into micro living, which means different groups of urban millennials in one building; this concept is called 'Fuzzy Living'. When looking into the influence of facilities on young people's housing choice, J Turner (2012, 2013) found that the size of a housing unit is very important for young people, even as the presence of a private bath room and a private kitchenette. In addition, both students and young professionals find the presence of an in-unit washing machine an important facility as well. Other facilities as included in different research papers to the residential preferences of young people are a common area, gym, media room, game room, hot tub, pool, and on-site property management (Barnes et al., 2016; Rugg & Quilgars, 2015; Angelo & Rivard, 2003).

What are the differences in residential preferences between different groups of people varying in group nature, nationality, household composition, gender, and income?

An indication of the differences in residential preferences between different sub groups is obtained by separately analysing the data of the sub groups. The different sub groups vary in socio-demographic characteristics and in sample size; more in detail, a distinction is made between groups varying in group nature, nationality, household composition, gender, and income. The sub groups are analysed separately in order to extract the influence of each attribute on the willingness to move of the sub group. The relative importance of every attribute is calculated for the different subgroups in order to get an indication of the differences in preferences. We can however not conclude if the differences between the groups are statistically significant, therefore it only gives an indication.

The results show that for all of the sub groups size and price are most important attributes. Size however seems to be less important for students than for young professionals and expats, while price seems to be more important to students. When looking at the differences between male and female one can conclude that the size and the presence of a separate bedroom is more important to women while the price is more important to men. Given this, it can be concluded that the look and the view of the apartment are more important for women than for men while the price aspect is more important for men. Besides, the presence of facilities seems to be more important to men; the presence of both a washing machine and a dishwasher within the housing unit significantly has a more positive influence on the willingness to move of men compared to women. The third group which is divided into sub groups is nationality; a distinction is made between people from Western countries

and people from non-Western countries. The results show that the relative importance of the attributes are quite similar to each other, implying that there are almost no differences in residential preferences between people from Western countries and people from non-Western countries.

When looking at the differences in preferences between the one-person households, couples, and other households we can conclude that size seems to be less important for one-person households compared to the other two household types and price is more important for one-person households when making a housing decision. This could be explained by the reasoning that one-person households mostly will have a lower income, since couples and other household types, like families, could have a collective income. Furthermore, the relative importance for the other attributes do not vary that much.

Finally, the differences in preferences between different income groups show that the relative attribute importance is distributed quite equal over the different income groups. One would expect that the higher the income, the less important the price. This is however not the case, since the results show that price is by far the most important attribute for the third income group, including people with a monthly net income between €2500 and €3500. In addition, size seems to be the most important attribute to people with an income between €1500 and €2500. Due to the high relative importance for the price attribute of the people with a monthly income between €2500 and €3500 the importance of the attributes dwelling division and washing machine is less compared to the other income group. The importance of the remaining attributes is distributed quite equal.

What amounts are young people willing to spend for housing-related and building-related facilities?

The willingness-to-pay estimates clearly and logically follow the relative importance estimates of the attributes. This means that the higher the relative importance of the attribute, the higher the willingness-to-pay for that attribute. Therefore, one can conclude that young people are willing to pay most for the size of the apartment. In addition, young people want to pay an almost similar amount of money for the dwelling division and for a washing machine, while they are willing to pay relatively less for a dishwasher, insurances package, bike sharing, and leisure facilities compared to the dwelling division and a washing machine. The exact amounts of the willingness-to-pay estimates for the attributes that were found to be statistically significant are:

- Size: €143,71 (for an improvement from 25 square meter to 45 square meter)
- Dwelling division: €77,19
- Washing machine: €79,09
- Dishwasher: €31,26
- Insurances package: €21,75

- Bike sharing: €18,48
- Leisure facilities: €11,26

Is there a possibility to develop a decision support tool that gives an insight into the residential preferences of young people and how could this tool be applied in practice?

Yes, based upon the results of the data analysis it is possible to create a decision support tool. This tool enables policy makers, governments, and real estate agencies to compare different housing alternatives by reviewing the preferences of young people. The attractiveness of self-selected different housing alternatives can be extracted based upon the probability that young people will choose for that alternative. The user of the decision support tool should manually create two alternatives by selecting a level for each attribute. In the case of this research, a total of 2,304 treatment combinations of alternative I could be compared to a total of 2,304 treatments combinations of alternative II. By selecting the attribute levels of interest, the probabilities that young people will choose the alternatives will appear. The probabilities for alternative I, alternative II and the option none of these are shown in the tool, since these three options were also included in the choice sets used in the online survey. In order to draw conclusions from the decision support tool, a total of five simulation examples are executed.

The results of the simulation examples show that the probability for the 'none of these' option is quite high; it was already found that the respondents had selected the option 'none of these' in 25 percent of the time. This implies that they are relatively often not impressed by the offered housing alternatives. Furthermore, another striking outcome of the different simulations is that the probabilities are distributed relatively equal in case there is a balanced combination of the both size and the price level. So, if the size attribute level 25 square meter is combined with price attribute level €950 the 'none of these' option will be the dominant one. On the other hand, if size attribute level 45 square meter is combined with price attribute level €750, that housing alternative will hold the largest probability. Only when the size attribute level is compared with the same price attribute level or one level higher or lower, the presence and absence of facilities play an important role in the housing choice behaviour of young people. Finally, the facilities have a smaller impact than the size and price attributes, which was already found in the estimates the relative attribute importance.

MAIN QUESTION: *What are the residential preferences and willingness-to-pay for both housing-related and building-related facilities of young people, including students, young professionals, and expats?*

The residential preferences and willingness-to-pay of young people for building-related and housing related facilities could be explained as follows: the results of the research show that size and price are the most important factors for young people when making a housing decision. Additionally, young people prefer facilities for private use over facilities for

common use. Generally, young people, including students, young professionals, and expats, relate more importance to the presence of an in-unit washing machine, dishwasher and the presence of a separate bedroom, since these facilities have a more positive influence than the facilities within the building for common use, such as a common area, a bike sharing service, and leisure facilities. When comparing the residential preferences of the three sub groups varying in nature with each other, one can conclude that size and price are the most important attributes for every group. However, size is less important for students compared to young professionals and expats while price is the most important attribute for students compared to the other groups. This could be explained by the differences in income between the groups; where students usually have a significant lower income than young professionals and expats, they have less to afford and therefore price is more important to them and they have to be satisfied with less space. When looking at the dwelling division, it can be concluded that the presence of a separate bedroom is more important to young professionals and expats compared to students. In addition, a washing machine is more important to expats and students while a dishwasher is more important to young professionals. Finally, the attributes furniture, insurances package, common area, bike sharing, and leisure facilities each have a relative importance of 5 percent or less for all three of the groups, implying that these facilities are less important to students, young professionals and expats.

Finally, as mentioned the willingness-to-pay estimates clearly and logically follow the relative importance estimates of the attributes. So, young people are willing to pay more for facilities for private use compared to facilities for common use. The willingness-to-pay amounts expressed in Euros per month for the significant attributes size, dwelling division, washing machine, dishwasher, insurances package, bike sharing, and leisure facilities are respectively €143,71; €77,19; €79,09; €31,26; €21,75; €18,48; and €11,26. These willingness-to-pay estimates are based upon the assumption that the dwelling or building will be improved from the presence of a facility to the absence of a facility. So, it is estimated that young people are willing to pay an amount of €77,19 for an improvement of the dwelling from no separate bedroom to a separate bedroom.

6.2 SOCIETAL RELEVANCE

The research that is carried out could be beneficial for governments and real estate managers and developers. The literature review showed that there is a growing inflow of (international) students, young professionals, and expats; both on a national and on a global scale. Therefore, for this growing group there is demand for housing accommodation that meets their preferences. This is completely in line with the core of this research: estimating young people's residential preferences and willingness-to-pay for housing-related and building-related facilities; so, the research adds valuable knowledge on young people's willingness-to-pay for housing-related and building-related facilities. The results of the research are therefore relevant for society. Additionally, attracting expats and international students to the Netherlands and providing them with proper housing solutions will take care

for economic growth on the one hand and an increase in cultural and societal activities on the other hand.

6.3 SCIENTIFIC RELEVANCE

While reviewing literature in the field of housing choice behaviour and residential preferences of young people it was concluded that there is a gap in the body of literature. A proper amount of literature to the residential preferences of students was found and only a few scientific papers about the residential preferences of young professionals and expats were found. The quantity of literature focusing on the willingness-to-pay for facilities within a dwelling and within a housing accommodation however was found to be scarce. So, where most literature focuses on the residential preferences of different groups of people in the society, this research specifically focuses on the growing group of students, young professionals, and expats, and provides researchers with an indication of their residential preferences and their willingness-to-pay for different kind of facilities corresponding to both the housing unit and the housing accommodation. The results of the research could therefore be valuable for different kind of stakeholders in the field of real estate on the one hand and for researchers on the other hand. Researchers could use this research to further investigate related topics.

6.4 LIMITATIONS

Some limitations that could have effect on the outcome of the research should be addressed. Firstly, a limitation in almost every study to the residential preferences of people is that not all factors that influence the housing choice can be taken into account, due to the complexity. Where several scientific papers found that factors as household nature, housing attributes, living environments, macroeconomics, and psychology affect the housing choice behaviour of people, this research mainly focused on household nature and housing attributes rather than living environments and macroeconomics for instance.

Another limitation of the research that should be addressed is the design of the questionnaire, and in special the choice sets. The respondents were presented with twelve choice sets per questionnaire where every choice set included option A, option B, and the option none of these. The advantage of the inclusion 'none of these' is that the respondents are not forced to choose one of the alternatives. However, the complexity of the alternatives could be considered as quite complex, since every alternative included ten attributes. Since most respondents want to fill in the questionnaire quite fast, it can be the case that respondents made their choice for an alternative based upon only a few attributes instead of all attributes; this has an impact on the final results.

The last limitation is that some of the presented alternatives are practically unreasonable. The 36 treatment combinations of the fractional factorial design are generated based upon scientific algorithms and there are alternatives that will never occur in practice. For example, a housing unit with the largest size (45 square meter) and the highest price (€750) does not exist in Dutch university cities, or only a very small quantity. On the other hand, the opposite

seems to be unreasonable as well: the smallest apartment for the highest price; this could only be the case if all facilities are present and the prices for making use of it are included in the rent. Furthermore, some alternatives out of the fractional factorial design are unreasonable, because real estate agencies have to base the basic rent of their apartments or studios upon aspects such as the size and presence of different facilities. The rent prices have to be calculated based on so called 'rent points' as provided by the 'huurcommissie'.

6.5 RECOMMENDATIONS

With this research, some recommendations are outlined for the stakeholders directly related to the topic to keep investigating in this field. The first recommendation is to investigate the effect of other relevant attributes that are excluded from this research, such as living environments and macroeconomics. Living environments variable can be considered as differences in climate, surrounding area, local materials, etc. Variables corresponding to the group of macroeconomics could be housing policy, income tax, and inflation. When the effects of these variables on young people's willingness to move are investigated, the study could be combined with this research in order to review the impact of all relevant influencers of young people's housing choice behaviour.

Another implication for further research is to execute a latent class analysis as follow-up on the already conducted random parameters logit model to identify unobservable sub groups within the population. A latent class analysis lets us know who is likely to be in a group and how that group's characteristics differ from other groups. So, besides the indication of the differences in preferences in this research, the similarities in preferences could be tested as well using this latent class analysis.

Finally, it could be valuable for real estate developers and other stakeholders in the field of real estate to have a more advanced decision support tool. The tool possibly could be extended with probability estimates separated per sub group varying in socio-demographic characteristics. Furthermore, the tool could be extended with a visualization of the total WTP estimates for every housing alternative. Then, both the probability that a certain housing alternative will be chosen can be extracted as well as the amount every sub group is willing to spend for that certain housing alternative. Such an extended tool could be valuable for stakeholders to improve their market research and to develop attractive accommodations for young people.

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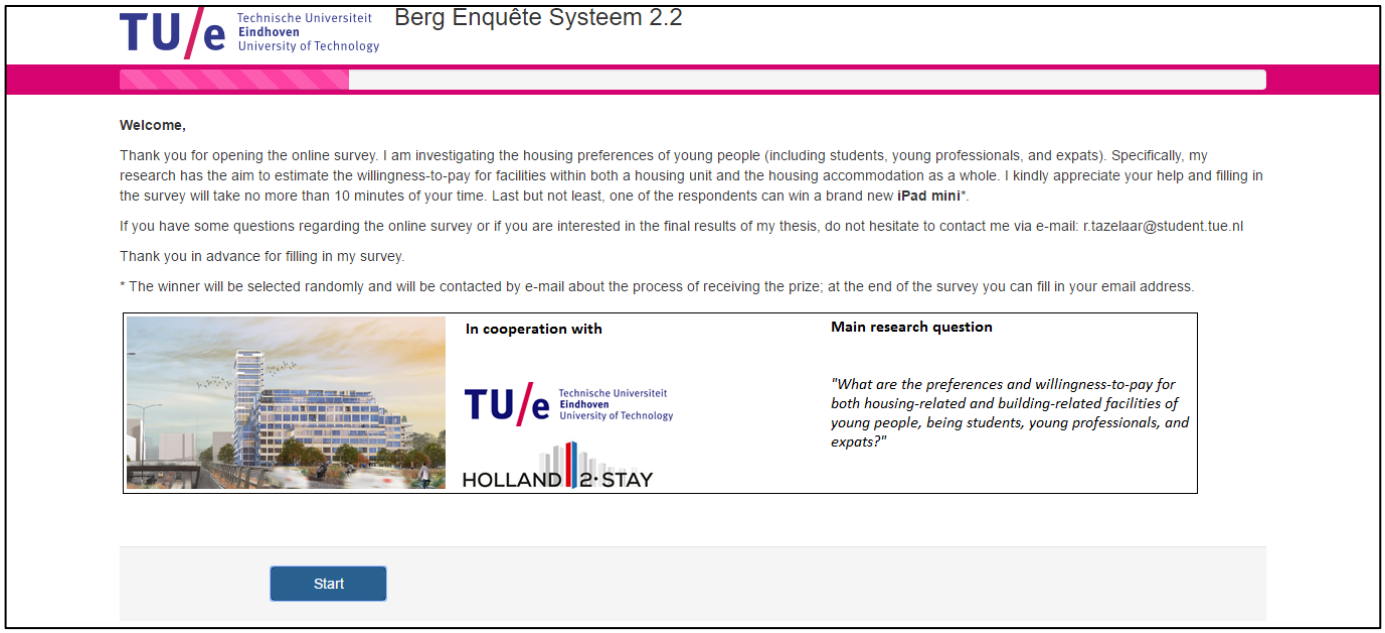
APPENDICES

APPENDIX A – DATA CODING

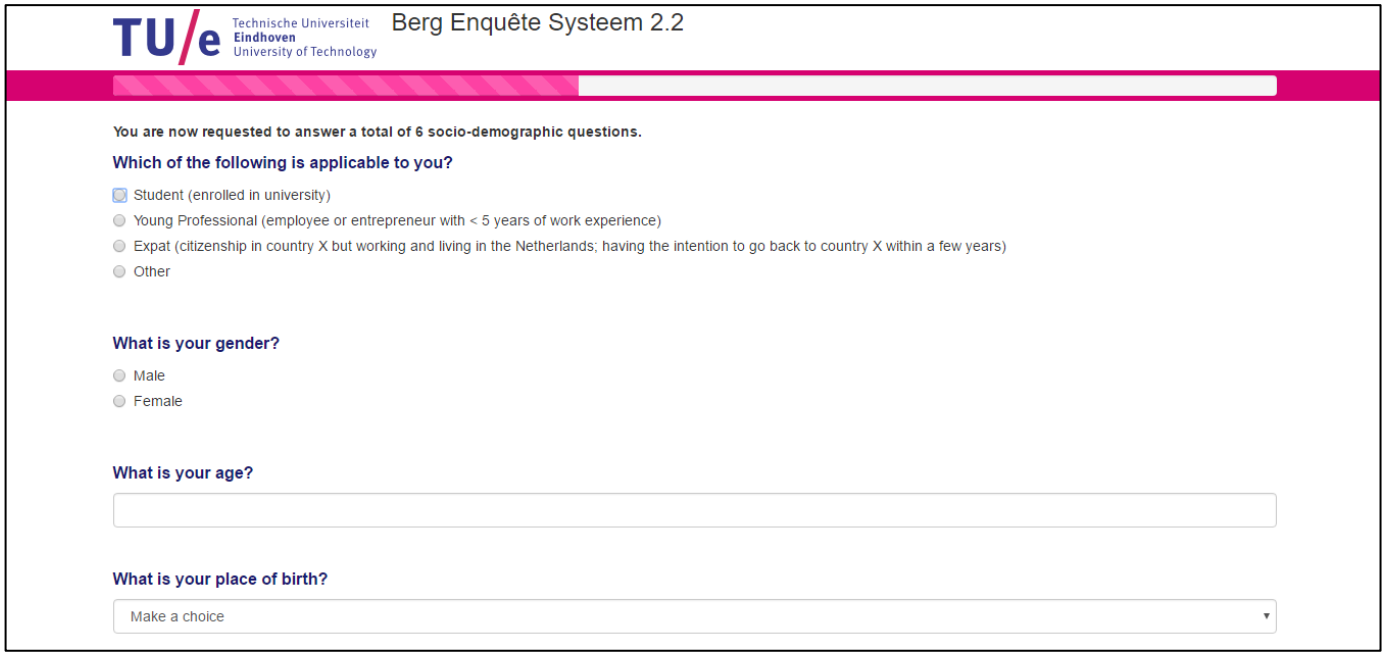
Attribute	Dummy coding			Effect coding			Orthogonal coding		
2 levels									
0	1			1			1		
1 (base)	0			-1			-1		
3 levels									
0	1	0		1	0		1	1	
1	0	1		0	1		0	-2	
2 (base)	0	0		-1	-1		-1	1	
4 levels									
0	1	0	0	1	0	0	3	1	1
1	0	1	0	0	1	0	1	-1	-3
2	0	0	1	0	0	1	-1	-1	3
3 (base)	0	0	0	-1	-1	-1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

APPENDIX B - ONLINE QUESTIONNAIRE

Introduction page



Socio-demographic questions (1/2)



Socio-demographic questions (2/2)

What is your highest level of completed education?

- High school graduate
- Bachelor's degree
- Master's degree
- Doctoral degree

What is your monthly net income?

- < €500
- €500 - €1,500
- €1,500 - €2,500
- €2,500 - €3,500
- > €3,500
- I don't know / I prefer not to say

Previous Next

Questions regarding current living situation (1/2)

TU/e Technische Universiteit Eindhoven University of Technology Berg Enquête Systeem 2.2

You are now requested to answer a total of 4 questions about your current living situation.

What is your household composition?

- One-person household
- Couple without children
- Couple with children
- I am living with my parents
- Other

What type of residence do you currently live in?

- Room with shared facilities
- Self-contained studio
- Apartment
- Terraced house
- Detached house

Questions regarding current living situation (2/2)

What is the size of the residence you currently live in?

- < 15 square meter
- 15 - 24 square meter
- 25 - 34 square meter
- 35 - 44 square meter
- > 45 square meter

What is the monthly all-in rent price (including basic rent, energy costs and service costs and excluding housing allowance) of the residence you currently live in?

- < €500
- €500 - €649
- €650 - €799
- €800 - €949
- > €950
- I do not rent a residence; I live in an owner-occupied residence

Previous Next

Example choice set and explanation of attributes

Now that you have completed the multiple choice questions, you will be presented with a total of 12 choice sets, each consisting of 2 different housing options and an option 'none of these', from which you are requested to select the option that corresponds your preferences. In order to see the explanation per attribute, you can drag your mouse over the dashed lines.

Example choice set

Specifications		Option A	Option B	None of these
Housing characteristics	Size	25 sqm	35 sqm	
	Price: monthly all-in rent	€ 850	€ 850	
	Residence division	No separate bedroom	Separate bedroom	
Housing-related facilities	Washing machine	No	Yes	
	Dishwasher	Yes	No	
	Furniture	Simple design furniture	Luxury design furniture	
	Insurances package	No	Yes	
Building-related facilities	Common area	Yes	No	
	Bike sharing including service	No	Yes	
	Leisure facilities	Yes	No	
Your choice		O	X	O

Note: all properties as included in the choice sets are self-contained and fully furnished, containing a complete furniture and inventory for daily live use. Additionally, all residences are available for both single use as for couples.

You will now be presented with a total of 12 choice sets. Again, you are requested to select the option that corresponds with your preferences. Good luck.

Choice sets (*12)

TU/e Technische Universiteit Eindhoven University of Technology Berg Enquête Systeem 2.2

Please select the option that corresponds with your preferences. In case none of the options matches your preferences, please select the option 'none of these'.

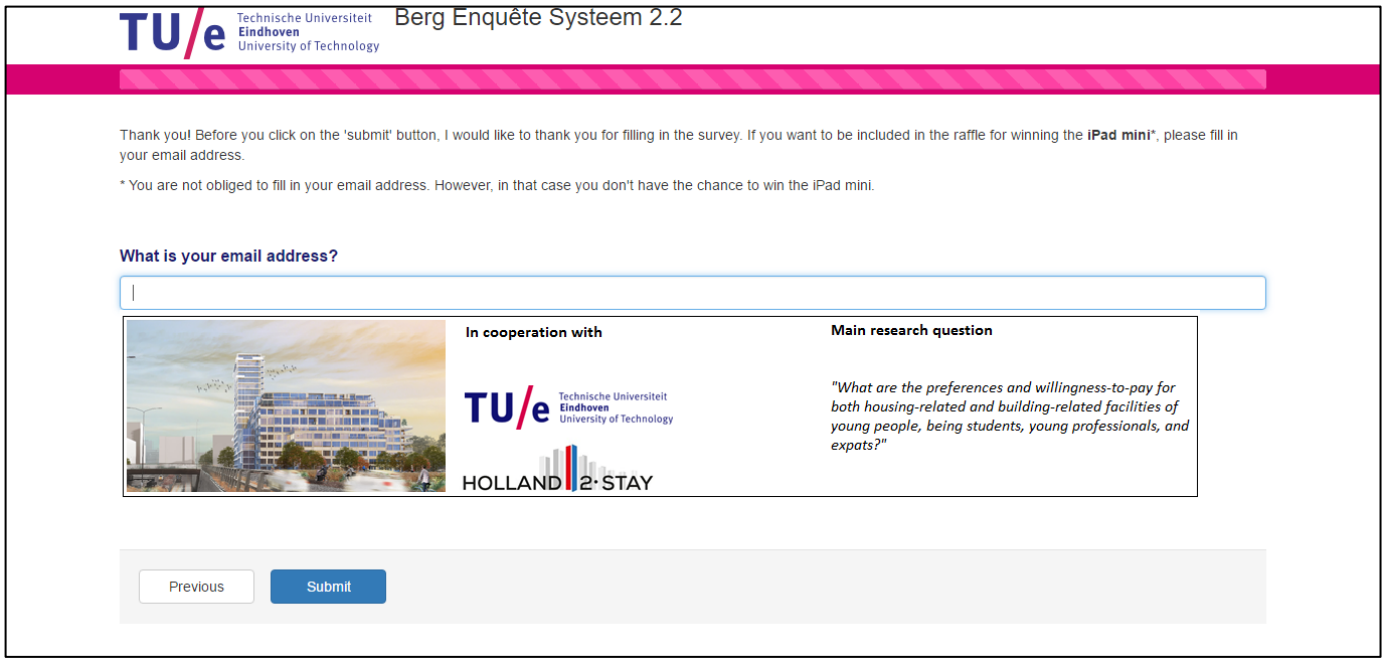
Specifications		Option A	Option B	None of these
Housing characteristics	Size	25 sqm	35 sqm	
	Price: monthly all-in rent	€ 950	€ 950	
	Residence division	No separate bedroom	Separate bedroom	
Housing-related facilities	Washing machine	No	Yes	
	Dishwasher	No	No	
	Furniture	Simple design furniture	Simple design furniture	
	Insurances package	Yes	No	
Building-related facilities	Common area	No	No	
	Bike sharing including service	No	Yes	
	Leisure facilities	No	Yes	
Your choice		☑	○	○

Note: all properties as included in the choice sets are self-contained and fully furnished, containing a complete furniture and inventory for daily live use. Additionally, all residences are available for both single use as for couples.

By clicking on next, the next choice set will be presented.

Previous Next

End page


Technische Universiteit Eindhoven University of Technology
Berg Enquête Systeem 2.2
Thank you! Before you click on the 'submit' button, I would like to thank you for filling in the survey. If you want to be included in the raffle for winning the iPad mini*, please fill in your email address.
* You are not obliged to fill in your email address. However, in that case you don't have the chance to win the iPad mini.
What is your email address?
In cooperation with
Technische Universiteit Eindhoven University of Technology
HOLLAND 2 STAY
Main research question
"What are the preferences and willingness-to-pay for both housing-related and building-related facilities of young people, being students, young professionals, and expats?"
Previous
Submit

APPENDIX C – DESCRIPTIVE STATISTICS

As seen in figure A , people from all over the world filled in the questionnaire. However, most respondents' nationality is European Union or Asia.

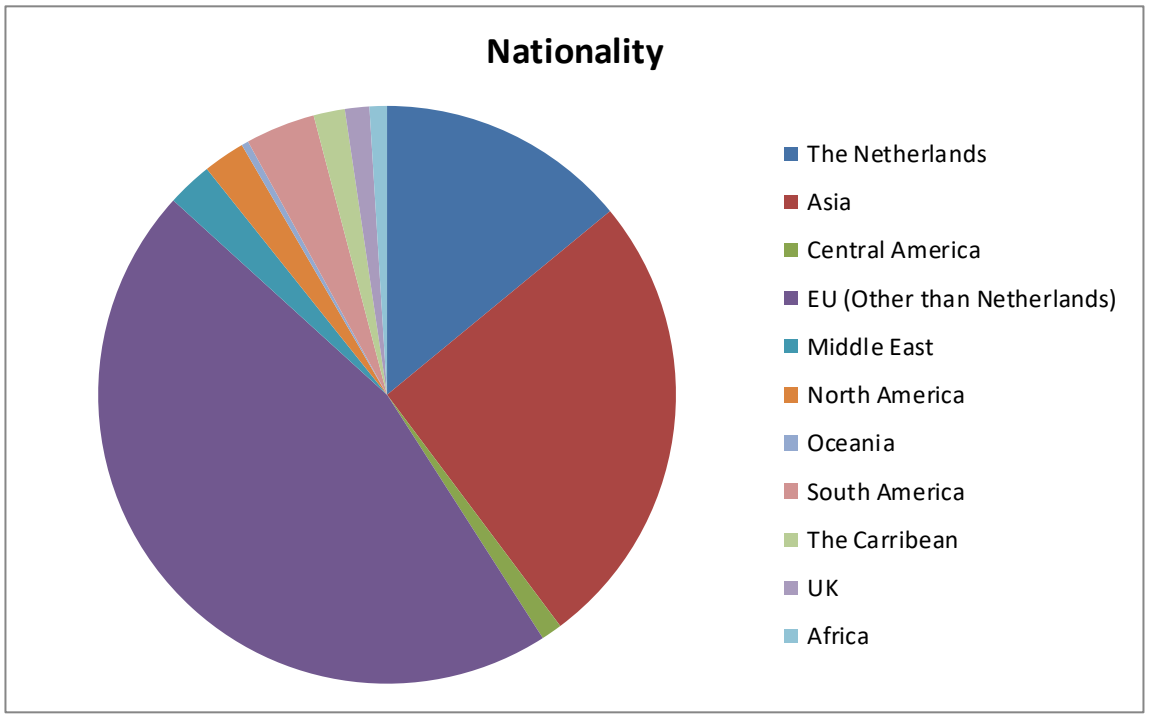


Figure A: Nationality division of the respondents.

In addition, the respondents were asked about both their monthly net income and their highest level of completed education. The descriptive statistics of these questions are represented in both figure B and figure C.

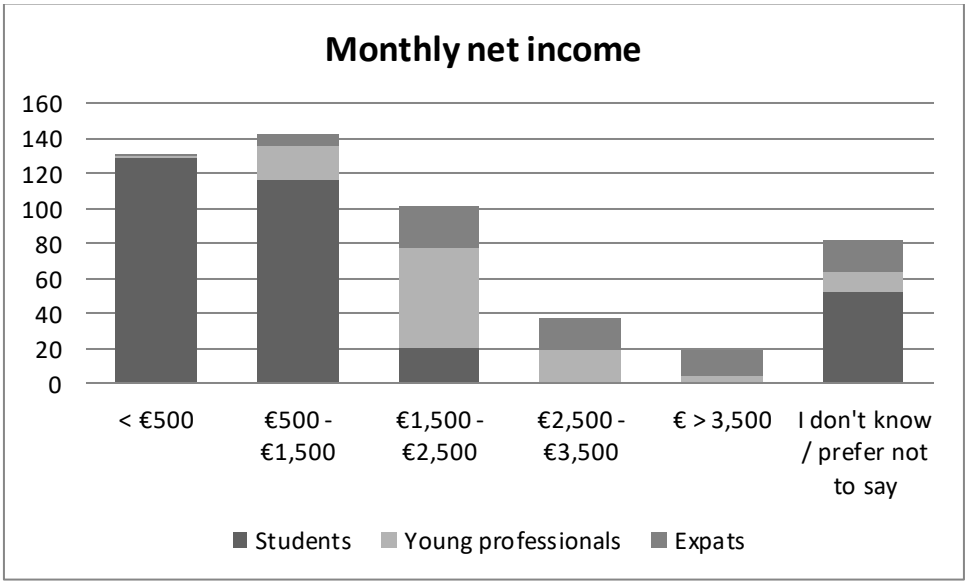


Figure B: Monthly net income of the respondents.

As seen in figure appendix D, most of the respondents have a monthly net income smaller than €2,500 and the lower income levels, < €500 and €500 - €1,500, almost fully consist of students. Additionally, a proper amount of respondents prefer not to say what their income is or don't know it.

Finally, the highest level of completed education of the respondents vary across high school graduates, bachelor degrees and master degrees; only a few respondents have a doctoral degree.

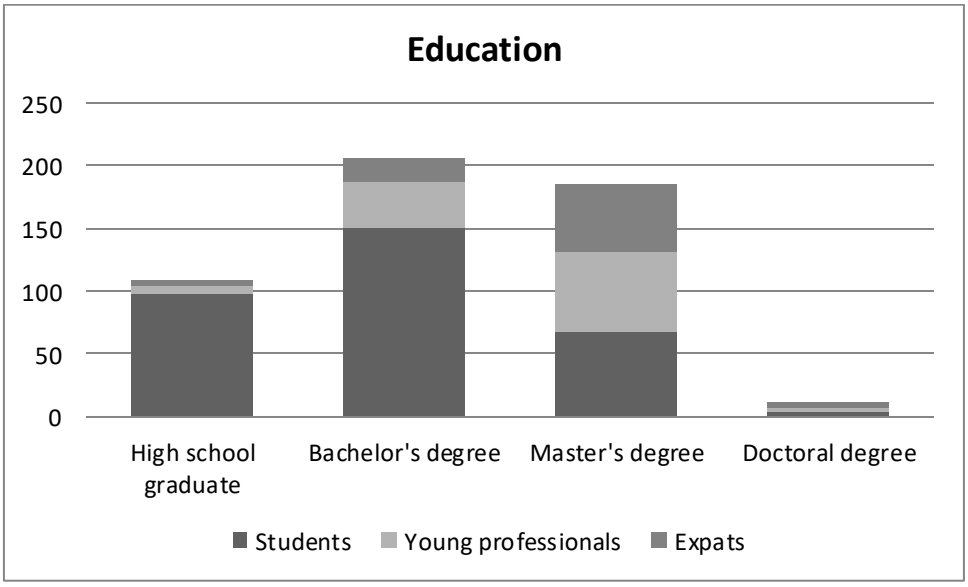


Figure C: Education level of the respondents.

Besides the socio-demographics of the respondents, the questionnaire also contained questions regarding the current living situation, including questions about the household composition and the type, size, and price of the current dwelling. The response on these questions are represented in a dashboard as can be seen in figure D.

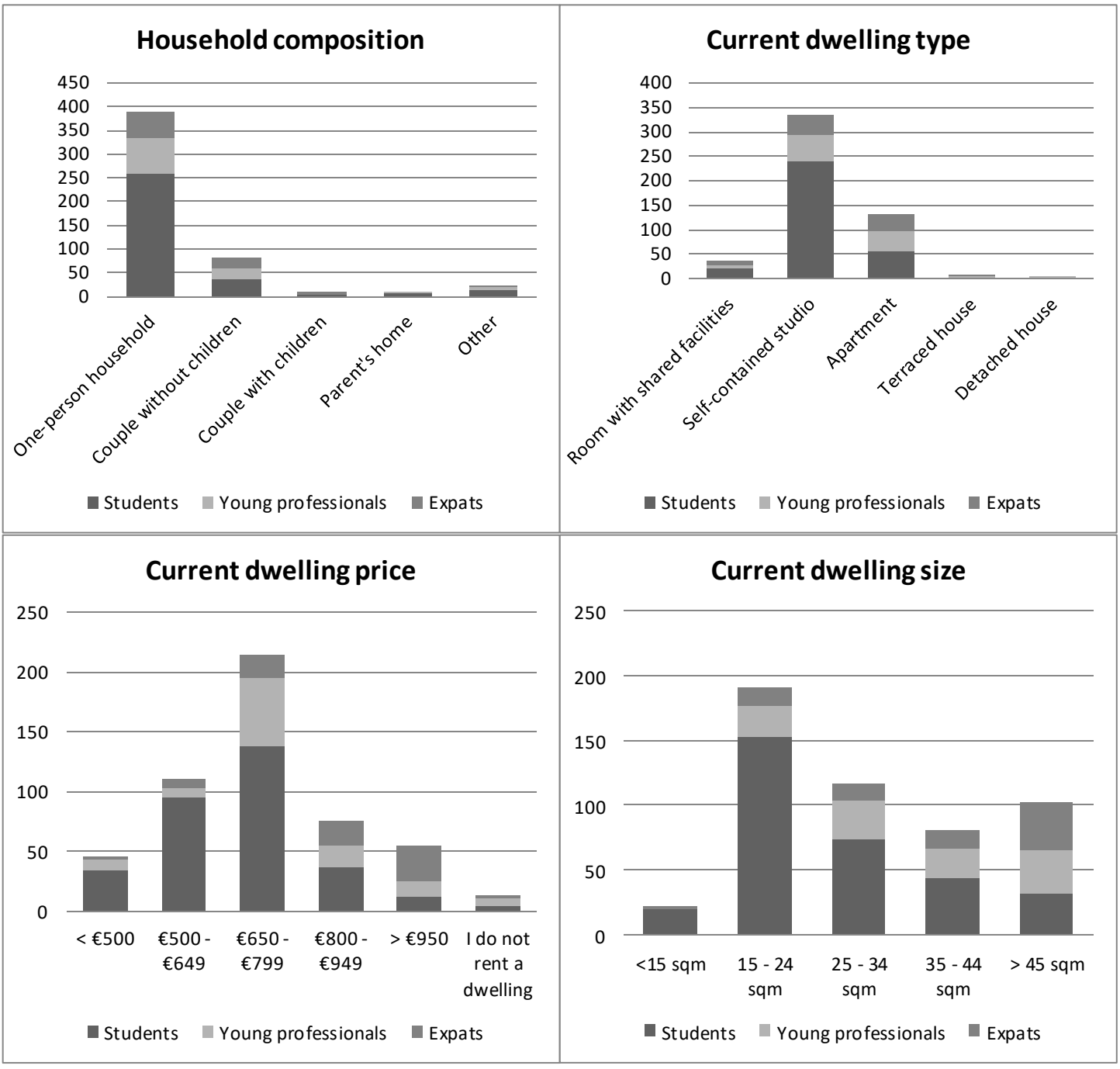


Figure D: Dashboard with information about the current living situation of the respondents.

Figure D shows that most of the respondents are one-person households living in a self-contained studio. Additionally, most of the respondents currently live in a housing unit with

a surface between 15 and 24 square meter. This is quite small and could be explained by the fact that more than a half of the respondents are student and normally have less to spend.

APPENDIX D – EFFECT CODING DATA

Variable	Level	Effect coding			
Main survey - questions					
Group	Young professionals	1	0		
	Expats	0	1		
	Students	-1	-1		
Gender	Male	1			
	Female	-1			
Age	18 – 22 years old	1	0	0	
	23 – 27 years old	0	1	0	
	28 – 32 years old	0	0	1	
	> 32 years old	-1	-1	-1	
Education	High school graduate	1	0	0	
	Bachelor's degree	0	1	0	
	Master's degree	0	0	1	
	Doctoral degree	-1	-1	-1	
Nationality	Western	1			
	Non-Western	-1			
Income	< €1,500	1	0	0	0
	€1,500 - €2,500	0	1	0	0
	€2,500 - €3,500	0	0	1	0
	> €3,500	0	0	0	1
	Prefer not to say	-1	-1	-1	-1
Household composition	One-person household	1	0		
	Couple	0	1		
	Other	-1	-1		
Type current dwelling	Room with shared facilities	1	0	0	
	Self-contained studio	0	1	0	
	Apartment	0	0	1	
	House	-1	-1	-1	
Size current dwelling	< 25 square meter	1	0	0	
	25 – 34 square meter	0	1	0	
	35 – 45 square meter	0	0	1	
	> 45 square meter	-1	-1	-1	
Price current dwelling	< €650	1	0	0	0
	€ 650 - €799	0	1	0	0
	€800 - €950	0	0	1	0
	> €950	0	0	0	1
	I do not rent a residence	-1	-1	-1	-1
Sub survey – choice sets					
WAS – DIS – INS – COM – BIK - LEI	Yes	1			
	No	-1			
DWE	Separate bedroom	1			
	No separate bedroom	-1			
FUR	Luxury design furniture	1			
	Simple design furniture	-1			
SIZ	25 sqm	1	0		
	35 sqm	0	1		
	45 sqm	-1	-1		
PRI	€750	1	0		
	€850	0	1		
	€950	-1	-1		

APPENDIX E – NLOGIT INPUT & OUTPUT ALL RESPONDENTS MODEL

Code model including all respondents

```
RPLOGIT
;Lhs=Choice
;CHOICES=PA,PB,None
;Rhs=Const,SIZ1,SIZ2,PRI1,PRI2,DWE,WAS,DIS,FUR,INS,COM,BIK,LEI
;FCN=SIZ1(N),SIZ2(N),PRI1(N),PRI2(N),DWE(N),WAS(N),DIS(N),FUR(N),INS(N),COM
(N),BIK(N),LEI(N)
;pds=pds
;alg=bfgs
;halton
;pts=1000
$
```

Output model including all respondents

```
--------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -5741.30397
Estimation based on N =   6156, K =  13
Inf.Cr.AIC  =  11508.6 AIC/N =    1.869
Model estimated: Aug 17, 2017, 11:06:46
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -6674.9026  .1399 .1381
Response data are given as ind. choices
Number of obs.=  6156, skipped    0 obs
--------+-----------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------------
    SIZ1|    -.64239***      .03183   -20.18  .0000     -.70478   -.58000
    SIZ2|     .10150***      .02919     3.48  .0005      .04428    .15872
    PRI1|     .78178***      .02938    26.61  .0000      .72421    .83936
    PRI2|     .08318***      .02876     2.89  .0038      .02682    .13954
     DWE|     .31776***      .02100    15.13  .0000      .27660    .35892
     WAS|     .32561***      .02099    15.51  .0000      .28447    .36674
     DIS|     .12870***      .02073     6.21  .0000      .08807    .16933
     FUR|     .02329         .02059     1.13  .2581     -.01707    .06365
     INS|     .08955***      .02068     4.33  .0000      .04901    .13008
     COM|     .01805         .02066      .87  .3823     -.02245    .05855
     BIK|     .07608***      .02068     3.68  .0002      .03555    .11660
     LEI|     .04637**       .02063     2.25  .0246      .00594    .08680
   CONST|     .26679***      .03093     8.63  .0000      .20618    .32741
--------+-----------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
--------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
Random Parameters Logit Model
Dependent variable                CHOICE
Log likelihood function     -5494.27481
Restricted log likelihood   -6763.05725
Chi squared [  25 d.f.]      2537.56489
Significance level               .00000
McFadden Pseudo R-squared      .1876049
Estimation based on N =   6156, K =  25
Inf.Cr.AIC  =  11038.5 AIC/N =    1.793
Model estimated: Aug 17, 2017, 13:03:10
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
No coefficients -6763.0572  .1876 .1860
Constants only  -6674.9026  .1769 .1752
At start values -5741.3040  .0430 .0411
Response data are given as ind. choices
Replications for simulated probs. =1000
Used Halton sequences in simulations.
RPL model with panel has     513 groups
Variable number of obs./group =PDS
Number of obs.=  6156, skipped    0 obs
--------+---------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*          Interval
--------+---------------------------------------------------------------------
        |Random parameters in utility functions
    SIZ1|    -.85575***      .05008   -17.09  .0000     -.95390   -.75760
    SIZ2|     .14900***      .03642     4.09  .0000      .07762    .22038
    PRI1|    1.03848***      .05444    19.08  .0000      .93178   1.14518
    PRI2|     .11975***      .03650     3.28  .0010      .04822    .19129
     DWE|     .41194***      .03593    11.47  .0000      .34152    .48236
     WAS|     .42131***      .03537    11.91  .0000      .35199    .49062
     DIS|     .17099***      .02889     5.92  .0000      .11436    .22762
     FUR|     .03143         .02675     1.17  .2401     -.02101    .08386
     INS|     .11231***      .02625     4.28  .0000      .06086    .16376
     COM|     .03580         .02612     1.37  .1704     -.01539    .08699
     BIK|     .10173***      .02565     3.97  .0001      .05145    .15200
     LEI|     .07528***      .02638     2.85  .0043      .02359    .12698
        |Nonrandom parameters in utility functions
   CONST|     .15640***      .03559     4.39  .0000      .08664    .22615
        |Distns. of RPs. Std.Devs or limits of triangular
  NsSIZ1|     .62079***      .05326    11.66  .0000      .51641    .72518
  NsSIZ2|     .14250         .11207     1.27  .2035     -.07715    .36215
  NsPRI1|     .79727***      .05529    14.42  .0000      .68890    .90565
  NsPRI2|     .19711**       .08853     2.23  .0260      .02359    .37062
   NsDWE|     .53798***      .04102    13.11  .0000      .45758    .61839
   NsWAS|     .52503***      .04139    12.69  .0000      .44391    .60615
   NsDIS|     .29109***      .04692     6.20  .0000      .19913    .38305
   NsFUR|     .18720***      .06169     3.03  .0024      .06630    .30810
   NsINS|     .13148*        .07264     1.81  .0703     -.01090    .27386
   NsCOM|     .12406         .08055     1.54  .1235     -.03380    .28193
   NsBIK|     .02962         .09388      .32  .7523     -.15437    .21362
   NsLEI|     .14714*        .08259     1.78  .0748     -.01473    .30901
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

APPENDIX F – NLOGIT INPUT & OUTPUT SUBGROUP DIFFERENTIATION

Code – all models

```
RPLOGIT
;Lhs=Choice
;CHOICES=PA,PB,None
;Rhs=Const,SIZ1,SIZ2,PRI1,PRI2,DWE,WAS,DIS,FUR,INS,COM,BIK,LEI
;FCN=SIZ1(N),SIZ2(N),PRI1(N),PRI2(N),DWE(N),WAS(N),DIS(N),FUR(N),INS(N),COM
(N),BIK(N),LEI(N)
;pds=pds
;alg=bfgs
;halton
;pts=1000
$
```

Output – students

```
--------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable               Choice
Log likelihood function     -3533.66721
Estimation based on N =   3840, K =  13
Inf.Cr.AIC  =   7093.3 AIC/N =    1.847
Model estimated: Jul 29, 2017, 09:37:34
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -4142.7213  .1470 .1442
Response data are given as ind. choices
Number of obs.=  3840, skipped    0 obs
--------+-----------------------------------------------------------------
        |                Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------
    SIZ1|    -.57936***      .04017   -14.42  .0000     -.65809   -.50063
    SIZ2|     .05529         .03727     1.48  .1379     -.01776    .12835
    PRI1|     .84100***      .03762    22.35  .0000      .76726    .91474
    PRI2|     .10945***      .03638     3.01  .0026      .03814    .18075
     DWE|     .28366***      .02649    10.71  .0000      .23174    .33559
     WAS|     .33971***      .02674    12.70  .0000      .28729    .39213
     DIS|     .11090***      .02619     4.24  .0000      .05958    .16223
     FUR|     .02288         .02626      .87  .3836     -.02859    .07434
     INS|     .11345***      .02630     4.31  .0000      .06190    .16500
     COM|     .02930         .02633     1.11  .2659     -.02232    .08091
     BIK|     .07421***      .02616     2.84  .0046      .02294    .12547
     LEI|     .07370***      .02616     2.82  .0049      .02242    .12498
   CONST|     .34188***      .03985     8.58  .0000      .26377    .41998
--------+-----------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
--------------------------------------------------------------------------
```

Output – young professionals

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -1212.86878
Estimation based on N =   1320, K =  13
Inf.Cr.AIC  =   2451.7 AIC/N =    1.857
Model estimated: Jul 29, 2017, 09:40:29
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -1425.5599  .1492 .1411
Response data are given as ind. choices
Number of obs.=  1320, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.83195***      .07248   -11.48  .0000     -.97402   -.68989
    SIZ2|     .16023**       .06419     2.50  .0126      .03442    .28603
    PRI1|     .85466***      .06493    13.16  .0000      .72740    .98191
    PRI2|     .03362         .06431      .52  .6011     -.09243    .15967
     DWE|     .42447***      .04752     8.93  .0000      .33133    .51761
     WAS|     .26081***      .04640     5.62  .0000      .16987    .35174
     DIS|     .20782***      .04641     4.48  .0000      .11685    .29879
     FUR|     .00513         .04566      .11  .9106     -.08437    .09463
     INS|     .09484**       .04621     2.05  .0402      .00426    .18541
     COM|    -.06661         .04627    -1.44  .1500     -.15731    .02408
     BIK|     .02240         .04643      .48  .6294     -.06860    .11340
     LEI|     .00855         .04620      .19  .8531     -.08200    .09911
   CONST|    -.00297         .06419     -.05  .9631     -.12879    .12285
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – expats

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function      -960.96243
Estimation based on N =    996, K =  13
Inf.Cr.AIC  =   1947.9 AIC/N =    1.956
Model estimated: Jul 29, 2017, 09:45:41
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -1093.1235  .1209 .1097
Response data are given as ind. choices
Number of obs.=   996, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.73980***      .08081    -9.15  .0000     -.89818   -.58141
    SIZ2|     .21236***      .07275     2.92  .0035      .06977    .35495
    PRI1|     .55302***      .07180     7.70  .0000      .41229    .69376
    PRI2|     .05471         .07304      .75  .4538     -.08844    .19786
     DWE|     .37424***      .05309     7.05  .0000      .27019    .47829
     WAS|     .37787***      .05273     7.17  .0000      .27452    .48121
     DIS|     .11634**       .05287     2.20  .0278      .01272    .21996
     FUR|     .04429         .05122      .86  .3872     -.05610    .14469
     INS|    -.03358         .05161     -.65  .5152     -.13473    .06756
     COM|     .07540         .05130     1.47  .1417     -.02515    .17595
     BIK|     .13001**       .05223     2.49  .0128      .02765    .23237
     LEI|     .01995         .05212      .38  .7020     -.08222    .12211
   CONST|    -.05975         .07266     -.82  .4109     -.20216    .08267
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – male

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -3387.58496
Estimation based on N =   3648, K =  13
Inf.Cr.AIC  =   6801.2 AIC/N =    1.864
Model estimated: Jul 29, 2017, 10:10:10
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -3954.8648  .1434 .1405
Response data are given as ind. choices
Number of obs.=  3648, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.59526***      .04108   -14.49  .0000     -.67578   -.51475
    SIZ2|     .09769**       .03799     2.57  .0101      .02323    .17215
    PRI1|     .82879***      .03844    21.56  .0000      .75344    .90414
    PRI2|     .08075**       .03745     2.16  .0311      .00736    .15414
     DWE|     .28737***      .02735    10.51  .0000      .23377    .34097
     WAS|     .36332***      .02744    13.24  .0000      .30954    .41710
     DIS|     .15803***      .02719     5.81  .0000      .10474    .21133
     FUR|     .02785         .02688     1.04  .3001     -.02482    .08053
     INS|     .08124***      .02704     3.00  .0027      .02825    .13424
     COM|     .02413         .02695      .90  .3705     -.02868    .07695
     BIK|     .09029***      .02687     3.36  .0008      .03763    .14295
     LEI|     .04989*        .02687     1.86  .0633     -.00277    .10255
   CONST|     .26261***      .04032     6.51  .0000      .18359    .34163
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – female

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -2342.87639
Estimation based on N =   2508, K =  13
Inf.Cr.AIC  =   4711.8 AIC/N =    1.879
Model estimated: Jul 29, 2017, 09:55:16
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -2719.9636  .1386 .1343
Response data are given as ind. choices
Number of obs.=  2508, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.71253***      .05060   -14.08  .0000     -.81169   -.61336
    SIZ2|     .10755**       .04582     2.35  .0189      .01775    .19736
    PRI1|     .72271***      .04583    15.77  .0000      .63289    .81253
    PRI2|     .08354*        .04512     1.85  .0641     -.00490    .17198
     DWE|     .36620***      .03298    11.10  .0000      .30156    .43084
     WAS|     .27308***      .03275     8.34  .0000      .20888    .33727
     DIS|     .09248***      .03219     2.87  .0041      .02939    .15557
     FUR|     .01576         .03221      .49  .6247     -.04737    .07889
     INS|     .10053***      .03226     3.12  .0018      .03731    .16376
     COM|     .01061         .03237      .33  .7431     -.05283    .07405
     BIK|     .05296         .03257     1.63  .1040     -.01088    .11680
     LEI|     .04567         .03235     1.41  .1580     -.01773    .10908
   CONST|     .27360***      .04834     5.66  .0000      .17886    .36834
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – Western

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -3984.54422
Estimation based on N =   4224, K =  13
Inf.Cr.AIC  =   7995.1 AIC/N =    1.893
Model estimated: Jul 29, 2017, 12:05:24
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -4600.5436  .1339 .1313
Response data are given as ind. choices
Number of obs.=  4224, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.63997***      .03860   -16.58  .0000     -.71562   -.56432
    SIZ2|     .09247***      .03517     2.63  .0086      .02353    .16140
    PRI1|     .76946***      .03549    21.68  .0000      .69990    .83902
    PRI2|     .07846**       .03479     2.26  .0241      .01027    .14666
     DWE|     .30362***      .02535    11.98  .0000      .25393    .35331
     WAS|     .34140***      .02549    13.39  .0000      .29144    .39136
     DIS|     .13586***      .02500     5.43  .0000      .08686    .18486
     FUR|     .01967         .02478      .79  .4272     -.02889    .06823
     INS|     .08912***      .02495     3.57  .0004      .04022    .13802
     COM|     .00915         .02491      .37  .7133     -.03967    .05797
     BIK|     .05999**       .02494     2.41  .0161      .01111    .10886
     LEI|     .01776         .02490      .71  .4757     -.03104    .06656
   CONST|     .18511***      .03678     5.03  .0000      .11303    .25720
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – Non-Western

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -1743.46546
Estimation based on N =   1932, K =  13
Inf.Cr.AIC  =   3512.9 AIC/N =    1.818
Model estimated: Jul 29, 2017, 12:07:18
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -2066.9770  .1565 .1510
Response data are given as ind. choices
Number of obs.=  1932, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.65073***      .05665   -11.49  .0000     -.76176   -.53971
    SIZ2|     .12037**       .05276     2.28  .0225      .01697    .22377
    PRI1|     .81071***      .05269    15.39  .0000      .70745    .91398
    PRI2|     .09842*        .05133     1.92  .0552     -.00219    .19902
     DWE|     .34842***      .03769     9.24  .0000      .27456    .42229
     WAS|     .29353***      .03716     7.90  .0000      .22070    .36636
     DIS|     .11678***      .03729     3.13  .0017      .04369    .18988
     FUR|     .03566         .03728      .96  .3388     -.03741    .10872
     INS|     .09096**       .03725     2.44  .0146      .01796    .16397
     COM|     .03853         .03718     1.04  .3000     -.03434    .11140
     BIK|     .11370***      .03727     3.05  .0023      .04066    .18674
     LEI|     .10753***      .03704     2.90  .0037      .03493    .18013
   CONST|     .45626***      .05756     7.93  .0000      .34345    .56907
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – one-person household

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -4324.39603
Estimation based on N =   4668, K =  13
Inf.Cr.AIC  =   8674.8 AIC/N =    1.858
Model estimated: Jul 29, 2017, 12:09:05
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -5041.6457  .1423 .1400
Response data are given as ind. choices
Number of obs.=  4668, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.60639***      .03628   -16.71  .0000     -.67750   -.53529
    SIZ2|     .09637***      .03351     2.88  .0040      .03069    .16205
    PRI1|     .80526***      .03396    23.71  .0000      .73869    .87183
    PRI2|     .10631***      .03287     3.23  .0012      .04188    .17074
     DWE|     .32965***      .02420    13.62  .0000      .28222    .37708
     WAS|     .31937***      .02401    13.30  .0000      .27230    .36643
     DIS|     .12763***      .02383     5.36  .0000      .08092    .17434
     FUR|     .03725         .02373     1.57  .1164     -.00925    .08375
     INS|     .09007***      .02366     3.81  .0001      .04369    .13644
     COM|     .03166         .02384     1.33  .1842     -.01507    .07839
     BIK|     .08475***      .02374     3.57  .0004      .03823    .13128
     LEI|     .03850         .02368     1.63  .1039     -.00791    .08491
   CONST|     .32205***      .03597     8.95  .0000      .25155    .39256
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – couples

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -1040.77780
Estimation based on N =   1104, K =  13
Inf.Cr.AIC  =   2107.6 AIC/N =    1.909
Model estimated: Jul 29, 2017, 12:10:29
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -1201.4265  .1337 .1238
Response data are given as ind. choices
Number of obs.=  1104, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.72672***      .07703    -9.43  .0000     -.87770   -.57574
    SIZ2|     .10875         .06945     1.57  .1174     -.02737    .24487
    PRI1|     .71168***      .06843    10.40  .0000      .57755    .84580
    PRI2|     .01640         .06912      .24  .8125     -.11907    .15187
     DWE|     .30017***      .04914     6.11  .0000      .20385    .39648
     WAS|     .32755***      .05007     6.54  .0000      .22940    .42569
     DIS|     .11947**       .04882     2.45  .0144      .02378    .21515
     FUR|    -.09461**       .04816    -1.96  .0495     -.18900   -.00022
     INS|     .08178         .04983     1.64  .1008     -.01588    .17944
     COM|    -.00176         .04842     -.04  .9710     -.09666    .09313
     BIK|     .08502*        .04920     1.73  .0840     -.01142    .18146
     LEI|     .06492         .04898     1.33  .1851     -.03109    .16092
   CONST|     .18594***      .07169     2.59  .0095      .04542    .32646
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – other households

```
--------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function      -350.10570
Estimation based on N =    384, K =  13
Inf.Cr.AIC  =    726.2 AIC/N =    1.891
Model estimated: Jul 29, 2017, 12:12:14
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only   -421.8359  .1700 .1421
Response data are given as ind. choices
Number of obs.=   384, skipped    0 obs
--------+-----------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------------
    SIZ1|    -.88835***      .13839    -6.42  .0000    -1.15958   -.61711
    SIZ2|     .18010         .12242     1.47  .1412     -.05983    .42004
    PRI1|     .81849***      .12194     6.71  .0000      .57949   1.05749
    PRI2|    -.11569         .12661     -.91  .3609     -.36383    .13246
     DWE|     .25398***      .08918     2.85  .0044      .07919    .42877
     WAS|     .43369***      .09255     4.69  .0000      .25229    .61509
     DIS|     .19965**       .08983     2.22  .0262      .02359    .37571
     FUR|     .22623**       .08858     2.55  .0107      .05261    .39984
     INS|     .16393*        .08934     1.83  .0665     -.01119    .33904
     COM|    -.09729         .08737    -1.11  .2655     -.26853    .07396
     BIK|    -.03214         .08892     -.36  .7178     -.20642    .14214
     LEI|     .04358         .08813      .49  .6210     -.12916    .21631
   CONST|    -.16390         .11964    -1.37  .1707     -.39839    .07059
--------+-----------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
--------------------------------------------------------------------------------
```

Output – income <€1500

```
--------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -3109.65719
Estimation based on N =   3288, K =  13
Inf.Cr.AIC  =   6245.3 AIC/N =    1.899
Model estimated: Jul 29, 2017, 12:22:25
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -3588.3316  .1334 .1301
Response data are given as ind. choices
Number of obs.=  3288, skipped    0 obs
--------+-----------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------------
    SIZ1|    -.65578***      .04369   -15.01  .0000     -.74142   -.57014
    SIZ2|     .13742***      .04000     3.44  .0006      .05903    .21581
    PRI1|     .76910***      .03974    19.35  .0000      .69122    .84699
    PRI2|     .04804         .03968     1.21  .2260     -.02974    .12582
     DWE|     .33168***      .02900    11.44  .0000      .27485    .38851
     WAS|     .32949***      .02881    11.43  .0000      .27301    .38596
     DIS|     .14464***      .02850     5.08  .0000      .08878    .20049
     FUR|     .05617**       .02819     1.99  .0463      .00092    .11143
     INS|     .08759***      .02850     3.07  .0021      .03172    .14346
     COM|     .02250         .02846      .79  .4292     -.03328    .07828
     BIK|     .05184*        .02841     1.82  .0680     -.00384    .10753
     LEI|     .00872         .02840      .31  .7589     -.04694    .06437
   CONST|     .13885***      .04140     3.35  .0008      .05770    .21999
--------+-----------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
--------------------------------------------------------------------------------
```

Output – income €1500 - €2500

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function     -1121.56768
Estimation based on N =   1206, K =  13
Inf.Cr.AIC  =   2269.1 AIC/N =    1.882
Model estimated: Jul 29, 2017, 12:23:38
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -1316.2162  .1479 .1390
Response data are given as ind. choices
Number of obs.=  1212, skipped    6 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.71864***      .07284    -9.87  .0000     -.86141   -.57587
    SIZ2|     .06379         .06566      .97  .3313     -.06490    .19248
    PRI1|     .65685***      .06903     9.52  .0000      .52156    .79215
    PRI2|     .22316***      .06486     3.44  .0006      .09604    .35028
     DWE|     .30664***      .04790     6.40  .0000      .21276    .40052
     WAS|     .37183***      .04854     7.66  .0000      .27669    .46698
     DIS|     .02681         .04747      .56  .5723     -.06623    .11985
     FUR|     .05747         .04744     1.21  .2257     -.03551    .15045
     INS|     .09201**       .04691     1.96  .0498      .00007    .18395
     COM|     .04018         .04721      .85  .3948     -.05236    .13272
     BIK|     .12413***      .04712     2.63  .0084      .03177    .21649
     LEI|     .08512*        .04693     1.81  .0697     -.00686    .17709
   CONST|     .18666***      .06925     2.70  .0070      .05095    .32238
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – income €2500 - €3500

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function      -344.32499
Estimation based on N =    444, K =  13
Inf.Cr.AIC  =    714.6 AIC/N =    1.610
Model estimated: Jul 29, 2017, 12:25:17
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only   -443.6615  .2239 .2014
Response data are given as ind. choices
Number of obs.=   444, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.72006***      .12627    -5.70  .0000     -.96754   -.47257
    SIZ2|     .09462         .11561      .82  .4131     -.13198    .32122
    PRI1|    1.12601***      .12164     9.26  .0000      .88760   1.36443
    PRI2|     .14781         .11401     1.30  .1948     -.07565    .37126
     DWE|     .26374***      .07982     3.30  .0010      .10729    .42019
     WAS|     .17088**       .08075     2.12  .0343      .01262    .32915
     DIS|     .12066         .08061     1.50  .1345     -.03734    .27866
     FUR|     .07257         .08113      .89  .3711     -.08645    .23159
     INS|    -.02599         .07963     -.33  .7441     -.18207    .13008
     COM|    -.03589         .08394     -.43  .6690     -.20042    .12863
     BIK|     .17768**       .08469     2.10  .0359      .01169    .34366
     LEI|     .12489         .07993     1.56  .1181     -.03176    .28154
   CONST|     .99097***      .14596     6.79  .0000      .70489   1.27704
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – income > €3500

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function      -202.30752
Estimation based on N =    228, K =  13
Inf.Cr.AIC  =    430.6 AIC/N =    1.889
Model estimated: Jul 29, 2017, 12:26:23
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only   -240.7529  .1597 .1109
Response data are given as ind. choices
Number of obs.=   228, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.56001***      .16363    -3.42  .0006     -.88071   -.23931
    SIZ2|    -.08020         .15576     -.51  .6066     -.38547    .22508
    PRI1|     .89679***      .16019     5.60  .0000      .58283   1.21075
    PRI2|    -.01070         .15359     -.07  .9445     -.31173    .29032
     DWE|     .27134**       .11077     2.45  .0143      .05424    .48844
     WAS|     .28325***      .10870     2.61  .0092      .07020    .49631
     DIS|     .24872**       .11077     2.25  .0247      .03163    .46582
     FUR|    -.00622         .10985     -.06  .9549     -.22153    .20909
     INS|     .15323         .11372     1.35  .1779     -.06966    .37613
     COM|     .12570         .11251     1.12  .2639     -.09482    .34623
     BIK|     .11843         .10512     1.13  .2599     -.08760    .32445
     LEI|     .11473         .10920     1.05  .2934     -.09930    .32876
   CONST|     .74397***      .17470     4.26  .0000      .40156   1.08637
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

Output – income: prefer not to say

```
------------------------------------------------------------------------------
Start values obtained using MNL model
Dependent variable                Choice
Log likelihood function      -894.37684
Estimation based on N =    984, K =  13
Inf.Cr.AIC  =   1814.8 AIC/N =    1.844
Model estimated: Jul 29, 2017, 12:27:52
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -1054.5552  .1519 .1410
Response data are given as ind. choices
Number of obs.=   984, skipped    0 obs
--------+---------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
  CHOICE|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
    SIZ1|    -.49649***      .07990    -6.21  .0000     -.65309   -.33989
    SIZ2|     .05990         .07534      .80  .4266     -.08777    .20757
    PRI1|     .84794***      .07507    11.29  .0000      .70080    .99508
    PRI2|     .04024         .07226      .56  .5776     -.10138    .18186
     DWE|     .36301***      .05299     6.85  .0000      .25915    .46688
     WAS|     .35283***      .05320     6.63  .0000      .24856    .45710
     DIS|     .19019***      .05221     3.64  .0003      .08786    .29252
     FUR|    -.13469**       .05230    -2.58  .0100     -.23719   -.03219
     INS|     .17754***      .05258     3.38  .0007      .07449    .28059
     COM|    -.01356         .05105     -.27  .7905     -.11362    .08650
     BIK|     .06875         .05234     1.31  .1889     -.03382    .17133
     LEI|     .07299         .05233     1.39  .1631     -.02957    .17555
   CONST|     .43119***      .08034     5.37  .0000      .27373    .58865
--------+---------------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
------------------------------------------------------------------------------
```

APPENDIX G – DECISION SUPPORT TOOL

Dropdown menu for every attribute, so that every attribute level can be selected

Coefficients for alternative I

Attribute	Attribute level	PWU - whole sample
Size	25	-0,64884
	35	0
	45	0
Price	€ 750	0,78802
	€ 850	0
	€ 950	0
Dwelling division	Separate bedroom	0
	No separate bedroom	-0,32327
Washing machine	Yes	0,32965
	No	0
Dishwasher	Yes	0,13365
	No	0
Furniture	Luxury design furniture	0
	Simple design furniture	-0,02538
Insurances package	Yes	0,0892
	No	0
Common area	Yes	0,01943
	No	0
Bike sharing	Yes	0,07919
	No	0
Leisure facilities	Yes	0
	No	-0,04806
Total utility		0,39359

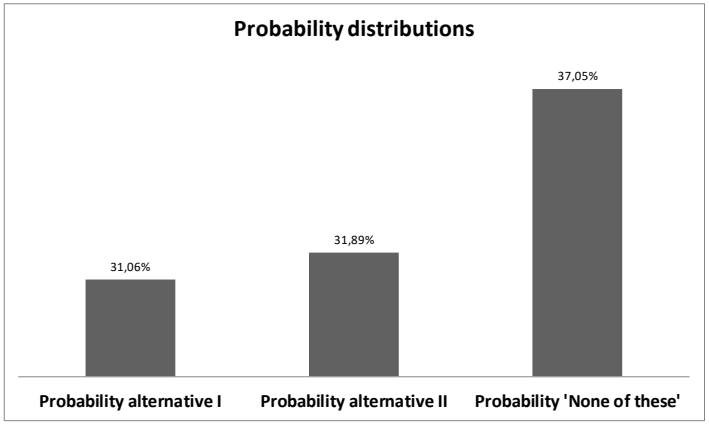
Coefficients for alternative II

Attribute	Attribute level	PWU - whole sample
Size	25	0
	35	0
	45	0,54764
Price	€ 750	0
	€ 850	0,08257
	€ 950	0
Dwelling division	Separate bedroom	0
	No separate bedroom	-0,32327
Washing machine	Yes	0,32965
	No	0
Dishwasher	Yes	0
	No	-0,13365
Furniture	Luxury design furniture	0
	Simple design furniture	-0,02538
Insurances package	Yes	0,0892
	No	0
Common area	Yes	0
	No	-0,01943
Bike sharing	Yes	0
	No	-0,07919
Leisure facilities	Yes	0
	No	-0,04806
Total utility		0,42008

Coefficient 'None of these'

Constant utility	0,57

	Alternative I	Alternative II	
Size in square meter	25	45	None of these
Monthly all-in rent price in €	750	850	
Dwelling division	No separate bedroom	No separate bedroom	
Washing machine	Yes	Yes	
Dishwasher	Yes	No	
Furniture	Simple design furniture	Simple design furniture	
Insurances package	Yes	Yes	
Common area	Yes	No	
Bike sharing	Yes	No	
Leisure facilities	No	No	



	Total utility I	Total utility II	Total Utility III	Exp I	Exp II	Exp II
Whole sample	0,39359	0,42008	0,57000	1,482292684	1,522083317	1,768267051

	Whole sample
Probability alternative I	31,06%
Probability alternative II	31,89%
Probability 'None of these'	37,05%