REUSE OF VACANT OFFICE BUILDINGS FOR SENIOR HOMES
OPPORTUNITIES & RESEARCH

T.H.J. (TOM) HENNINK
S155153

CONSTRUCTION MANAGEMENT & ENGINEERING
EINDHOVEN UNIVERSITY OF TECHNOLOGY

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Colophon

General

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Author

Name:	Tom Herman Jan Hennink
ID number:	S155153
E-mail:	tomhennink@hotmail.com
Master track:	Construction Management & Engineering
University:	Eindhoven University of Technology

Graduation Committee:

Chairman:	prof.dr.ir. B. (Bauke) de Vries
First supervisor:	dr.ir. P.J.H.J. (Peter) van der Waerden
Second supervisor:	dr.ir. A.D.A.M. (Astrid) Kemperman

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Preface

Before you lies “Re-use of vacant office building for senior homes”. This is my master thesis and it is the closure of my master (Construction Management & Engineering) and my time as a student at the Technical University of Eindhoven.

As there is an aging population in the Netherlands, a shortage of suitable homes for the (future) elderly is predicted. I think there is still a lot to research about the housing of the aging population. Furthermore, improvement in the housing of elderly can be made. I conducted this research in order to provide insights into the housing of elderly and how to improve it.

This research would not have been possible without the guidance from the people around me. First, I would like to thank my first supervisor Peter van der Waerden for his excellent guidance and always being available for answering my questions. I would also like to thank my second supervisor Astrid Kemperman for the good guidance during the process. Furthermore I wish to thank all my respondents who filled in my survey, without them I would not have been able to conduct my analysis.

My girlfriend (and soon to be partner, at 28-08-2018) deserves a special note of thanks. I thank her for her patience (yes it was needed) and her support during the process of the master thesis.

I hope you enjoy your reading

Tom Hennink

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Content

Abstract

The housing of the aging population in the Netherlands is a concern for now and for the future. At the same time, there are concerns with structurally vacant office buildings at the edge of the city despite the economic growth. To approach both problems, vacant office buildings at the edge of the city can be transformed into dwellings for the aging population. However, the knowledge about housing preferences of the aging population related to living in transformed office buildings is limited. This research intends to gain insight in the housing preferences of the aging population and investigate whether a transformed office building at the city can meet these preferences. The first part of the research consisted of collecting data of existing research in order to determine the housing preferences of the aging population. The results of the first part were used in the design of the stated choice experiment. A survey containing a stated choice experiment was used in this research. The data collected in the survey was analysed by means of both a Multinomial Logit (MNL) Model and a Latent Class (LC) model. The results of the LC model show two groups of (future) elderly. One group rejects living in a transformed office building at the edge of the city while a second group is attracted to it. The attributes needed to attract the second group are part of the results. These results provide municipalities, building owners, developers and other actors with insight into the potential of a successful transformation of a vacant office building into dwellings for (future) elderly. Therefore, the results can support actors with the decision-making process in the initiative phase of finding new destinations for vacant office buildings at the edge of the city.

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Summary

The housing of the aging population in in the Netherlands is a challenge now and for the future. About half of the municipalities expect a shortage in dwellings for (future) elderly. The number of households existing out of elderly will grow from 2 million in 2015 to 3.3 million in 2040. This results into a growth of 1.3 million elderly households. About 50% of the 3.3 million elderly households will be single person households. So, at the moment there already is a housing shortage while many dwellings are needed for elderly in the future. Furthermore, elderly have different housing preferences than other groups and therefore not all the dwellings at the current market are suitable for elderly.

On the other hand, another challenge is present in the Netherlands. Structural (longer than three years) vacant office buildings at the edge of the city are a problem for both building owners and municipalities. At the moment, 5 million square meters of office buildings is structurally vacant. Despite the growing economy there is no demand for these buildings in the current market.

Because of the vacancy related problems which arise on economic and society level, building owners and the government look for solutions. Do nothing, demolish the building or transform the building are the three options for building owners, transformation is applied often. Transformation is the process of changing of existing real estate that reached the end of its lifespan because of aging, vacancy or bankruptcy of the owner for example.

The transformation of structural vacant office buildings at the edge of the city into dwellings for elderly can be an approach to the two problems. First, the office buildings which are transformed will be off the office building market, this will decrease the total amount of vacancy. Second, additional dwellings for elderly – which are needed in the future – are created. Elderly will have more choice between suitable dwellings.

The aim of this research is to gain insight in how to make vacant offices on the edge of a city meet the housing preferences of (future) elderly. It is needed to determine which attributes are already known as attractive. In order to do this, a literature study was conducted. From the results of the literature study a list of “fixed” attributes was made, this list was used in questionnaire.

The questionnaire existed out of a stated choice experiment. In the stated choice experiment stated preference was applied. This means that respondents have to choose an alternative in a hypothetical situation where several alternatives are presented. In total there are 205 useful responses. In the experiment the “fixed” attributes are as follows:

- It is a one level apartment;

- There is a balcony;
- Service (care, handyman etc.) can be delivered if wished for;
- There is enough parking space;
- There is a bus stop in front of the complex;
- The complex is surrounded by green;
- Security is provided in by means of cameras etc.;
- A gym is present in the complex;
- The complex is a transformed office building.

These attributes are applied in order to make the alternative as attractive as possible. Since their attractiveness is already known, there is no need to ask about them in the survey. However, there are attributes which are still unknown or of such importance that these have to be questioned in the experiment. These attributes are called the “variable attributes”, the list looks as follows:

- Rent;
- Apartment surface;
- Common rooms;
- Age of residents;
- Organised activities;
- Common outdoor facilities;
- Distance to shops and catering;
- Distance to care (facilities).

With the results of the questionnaire the attractiveness of the variable attributes can be determined. The results were analysed be means of a MNL (Multinomial Logit) model and a LC (Latent Class) model. The outcome was that the respondents can be divided into two groups. One group is attracted to the presented alternatives and the other group refuses the presented alternatives. The difference in characteristics between the groups is that the first group participates in organised activities more often. This group is already attracted to an apartment in a transformed office building on the edge of a city when the “fixed” attributes are applied. However, the apartment can be even made more attractive by applying the following besides to the fixed attributes:

- Organise activities in the building on a weekly basis;
- Presence of a common activity room;
- Place an outdoor gym next to the building;
- Apartment surface of 100 square meter;
- Rent of 500-700 euro per month.

With these results municipalities and building owners can gain insight in the suitability of a certain vacant office building on a location at the edge of a city. The results can give a first indication about whether a building is suitable or not for transformation into dwellings for elderly. The stated preference method allows researchers to test new dwellings for elderly in a hypothetical situation. Further research regarding this subject can be done with focus on analysing the different groups of elderly or a case study.

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Samenvatting

Het huisvesten van de vergrijzende bevolking in Nederland is een uitdaging nu en voor de toekomst. Momenteel verwacht de helft van de gemeenten een tekort aan woningen voor (toekomstige) ouderen. Ondertussen wordt verwacht dat het aantal huishoudens bestaande uit ouderen zal groeien van 2 miljoen in 2015 tot 3.3 miljoen in 2040. Dit resulteert in een groei van 1.3 miljoen huishoudens. Ongeveer 50% van de 3.3 miljoen huishoudens in 2040 zal naar verwachting bestaan uit alleenstaande ouderen. Eenzaamheid zal hierdoor waarschijnlijk en rol gaan spelen in de huisvesting van ouderen. Dus momenteel is er al een tekort aan woningen voor ouderen terwijl een veel woningen voor ouderen nodig zullen zijn in de toekomst. Verder hebben ouderen andere woonvoorkeuren dan andere groepen en daarom zijn niet alle woningen op de huidige markt geschikt voor ouderen.

Aan de andere kant is er andere uitdaging aanwezig in Nederland. Structureel (langer dan drie jaar) leegstaande kantoorgebouwen aan de rand van de stad zijn een probleem voor zowel gebouweigenaren als gemeenten. Momenteel staat er 5 miljoen vierkante meter kantoorpand structureel leeg. Ondanks de economische groei is er geen vraag naar deze gebouwen in de huidige markt.

Vanwege de problemen die ontstaan op economisch en maatschappelijk niveau door de leegstand, zoeken gebouweigenaren en de overheid naar oplossingen. Niets doen, slopen of transformeren zijn de drie opties, transformatie wordt vaak toegepast. Transformatie is het proces van het veranderen van bestaan vastgoed dat het eind van de levenscyclus heeft bereikt vanwege ouderdom, leegstand of een faillissement bijvoorbeeld.

Het transformeren van structureel leegstaande kantoorpanden aan de rand van de stad naar woningen voor ouderen kan een (deel)oplossing zijn van de twee voorgenoemde problemen. Ten eerste worden de getransformeerde gebouwen van de markt afgehaald, dit zal de totale hoeveelheid leegstand laten dalen. Ten tweede worden er de nodige woningen voor ouderen gecreëerd. Ouderen zullen meer keuze hebben tussen verschillende woningen die geschikt voor hen zijn.

Het doel van dit onderzoek is om inzicht te krijgen in hoe leegstaande kantoorgebouwen aan de rand van de stad aantrekkelijk te maken voor ouderen om in te wonen. Het is nodig om eerst de kenmerken te bepalen waarvan al bekend zijn dat ze attractief zijn. Een literatuurstudie is uitgevoerd om deze kenmerken te bepalen. Van de resultaten uit de literatuurstudie is een lijst van “vaste” kenmerken opgesteld, deze lijst is gebruikt in de enquête.

De enquête bestaat uit een stated choice experiment waarbij stated preference toegepast is. Dit betekent dat respondenten een alternatief moeten kiezen in een hypothetische situatie

waarin meerdere alternatieven aangeboden worden. In totaal is de enquête 205 keer compleet ingevuld. In het experiment waren de “vaste” kenmerken als volgt:

- Het appartement is gelijkvloers;
- Er is een balkon;
- Services kunnen geleverd worden indien gewenst;
- Er is voldoende parkeerruimte;
- Er is een bushalte voor het complex aanwezig;
- Het complex is omringd door groen;
- Er is beveiliging aanwezig in de vorm van camera’s etc.;
- Een sportschool is aanwezig in het complex;
- Het complex betreft een getransformeerd kantoorgebouw.

Deze kenmerken worden toegepast om het alternatief in de basis zo aantrekkelijk mogelijk te maken. Omdat de aantrekkelijkheid van de kenmerken al bekend is, is er geen noodzaak om deze verder te bevragen in de enquête. Echter, er zijn kenmerken die nog steeds onbekend zijn of van dusdanig belang zijn dat deze bevraagd moeten worden in de enquête. Deze kenmerken worden “variabele kenmerken” genoemd. De lijst ziet er als volgt uit:

- Huur;
- Oppervlak appartement;
- Gemeenschappelijke ruimtes;
- Leeftijd bewoners;
- Georganiseerde activiteiten;
- Gemeenschappelijke faciliteiten buiten;
- Afstand tot winkels en horeca;
- Afstand tot zorg.

Met resultaten van de enquête kan de aantrekkelijkheid van de variabele attributen worden bepaald. De resultaten zijn geanalyseerd met behulp van een MNL (MultiNomial Logit) model en een LCM (Latent Class Model). Uit de resultaten blijkt dat de respondenten in twee groepen kunnen worden ingedeeld. Een groep is aangetrokken tot de gepresenteerde alternatieven en de andere groep niet. Het verschil tussen de groepen is dat de eerste groep meer meedoet aan georganiseerde activiteiten in de huidige buurt. Deze groep voelt zich al aangetrokken tot het aangeboden alternatief als alleen de “vaste kenmerken” aanwezig zijn. Echter, het appartement kan nog aantrekkelijker gemaakt worden door de volgende - voorheen variabele - kenmerken naast de vaste kenmerken toe te passen:

- Organiseer wekelijks gemeenschappelijke activiteiten in het complex;
- Gemeenschappelijke activiteitenruimte;

- Sporttoestellen buiten naast het gebouw;
- Oppervlakte van het appartement van 100 vierkante meter;
- Huur van 500-700 euro per maand.

Met de resultaten van dit onderzoek kunnen gemeenten en gebouweigenaren inzicht krijgen in de geschiktheid van een leegstaand pand aan de rand van de stad. Er kan aan de hand van de resultaten een eerste inzicht verkregen worden in of een gebouw geschikt is voor transformatie in appartementen voor ouderen. De stated choice methode kan gebruikt worden bij verder onderzoek naar nieuwe woonconcepten in getransformeerde kantoorgebouwen. Ander verder onderzoek kan gedaan worden naar verschillende doelgroepen onder ouderen en hun voorkeuren met betrekking tot wonen in een getransformeerd kantoorpand aan de rand van de stad.

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1. Introduction

At the moment, there are two problems in the Netherlands which are a concern for the future. The first problem is the amount of vacant office buildings in the Netherlands, at the moment millions of square meters are vacant. Problems concerning vacancy are costs (decreasing value and maintenance) for the building owner and deterioration of the building and its surroundings. Especially owners of vacant office buildings at the edge of the city face problems as the location might not be attractive as location at a city centre.

The second problem is the aging population in the Netherlands. The number of people aged 65 years and older will grow from 2.7 million (in 2012) to 4.2 million in 2040. Furthermore, the number of households – existing of people aged 65 years and older – will also grow. The current supply of dwellings might not meet the preferences of the elderly population in the future. Therefore new dwellings, which meet the preferences of the aging population, might have to be built. Besides, the preferences of elderly are important when they consider moving to a new dwelling. Some elderly will stay in their dwelling, but some of them will or have to move elsewhere because of distance to family or the availability of care facilities for example.

However, there are possibilities to make change and use both problems as a (partly) solution for each other. Vacant office buildings at the edge of the city may have potential to be transformed into dwellings which meet the preferences of elderly. When a transformation of vacant office buildings at the edge of the city into dwellings for elderly is successful, the office building will be off the market and dwellings for elderly are created. However, the dwellings in transformed office building have to meet the preferences of the elderly. Therefore not all vacant office buildings at the edge of the city might be suitable for transformation into dwellings for elderly. In order to determine which vacant office buildings can meet the housing preferences of elderly and what is needed to meet these preferences, research has to be conducted.

In this introduction background information, context and motives regarding this problem will be presented. Furthermore, the research problem, research approach, scientific relevance and practical relevance will be described.

Vacant office space

The Netherlands is one of the more densely populated countries in the world, per square kilometre there are 410 inhabitants (Populationpyramid, 2018). The consequence of this is that much planning, design and communication between actors (government, companies, inhabitants) is involved when it comes to space for buildings for example. Despite the fact that the Netherlands is densely populated, there is still a surplus in some kinds of space. One kind of space concerns the surplus of office buildings. In the Netherlands 15.9% of the total surface

of office buildings is vacant (PBL, 2018) (Hernandez, 2017). This comes down to a total of 7.67 million square meter of lettable floor space (CLO, 2018). The total surface can be divided in three types of vacancy (CLO, 2018):

1. Structural vacancy (longer than three years);
2. Long-term vacancy (one until three years);
3. Friction vacancy (one year and less).

The biggest part of the total vacancy exists of structural vacancy (5 million square meters). Long term and friction vacancy are significant smaller parts of the total vacancy. According to Remøy and Van der Voordt (2007) vacancy is a problem at different levels. Economically, vacancy affects the owner of a building directly by means of maintenance of the building and decreasing value for example. For society, vacancy may cause problems regarding insecurity, social uncertainty and criminality (from vandalism and graffiti to illegal occupancy). As such, vacancy also has indirect effect through the negative image it gives to the surrounding area and buildings. This can lead to deterioration of the area, with rising vandalism, technical decay and devaluation of buildings (Remøy & van der Voordt, 2007). Because of these problems, different actors look for solutions like demolition or transformation of vacant office buildings (for more information, see section 2.1).

Aging population

The aging population in the Netherlands is something that needs attention in the coming decades. According to the CBS (Central Bureau of Statistics), the number of people older than 65 years will grow from 2.7 million in 2012 to 4.2 million in 2040 (Raets, 2012). Furthermore, the number of households existing of people aged 65-80 years and aged 80 years or older will grow significantly until 2040 (CBS, 2015). Figure 1 shows that the number of households existing of persons aged 65 years or older will grow from 2.0 million in 2015 to 3.3 million in 2040. These circumstances make that there might be a new kind of demand for homes which needs attention from governing parties. People aged 65 years and older have different living preferences than younger people aged 25-45 years for example (BPD, 2016), Furthermore health conditions, distance to family and other factors play a role in the living preferences of the elderly. The things mentioned above create a new challenge in the future regarding the question about the housing of elderly. Where are these elderly going to live? What are the preferences of the elderly? Can they stay in their own homes or do they want/have to move? These and other questions arise when the problem is discussed by the government, building owners and other actors.

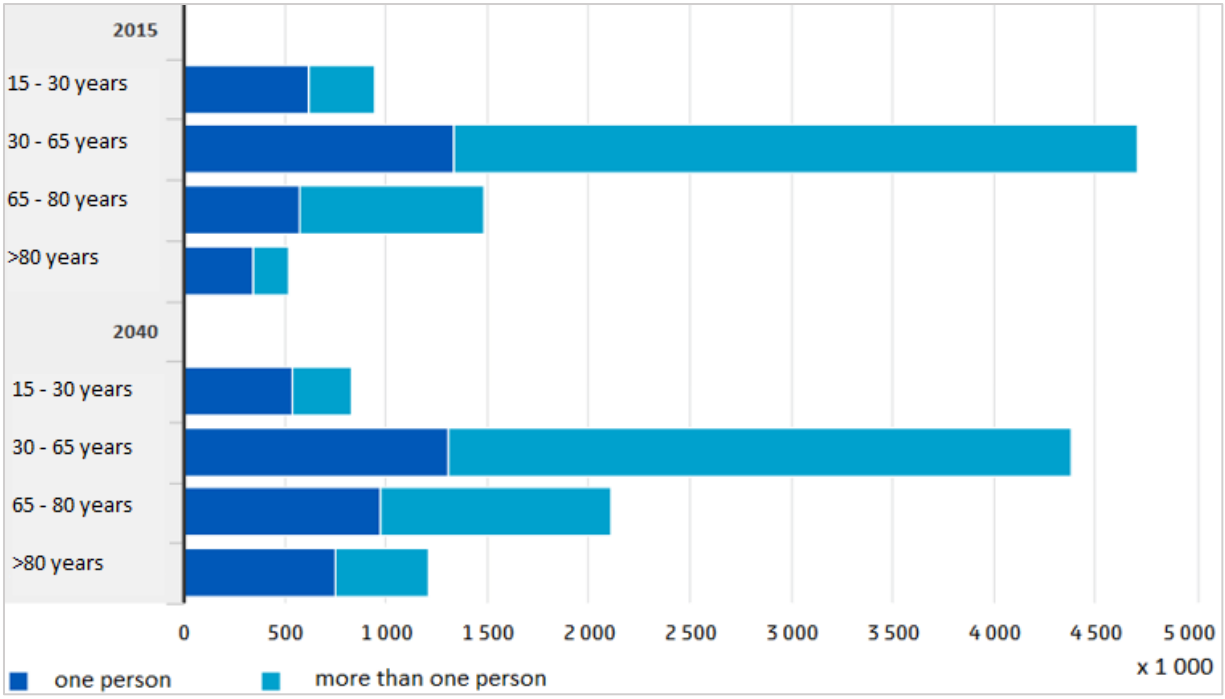


Figure 1: Number of one-person and multi-person households in 2015 and 2040, own translation (CBS, 2015)

Context and motives

There are several options to create dwellings to live for the elderly; new dwellings can be built for example. However, there is only space for new dwellings at the edge of a city due to lack of space inside the city which leads to high land prices (Vermeulen, Teulings, Marlet, & de Groot, 2016). Questions arise about whether elderly do want to live at the edge of the city.

For vacant office buildings in the city centre, solutions are provided and research on it has also been done (Remøy & van der Voordt, 2007) (Hernandez, 2017). However, buildings at the edge of the city might less attractive to be filled in by offices or dwellings because of the larger distance to urban amenities for example. Furthermore, office buildings at the edge of the city which are empty longer than one year can lead to more criminality in the surroundings (Remøy & van der Voordt, 2007). This is why the focus of the research is on the possibilities of transformation of vacant office buildings at the edge of the city to places where the elderly can live.

With the transformation of vacant office buildings into dwellings for the elderly, two problems are approached and (partly) solved. First, the office buildings which are transformed will be off the office building market, this will decrease the total amount of vacancy. Especially structural vacancy (longer than 3 years) is considered in this case: these office buildings are probably not attractive for office use anymore. Second, additional homes for elderly which are needed in the future are developed without occupancy of new land. Consequently, elderly will have more choice regarding the location and type of their place and type of dwelling to live.

1.1 Research problem

There are possibilities for new kinds of houses for the growing elderly population. These elderly have certain characteristics and preferences which have to be mapped in order to see what kind of dwelling they prefer. Furthermore, the attributes of the vacant office buildings also have to be mapped. Successful transformation of vacant office buildings into suitable dwellings for elderly is about combining the attributes of transformed office buildings and preferences of the elderly and finding the best fit between them. If the needs and preferences of the elderly are not met, the transformed office buildings will not be attractive for them.

Research question

What are the housing preferences of the aging population and can vacant office space at the edge of the city be transformed to meet these preferences?

In order to be able to answer the main question better, five sub-questions have been formulated:

1. *What are the housing preferences of the aging population?*
2. *What do (future) elderly think of green and sport facilities in the area?*
3. *What environmental characteristics do (future) elderly prefer?*
4. *Do common facilities make a transformed office building more attractive?*
5. *What is the potential of vacant office buildings regarding transformation into dwellings for elderly?*

1.2 Research objectives and limitations

The goal of this research is to gain insight into the living preferences of the elderly and the future elderly generation. With the gained insight, it can be determined whether a vacant office building at the edge of the city can be made suitable for housing of the aging population or not. The outcome can provide information for municipalities, building owners and developers on how to redevelop these vacant office spaces.

The research will only focus on people aged 55 and older because these people are the elderly from now and the near future. Furthermore, a limited number of attributes can be taken into account due to the size of the experiment (chapter 3). Too many attributes might place too much load on the cognitive burden of the respondent or the experiment might become too long.

1.3 Research model

In order to answer the sub questions and the main question, data about the target group has to be gathered. The way the data is collected and further explanation will follow in the next paragraphs which describes the phases in the research.

1 Literature review – Chapter 2

The first phase consists of an extensive literature review focused on the aging population. The literature study is conducted in order to determine the housing preferences of the aging population. Furthermore, insight will be gained in preferences of the (future) elderly regarding green, sport facilities and environmental characteristics. Lastly the focus will be on potential of common facilities in a transformed office building at the edge of the city.

In the literature study there is also focus at the potential of vacant office buildings at the edge of the city. The amount, type and transformation potential of vacant office buildings will be analysed.

With the gained insight, further examination will be conducted in order to determine the most suitable survey method and relevant attributes. It is important to determine how to get the data from the elderly since computers are not commonly in use by them. Surveys can be conducted via paper for example and processed into SPSS.

2 Experiment – Chapter 3

In phase 2 the experiment will be developed. The attributes which will be part of the experiment are determined and a survey is set up. Choices made by individuals between different products (or services) can be analysed using the statistical technique called Discrete Choice Modelling (DCM) (Henser, Rose, & Greene, 2005). A discrete choice model describes the probability that a person will choose certain alternatives from a set of available alternatives. The Discrete Choice Model in this research will help to identify the impact of different attributes on the choice behaviour of (future) elderly.

3 Survey – Chapter 3

In phase 3 the data is collected via a stated choice experiment. There have to be enough respondents to the survey in order to conduct a reliable research. Therefore intensive collection of data is needed in order to gather enough to have reliable numbers per alternative and attribute.

Data for the discrete choice model is collected by means of a stated choice approach. Stated choice makes it possible to test hypothetical situations (like the possibility of living in a transformed office building at the edge of the city in this case). Stated choice makes it possible to gain insight in new situations and provide possible solutions.

There is also the revealed choice approach which can be used. However, revealed choice is less suitable for this research. The questions usually are about the current situation while this research is about the potential of a not yet existing situation (place to live). Furthermore, the questions are already in a certain direction this way and no hypothetical situation can be tested.

4 Analysis – Chapter 4

In the fourth phase all the collected and processed data will be analysed with a discrete choice model. The preferences will be connected with the attributes. The analysis of the data will be done by means of a discrete choice model such as a Multinomial Logit (MNL) model and Latent Class Model (LCM).

5 Conclusions and recommendations – Chapter 5

The last phase consists of the conclusion and recommendations. In the conclusion all the important outcomes of the research will be highlighted and discussed. Furthermore recommendations will be made for both future use of the research and the application of the results in practice.

1.4 Expected scientific and practical relevance

This research will be further research based on earlier research regarding housing preferences of elderly. Besides the preferences that are found in previous research, further research will be conducted in order to find other relevant preferences. Furthermore, the focus will be on a different area with the potential of vacant office buildings at the edge of the city for housing the elderly.

The outcome of this research will be an analysis of the housing preferences of the aging population. Another outcome is the analysis of the potential of vacant office buildings in meeting these preferences. With the gained insight, it can be determined which building attributes and environmental characteristics can make a vacant office building attractive for (future) elderly. Therefore developers, municipalities and building owners can make a quick scan of a building and see whether it can be transformed into an attractive complex for elderly or not.

2. Literature review

In chapter 2 the literature review is described. In section 2.1 the situation of the aging population in the Netherlands will be explained first. Furthermore the housing preferences of the aging population which are relevant for this research will be determined. This will be done by means of analysing previous studies about housing preferences of elderly. The goal of analysing previous studies is get answers at the sub questions 1 until 4 from section 1.1 (research problem). In section 2.2 the problems about vacant office buildings and the potential transformation of these buildings will be discussed. The insight gained in section 2.1/2.2 will help to answer sub question 5 (section 1.1, research problem). The last section of this chapter, section 2.3, provides an overview of the findings in section 2.1 and section 2.2.

2.1 Aging population: background information and housing preferences

2.1.1 Growing aging population and housing shortage

As mentioned in chapter 1 (introduction), the number of people older than 65 years (65-plussers) will grow from 2.7 million in 2012 to 4.2 million in 2040 (Raets, 2012). Furthermore, the number of households existing of people aged 65-80 years and aged 80 years and older will grow significantly until 2040 (CBS, 2015). The number of households existing of persons aged 65 and older will grow from 2.0 million in 2015 to 3.3 million in 2040 (CBS, 2015).

Another thing is that a significant share of the households from persons of 65 years and older are one-person households in 2040. Out of the households from persons aged 80 years and older, about 50% is a part of a one-person household. With the rise in numbers of one-person households loneliness might become more apparent. In section 2.1.4 loneliness and the relevance of loneliness in this research will be explained.

Most of the “border municipalities” will face a higher percentage of elderly in the population than bigger cities like Utrecht or Eindhoven (Manting & Vernooij, 2005) (de Jong & van Duin, 2009) (Kooiman, de Jong, Huisman, van Duin, & Stoeldraijer, 2016, pp. 24-25). Border municipalities will have a population that consists at least 24% of elderly in 2025. In the bigger cities the share of elderly will be around 18-20% in 2025 (figure 2). The main cause for the higher percentage of elderly in border regions is that the elderly stay there while less children are born and young people leave the region to live, work and study elsewhere (Kooiman, de Jong, Huisman, van Duin, & Stoeldraijer, 2016, pp. 24-25).

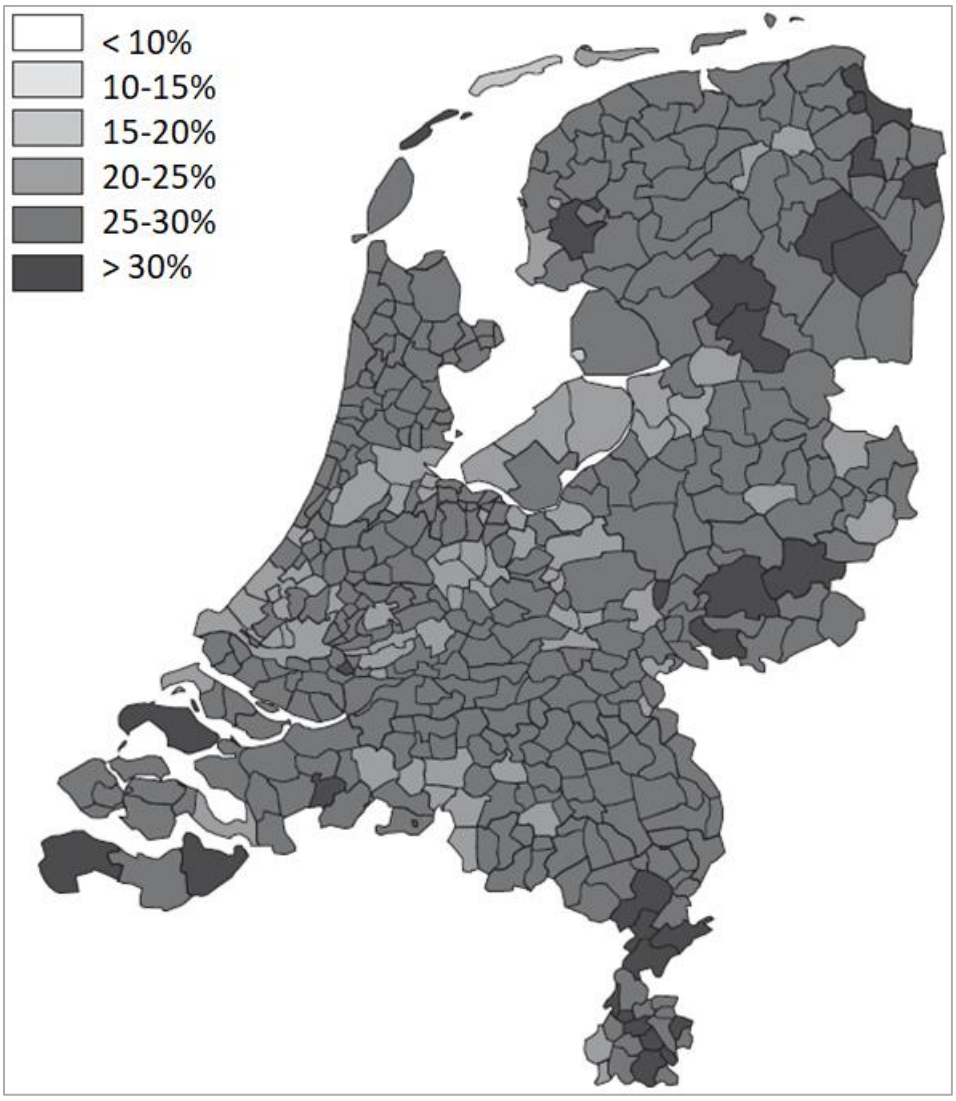


Figure 2: Share of elderly in 2014 per municipality (de Jong & van Duin, 2009)

Despite the fact that an aging population is expected, half of the municipalities expects a shortage of houses designed for elderly in 2020 (ANBO, 2016). The research of Ispo Facto (2016) points out that especially smaller municipalities (50.000 inhabitants or less) expect a shortage in 2020. A percentage of 62%-63% of the smaller municipalities expects a shortage in 2020. Out of municipalities with 50.000-100.000 inhabitants, 36% expects a shortage in 2020. The percentage of larger municipalities with at least 100.000 inhabitants which expects a shortage in 2020 is 8%. From the number mentioned above can be concluded that smaller municipalities have more difficulties with the growing aging population and providing enough houses than larger municipalities. An explanation for this might be that the percentage of elderly in smaller municipalities is higher and that bigger municipalities have more financial sources to build dwellings suitable for the elderly.

2.1.2 Elderly and housing preferences

Several studies about elderly and housing preferences have been done in the past. In the literature study, several studies are analysed. A detailed overview of all the results of the literature study can be found in appendix 5. In this section the main results will be mentioned.

First, the reasons why elderly move or stay will be discussed. The reasons why elderly move give insight in the housing preferences of (future) elderly (sub question 1). Elderly, who want to move, might want this because not all their housing preferences are met in the current situation. At first instance, people might think most people aged 55 years and older do not want to move anymore because most of them are satisfied with the current conditions. In the research of Voogd (2005), 94.6% is satisfied with the current situation for example. Also in other studies, most respondents are happy with the current situation. However, the difference between the percentage of people who are satisfied with the current conditions and people who want to stay in their home is considerable. In the study of Voogd (2009) about 42% of the respondents might want to move or is looking for another home (within five years). In the other studies most elderly are also satisfied with the current conditions – no exact percentages are mentioned – but a significant percentage might move or wants to move, (table 1 - ANBO, 2015; Bureauvijftig, 2015). Only in the studies of Nivel (2014) and Nijmegen (2015) there is a small percentage of people who want to leave or are looking of a new dwelling (table 1). A possible explanation for the difference might be the fact that target groups in the studies differ in the range of age. Furthermore, some studies were only conducted in a town while other studies were conducted in an entire region. The background of elderly might differ because of this.

Table 1: Percentages regarding moving

Group	Voogd[1] (2005)	Nivel (2014)	Bureauvijftig (2015)	ANBO (2015)	Nijmegen (2015)
Percentage of people who want to stay in their homes	58,2	79,0	31,0	34,0	85,0
Percentage of people who might move	27,3	-	57,0	28,0	-
Percentage of people who want to leave or are looking	14,6	21,0[2]	8,0	31,0	15,0

Another thing which stands out is the connection between the willingness to move and the age of the respondent. With higher age comes less willingness to move. This connection appears in several studies. In the research of Nivel (2014) people aged 57-61 want to stay

[1] Within five years
[2] When poeple need more care

where they live now less often (75%) than people aged 72-77 (84%). The results of the study from Nijmegen (2015) show that 18% of the people aged 55-65 years and 12% of the people aged 65 and older want to move. In the research of Voogd (2005) the connection is also visible (table 2).

Table 2: Age and willingness to move (Voogd, 2005)

	Move within five years		
Age (group)	No (%)	Yes (%)	Maybe (%)
55-65 years (future elderly)	51,0	18,2	30,8
65 years and older (current elderly)	63,4	11,9	24,6

In the research of Nivel (2014) another connection between characteristics of people and willingness to move is mentioned. Elderly with owner-occupied homes and/or high income tend to move less than elderly with low income and/or rental (Post, Poulus, van Galen, & van Staalduinen, 2012) (van Iersel & Liedelmeijer, 2010).

Elderly who want to stay or move have their reasons for their decision. In all studies one main reason for staying is mentioned, namely that most respondents are satisfied with the current conditions and have no reason to move. Some people also take preliminary measurements regarding health issues, but these measurements are related to their own house. The house is made suitable to live in when people are older by means of adjusting doors and stair elevators for example (Lijzenga & van der Waals, 2014). Because of the adjustments, elderly can stay as long as possible where they live now if they want to.

There are several reasons for moving, but a few main reasons are mentioned in the results of the studies. In the research of van Aken and Kerkhof (2009) an overview of the reasons to move is presented, this overview is mostly similar to the results of the other studies (figure 3, next page).

The first reason to move is that people want a house where all the important rooms are on one floor (ANBO, Wonen en Verhuizen, 2015) (Nijmegen, 2015) (Voogd, 2005) (Lijzenga & van der Waals, 2014) (van Aken & Kerkhof, 2009). The living room, kitchen, bedroom and bathroom can be considered as important rooms. The reason behind this is that elderly have difficulties walking stairs because of their physical ability, this can be considered as a mobility constraint. In the study of Van Aken and Kerkhof (2009) having all rooms on one floor is the most important reason to move (figure 3).

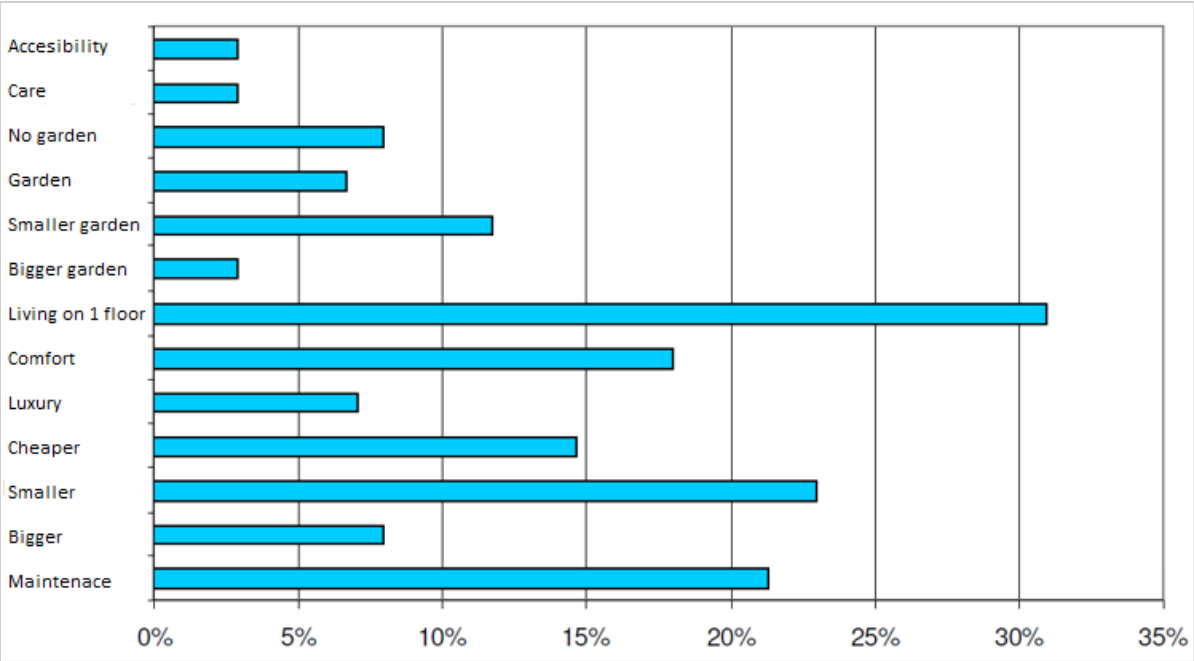


Figure 3: Motives for moving (Van Aken & Kerkhof, 2009)

Another reason which emerges in the studies also has to do with physical ability. Elderly tend or want to move because of the amount of maintenance of the house and garden (figure 3). Furthermore, living in a smaller house and comfort are important reasons to move (figure 3) (ANBO, Wonen en Verhuizen, 2015) (Bureauvijftig, 2015) (Lijzenga & van der Waals, 2014) (Nivel, 2014) (van Aken & Kerkhof, 2009) (Voogd, 2005).

Lijzenga and van der Waals (2014) also mention that quality of amenities is not the main factor for the elderly to move. However, elderly experience close distances to amenities as pleasant. Lijzenga and van der Waals (2014) try to explain this with following three reasons:

1. In many cases dwellings designed for elderly are already close to the most important amenities. Because of this, elderly experience close distance to amenities as something taken for granted and elderly do not think of it as a choice anymore.
2. Close distances became less important during the last years. The cause for this is that goods can be delivered at home for example. Another example is that Taxi Busses provide enough mobility for elderly to get to amenities.
3. In smaller municipalities elderly often have no choice because of the fact that there is only one shopping centre. Because of this, distance to amenities is not experienced as a choice.

In most studies, people prefer a rental property instead of an owner-occupied property when they move. Only in the research of Voogd (2005) more people (48,7%) want an owner-occupied property than a rental property (24,6%). Furthermore, Voogd (2005) mentions the connection between income and owner-occupied or rental property, higher income leads to

higher preference of owner-occupied property. In the research of ANBO (2015), 65,0% from the people who own a house would choose for rental property instead of buying a house again (35,0%). Also in the research of Nijmegen (2015) more people prefer a rental property. The fact that Voogd (2005) comes with the low rental property numbers, might come from the fact that the research was conducted is Haren (20.000 residents) where more people have an owner-occupied property instead of a rental property.

Both elderly who live in a rental and owner-occupied property have living costs. In the research of Bureauvijftig (2015), elderly were asked what living costs they prefer in the current situation or in the future. A majority prefers living costs between 500-750 euro per month (including gas, water and electricity).

The result of the studies shows that most (future) elderly prefer an apartment when they move in the future. In the research of Voogd (2005) 48.7% of the respondents prefers an apartment and about 25,0% in a detached or semi-detached house. The consumer panel of Nivel (2013) shows that most of the respondents want to move to an apartment, a house for elderly or a “aanleunwoning” (dwelling next to care centre where people have to possibility to use the services and amenities of the care centre). An explanation for this might be that – as mentioned before – most people move because they want to live in a house with all important rooms on one floor. Furthermore, an apartment requires less maintenance than a detached or semi-detached house due to the size and the lack of a garden in most cases for example.

In the research of Bureauvijftig (2015) respondents mention a few attributes of the house which they find most important. First, the ideal home counts three rooms and has a surface om 80-110 square meter. Furthermore a balcony or garden, living on the ground floor and living close to care facilities are considered important. However, not all outcomes of the studies show that three rooms are preferred. In the research of Nijmegen (2015) elderly prefer a second bedroom which also can be used for other activities or purposes. Results of Van Aken and Kerkhof (2009) show that when it comes to apartments, the size of the balcony is the most important characteristic (figure 4). The size of the living room and architecture are the second most important characteristics of the house (figure 4). The larger the surface of the balcony and living room, the bigger the preference for the apartment is.

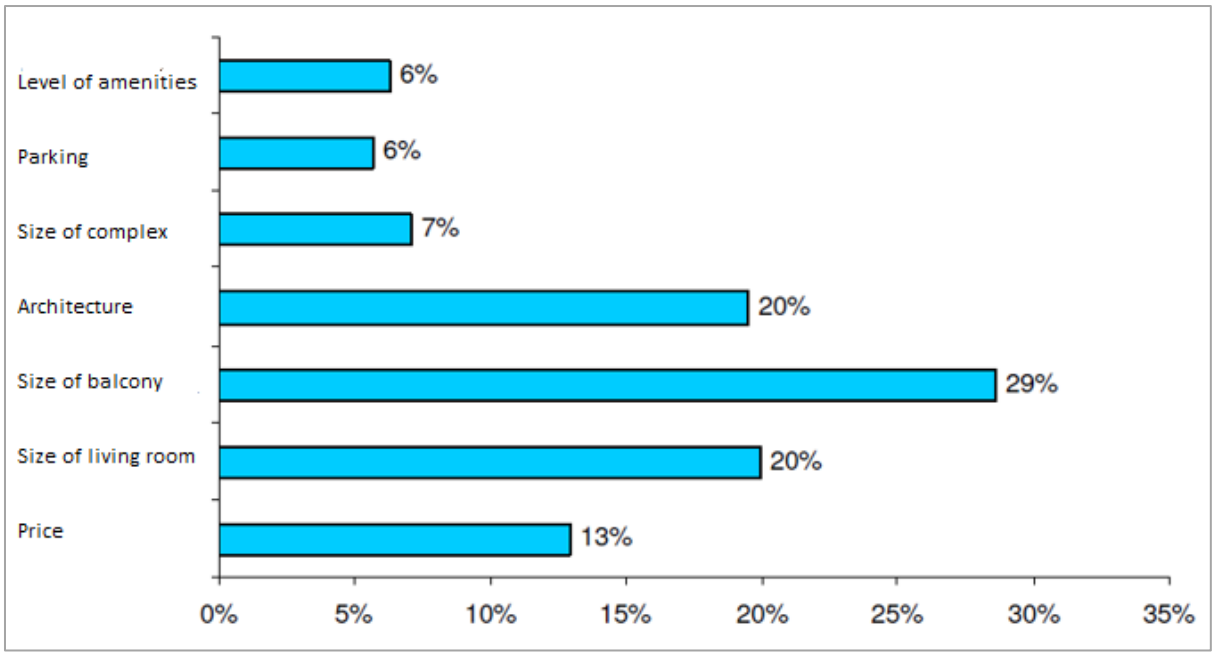


Figure 4: Weight of different attributes of an apartment (van Aken & Kerkhof, 2009)

Elderly prefer several kinds of services. In the studies of Voogd (2005) and Bureauvijftig (2015) elderly consider a handyman, household help and help with garden maintenance as the most important services which they might use. However, not all elderly are interested in services. In the research of Bureauvijftig, about 50% of the elderly is interested in services. Furthermore, Bureauvijftig (2015) mentions that when it comes to services, the preference lies in paying for actual use per service. Elderly do not prefer a subscription for services.

When elderly move, they have more wishes besides that the dwelling is an apartment and it had certain surface or amount of rooms. Nivel (2014) refers to other studies where elderly talk about living independent, in this case this means living without help from others every day with the daily activities. When elderly want to move, 85% wants to move to a dwelling where they can live independently. However, elderly want to live close to a care centre or in a dwelling designed for elderly (van Iersel & Liedelmeijer, 2010) (Kullberg, 2005). In more studies elderly prefer to live in dwellings designed for elderly. Nivel (2014) mentions that a house designed for elderly (Dutch: seniorenwoning) or a dwelling connected to that of a family member are the most preferred house if people have to move. Also in the research of ANBO (2015) many elderly (81% percent of the respondents who might move) want to live in a dwelling designed for elderly. Furthermore, most respondents (47%) prefer to move to a dwelling which is already adjusted for them instead of adjusting it themselves (24%).

It seems most elderly prefer to live in some kind of dwelling designed for elderly. However, the knowledge among dwellings for elderly limited as Bureauvijftig states. Most elderly know the traditional dwellings like a house dwelling for elderly, service apartment, live/care centre and a dwelling connected to the dwelling of family members. Modern initiatives such as small communities are not well known among elderly. During the last decades, many initiatives and

ideas regarding housing for elderly have been tested and applied in the society. Between living independent at your own dwelling and living in a care centre for elderly many forms of housing can be found. It is important to get an overview of all dwelling types and which types might be applicable. The following dwelling types might be applicable:

Aanleunwoning: Is a dwelling in or next to a care centre where the residents can make use of the care and the services/amenities of the care centre.

Gestippeld wonen: Is a type of dwelling in which members of a house group live spread across a house block. Every resident has his/her own apartment, but residents help each other with care etc. They also undertake activities together.

Serviceflat: Is an apartment block where people can make use of paid services like a handyman, cleaning service or food delivery.

A detailed description of all dwelling types is shown is appendix 8 (KCWZ, 2018) (Woonz, 2018) (Stijvolouder, 2018).

Besides the characteristics of the dwelling itself (like apartment surface or presence of balcony), there are also the characteristics of the environment. From the research of Voogd (2005), Nivel (2014), Bureauvijftig (2015) and Nijmegen (2015) a global picture comes forward regarding preferences for location and amenities. In the research of Voogd (2005) the most important amenities mentioned by the respondents are:

- Shops for daily supplies;
- Family doctor;
- Post office;
- Bus station;
- ATM.

These amenities also come forward in the other studies. Regarding location, there are similarities and differences between the results of the studies. In all studies the (future) elderly want to live close to amenities such as shops or a family doctor. The distance to amenities seems more important than the location in a town or city. In the research of Voogd (2005) 37.4% of the respondents who might or do want to move, want to move to the city centre, the other part of the respondents prefer many options like different parts of the city or another municipality. In research of Nijmegen (2015) people like to stay in their own neighbourhood because of social connections. So people do not prefer an exact location in a town or city, but they prefer to live close to amenities (and sometimes also their social connections).

2.1.3 Aging population and green/sports

In the studies discussed until now the attributes of the apartment itself and amenities such as shops and care facilities were highlighted. One of the aspects that has not been mentioned – expect in the shape of a garden – in the studies is green. In order to answer sub question 2 (section 1.1) further insights have to be gained in studies about green and sports.

Green can be considered as an important aspect of living, for example green contributes to the well-being of elderly living in cities (Reformatorisch Dagblad, 2017). A literature study of Wen, Albert & Von Haaren (2018) shows that empirical studies on the elderly's preferences not only focus on landscape aesthetics but also on other human needs. Relevant studies about needs can be categorized into five interrelated groups (Wen, Albert, & von Haaren, 2018):

(1) Green spaces and open spaces that can promote elderly people's walking and other physical activities;
(2) Parks that can promote participation;
(3) Green spaces that can support social contacts and wellbeing;
(4) Therapeutic gardens and space;
(5) Aesthetic and attractive green spaces.

Taking these aspects into consideration it can be assumed that green has a positive influence on the quality of life of elderly. Therefore it might be interesting to use green in the experiment which will be explained in chapter 3. For example, green can be implemented in the experiment by means of offering a parc around the transformed office building at the edge of the city.

Another aspect which requires attention is physical activity. Physical activity contributes to the health and wellbeing of elderly. Since more than half of the Dutch population (56%) participates in sport at least once per week (de Zeeuw, 2016) (SCP, 2014), sport is an important part of the daily live. A percentage of 65% from people aged 50-65 years and 55% of people aged 65-79 years sports at least 12 times per year. In terms of sporting per week, between 2013 and 2016 about 40% of people aged 65-79 years participate in sport weekly (MAX Vandaag, 2017). Fitness is the most popular sport among elderly followed by swimming and tennis (table 3). It can be noted that sports can be considered as an important part of the daily life of elderly. In order to use this in the experiment (chapter 3), sport facilities can be offered as a part of the presented alternative in the experiment.

Besides sports, walking and cycling can also be considered as physical activity. It is important to create place where elderly can take a walk for example. This can be done by means of a parc next to the building as a part of the presented alternative. In chapter 3 the implementation into the experiment will be explained.

Table 3: Popular sports among (future) elderly (MAX Vandaag, 2017)

Top five popular sport of people aged 50-65	Top five popular sport of people aged 65-79
1. Fitness	1. Fitness
2. Jogging	2. Swimming
3. Tennis	3. Tennis
4. Swimming	4. Gymnastics
5. Yoga	5. Golf

2.1.4 Aging population and loneliness

As mentioned in section 2.1.1, lonileness is something that might become a problem because of the large number of single person households. In 2012 1 million of the 2.9 million people aged 65 years and older felt lonely (Achtzaam, 2015). Some of these people (200.000) have contact once per month and 10.000 of them never got any visitors at the time. Furthermore, there rests a taboo on loneliness, people do not like to admit that they are lonely. Because of this the real number of lonely elderly might be higher (Achtzaam, 2015). Elderly only mention that they are lonely when the researchers kept asking about it (Lijzenga & van der Waals, 2014).

Lijzenga and van der Waals (2014) mention that loneliness can be a reason to move. However, it is almost never the main reason but one of the underlying reasons. As pull factor the meaning of loneliness is more significant. Elderly tend to choose for a house with people of the same age because they think they can make contact easier. This is why loneliness is relevant in this research. A transformed office building at the edge of the city might become more attractive for lonely elderly when there are better possibilities for social contact than in the current situation. Creating better possibilities for social contact might be possible by means of common facilities for elderly.

2.2 Vacant office buildings

As mentioned in chapter 1, according to the PBL (2018) 15.9% of the total surface of office buildings is vacant in the Netherlands. This comes down to a total of 7.67 million square meters of lettable floor space (CLO, 2018). The total surface can be divided in structural (>3 years), long-term (1-3 years) and friction vacancy (<1 year). The biggest part of the total vacancy exists of structural vacancy (5 million square meters), long term and friction vacancy are significant smaller parts of the total vacancy (figure 5). The amount of structural vacancy can be considered notable. For example, with dwellings of 100 m^2 on average, 50.000 dwellings could be created from vacant offices. However, not every vacant office building is suitable for transformation into dwellings. According to Rabobank (2017), 37.000 dwellings of 70 m^2 can be created from transformed office buildings.

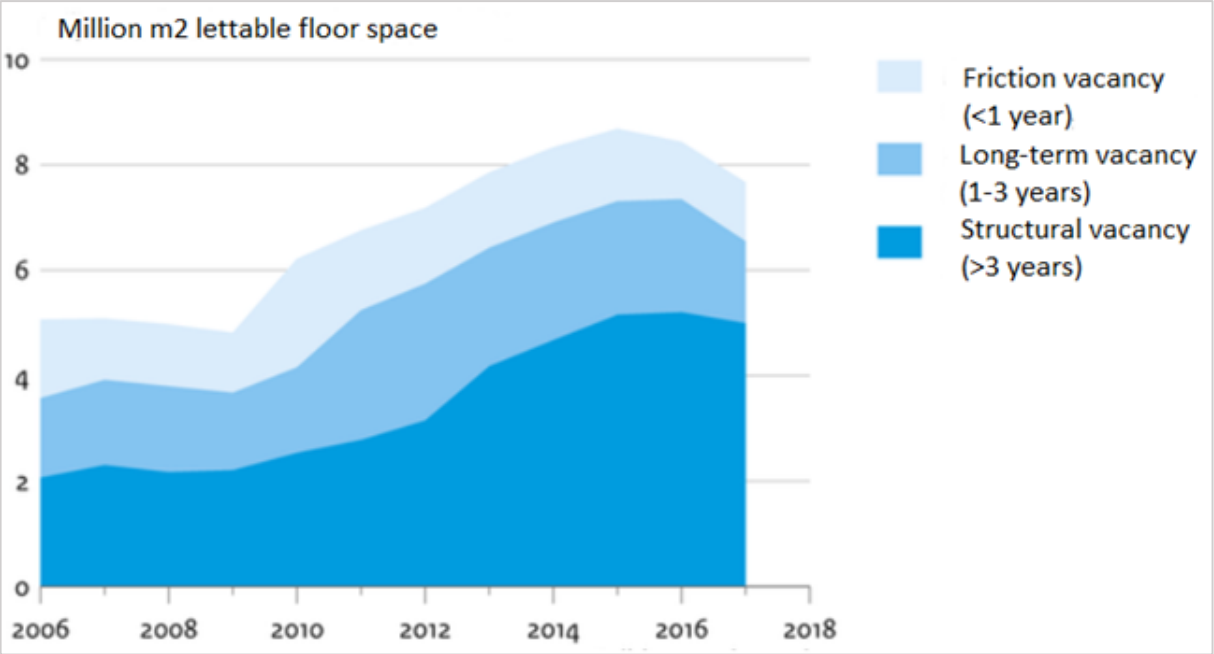


Figure 5: Amount of vacant officle floor space in the Netherlands (CLO,2018)

JJL (2015) mentions that despite the fact that the Dutch economy is growing, no increase of office job related growth is expected. An example that JJL (2015) mentions is the Dutch tax authorities who said that they wanted to swap 4000 to 5000 employees with 1000 new ICT employees. The further automatization of the economy will pressure the demand for office space in the future (JJL, 2015).

Because of the pressure of demand for office space, the amount of office buildings which are structurally vacant and the problems mentioned by Remøy and van der Voordt (2007) which arise from it, municipalities and other parties have been looking for solutions in order to solve these problems. There are three options for municipalities and building owners regarding vacant office buildings.

1. Do nothing and risk further deterioration of the area.
2. Demolish the buildings and build something new: this is applicable when the building is not suitable for use or transformation anymore.
3. Transform the building and make it suitable for another purpose: Transformation is the process of changing of existing real estate, that reached the end of its lifespan because of aging, vacancy or bankruptcy of the owner for example (Luyt & Boswinkel, 2016) (Remøy H. , 2010).

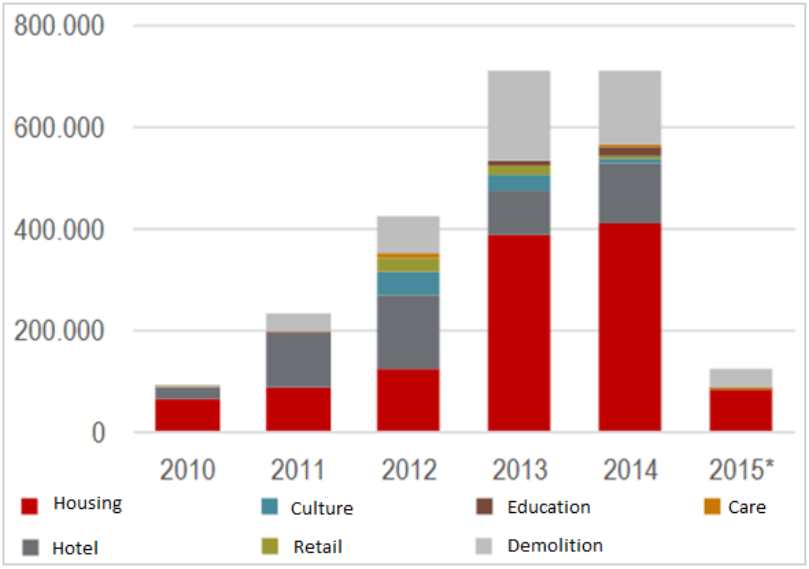


Figure 6: Transformation purposes in square meter (RVO, 2014)

About 470.000 m2 of vacant office space has been demolished and 1.8 million m2 has been transformed from 2010 to 2014 (figure 6). Office buildings are mainly transformed for residential purposes and less frequent into hotels. Apparently, parties favour transformation above demolition when a place is being developed. So why buildings are transformed more often than they are demolished? What is the potential of transformation? First of all there is the legal side of demolishing a building. A building can have a monumental status for example. In this case demolition is not allowed. Furthermore, the municipality must authorize the demolition first before any demolition of an office building can commence (VNG, 2018). There are also cases where the development plan allows less space (cubic meters) with new buildings than the building that is already there (RVO, 2014). The government also tries to stimulate transformation of building via legal procedures. According to Bullen (2009) the ability to make commercial buildings attractive to developers as viable reuse projects relies heavily on the use of legislation that reduces code and zoning requirements and offers substantial financial incentives in the form of tax concessions. In the Dutch building code of 2012 there are adjusted requirements when it comes to transformation (RVO, 2014). These requirements for elements of the building which stay (almost) the same are less strict than something new is built. Another stimulation from the government is the RVV (Dutch: Regeling Vermindering Verhuurdersheffing). This regulation makes sure that parties who transform building into apartments for rent for example pay less levy/charge for renters (RVO, 2018).

Furthermore, in most cases less material is needed with transformation than building something new. With this also come lower costs if the structure of the building is suitable for

transformation. Keeping certain elements of the building can reduce costs (RVO, 2014). Furthermore Remøy and Wilkinson (2012) mention that the drivers for conversion or transformation may be social, environmental and/or economic as well as functional obsolescence. According to Bullen (2007) adaptive reuse enhances the longer-term usefulness of a building and is therefore a more sustainable option than demolition and rebuilding. The positive benefits for adaptive reuse identified during the research of Bullen also support the tenets of sustainability and include (Bullen , 2007):

- reducing resource consumption, energy use and emissions;
- extending the useful life of buildings;
- being more cost effective than demolition and rebuilding;
- reclaiming embodied energy over a greater time frame;
- creating valuable community resources from unproductive property;
- revitalizing existing neighbourhoods;
- reducing land consumption and urban sprawl;
- enhancing the aesthetic appeal of the built environment;
- increasing the demand for retained existing buildings;
- retaining streetscapes that maintain sense of place.

Besides the benefits, Bullen (2007) also mentions that there are barriers to adaptive reuse, which invariably concern costs. However, according to Bullen (2007) this is often a smoke screen obscuring the real reason that it is easier under current development processes to produce a new building. Adaptation of existing buildings is frequently considered to be less creative than producing a new building and therefore is less attractive. The range of barriers to adopt adaptive reuse for an existing building identified during the research of Bullen includes (Bullen , 2007):

- only being viable where the costs and benefits are factored in over the life of the building;
- building owners see no economic benefit in reuse;
- older buildings may require extensive and costly refurbishment;
- inability to match the performance of a new building;
- ongoing maintenance costs may be higher than a new building;
- older buildings may be unable to meet current sustainability standards;
- availability and price of matching existing materials may create problems;
- maintaining the structural integrity of older buildings may be difficult.

The initiative might have to come from the Dutch government in order to reduce the experience of some of the barriers mentioned above. With the application of the “RVV” and

lower standards and requirements in the building code as mentioned earlier, the Dutch government took steps in order to stimulate transformation of office buildings.

Despite the barriers mentioned above, reuse of building receives substantial support as a process that has potential to satisfy the tenets of sustainability. However, any consideration of adaptive reuse should certainly incorporate an assessment of the merits of reusing a building on an individual basis (Bullen , 2007).

Regarding the potential of transformation several aspects have to be considered (Deloitte, 2015) (Rabobank, 2017). The first aspect is that not every vacant office building is suitable for transformation because of technical reasons. The structure of the building might be insufficient or not suitable for residential purposes, even after transformation. Rabobank (2017) refers to a study of Deloitte (2015) which shows that more than a third (35%) of the vacant office space (8.7 million square meters in 2015) can be transformed into dwellings. That is equal to about five percent of the total need for dwellings in the 258 municipalities which are researched. Only municipalities with an office space supply bigger than 10.000 m^2 and office buildings bigger than 500 m^2 were considered in the research. About 25.000 dwellings (of about 85 m^2) can be created for a total demand of 490.000 dwellings until 2025 in these municipalities (Deloitte, 2015). Figure 7 shows that not everywhere the amount of potential is the same, the most potential is in the provinces of Noord- and Zuid Holland followed by Gelderland, Utrecht and Noord-Brabant.

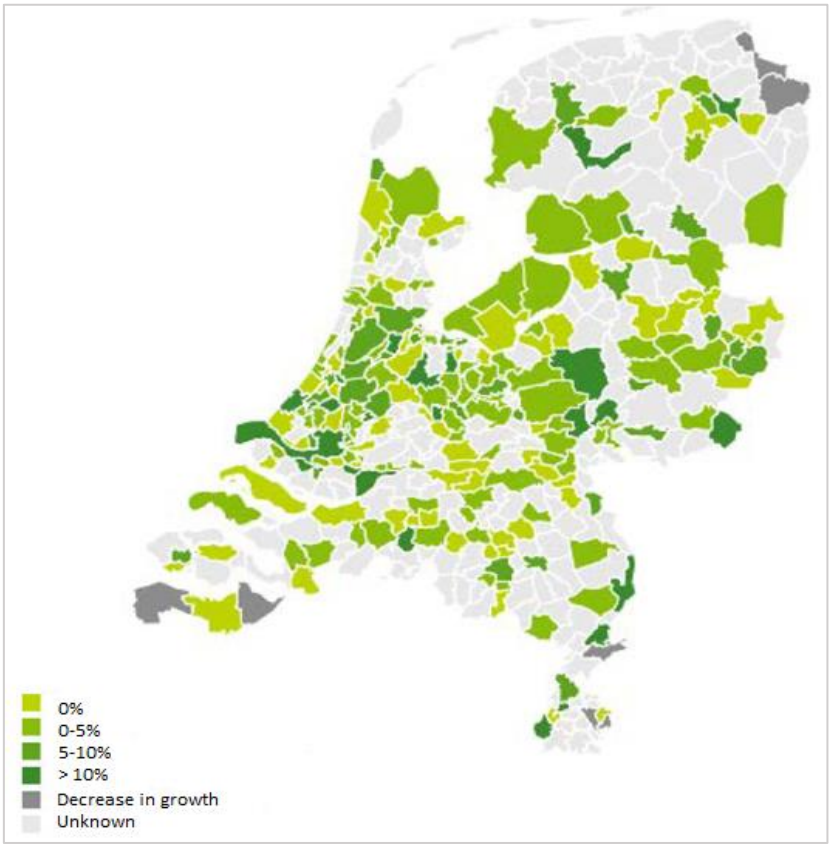


Figure 7: Potential percentage of total growth household amount which can be filled in with transformation of offices (Deloitte, 2015)

Another aspect is that there might be not enough demand in a certain region or the location is not attractive. In some municipalities there might be suitable buildings, but there is no demand because there is no growth in the number of households or a decreasing number of households (figure 7, grey coloured areas). People might have preferences and not every building or location meets these preferences and is considered unattractive by the target groups. Not every office location is suitable for housing. Remøy, de Jong and Schenk (2011) mention that in the Netherlands, 70 percent of the vacant office buildings are located in mono-functional office locations. These locations generally have a low level of public and commercial services and facilities and although they are well accessible by cars, they are not well accessible by public transportation. In such locations transformation is only possible as part of a large-scale location transformation, as under the current circumstances nobody would like to live there. Location characteristics are important for people's choice of where to live and work, and distance to the city centre is an important aspect (Remøy, de Jong, & Schenk, 2011).

When actors invest in a transformation project, they want to see a return of investment. NVM Business (2016) produced a report in which 10 transformation projects were analysed (table 4). When the rent income, maintenance costs and management costs are considered, some projects seem more successful than other projects. The "profit" (rent minus maintenance costs and management costs) per year from the Italiëlaan-Zoetermeer (€2.000) is significantly lower than the Einsteinbaan-Nieuwegein (€200.200) for example (table 4). The results of the projects show that the transformations can be considered as successes.

Table 4: Results of transformation projects in the Netherlands (NVM, 2016)

Project	GFA (m2)	Dwellings (amount)	Building costs	Maintenance costs per year	Management costs per year	Rent per year
Brinkwal, Niewegein	1.585	25	€ 2.749.000	€ 34.375	€ 33.725	€ 173.400
Einsteinbaan, Nieuwegein	4.330	50	€ 5.485.000	€ 68.750	€ 67.450	€ 336.400
ACTA, Amsterdam	20.000	460	€ 3.910.000	-	€ 165.600	-
Elsevier, Amsterdam	12.000	245	€ 17.500.000	-	-	€ 1.150.000
Olmenhof, Amstelveen	2.500	95	€ 540.000	-	-	€ 36.000
Koestraan, Middelburg	3.985	452	€ 4.860.000	€ 70.680	€ 78.480	€ 557.000
Nedinsco, Venlo	9.250	27	€ 14.392.003	€ 245.135	€ 231.755	€ 654.837
Populier, Schoonhoven	1.600	22	€ 4.413.000	€ 9.750	€ 6.250	€ 174.000
Italiëlaan, Zoetermeer	5.000	67	€ 7.752.000	€ 72.500	€ 67.600	€ 142.120
De Hulk, Almere	2.000	27	€ 5.300.000	-	-	€ 17.500

Municipalities and other organisations are trying to map all the vacant office buildings and their characteristics in the Netherlands. This is done to create an overview in response to the amount of vacant office building and the potential of buildings/locations. There are overviews like the "Transformatieatlas 2017" from the Rabobank (2017) (figure 8), the "leegstandmonitor 2014" of the municipality of Eindhoven (2014) and the database of the Province of Noord-Brabant (2017) (figure 9). These databases might be interesting for selecting vacant offices at the edge of the city to use in case studies. Furthermore, figure 8 and 9 show that most vacant office buildings are located at the edge of the city of Eindhoven. Another important aspect is the energy label. A vacant office building must be able to be upgraded to a better energy label such as A or B to be suitable for (future) elderly to live in.

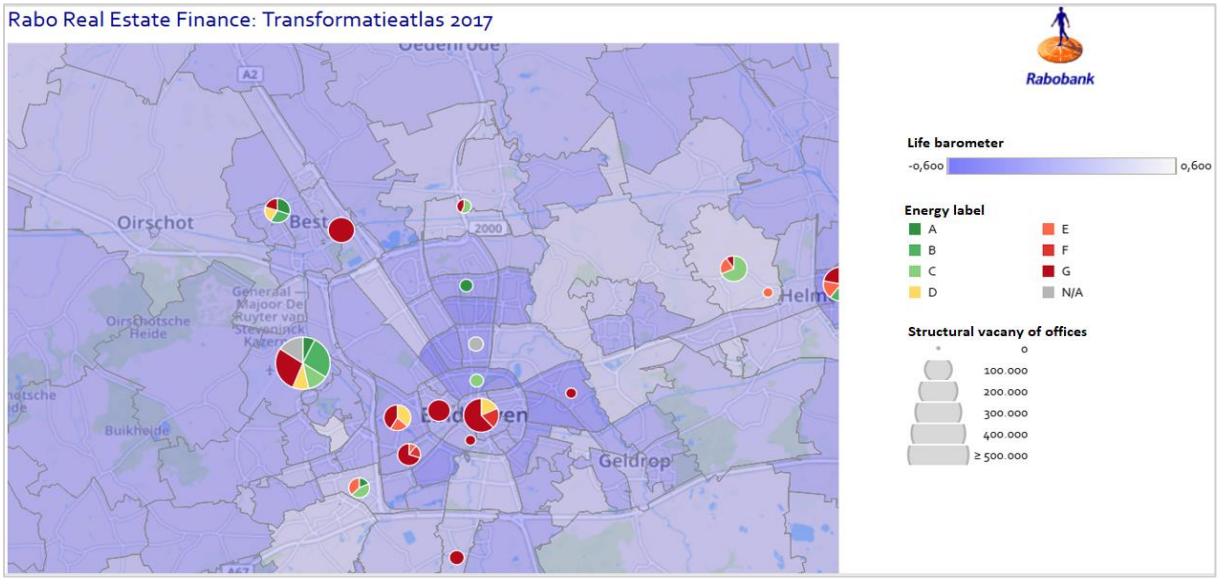


Figure 8: Screenshot of the transformation atlas (Rabobank, 2017)

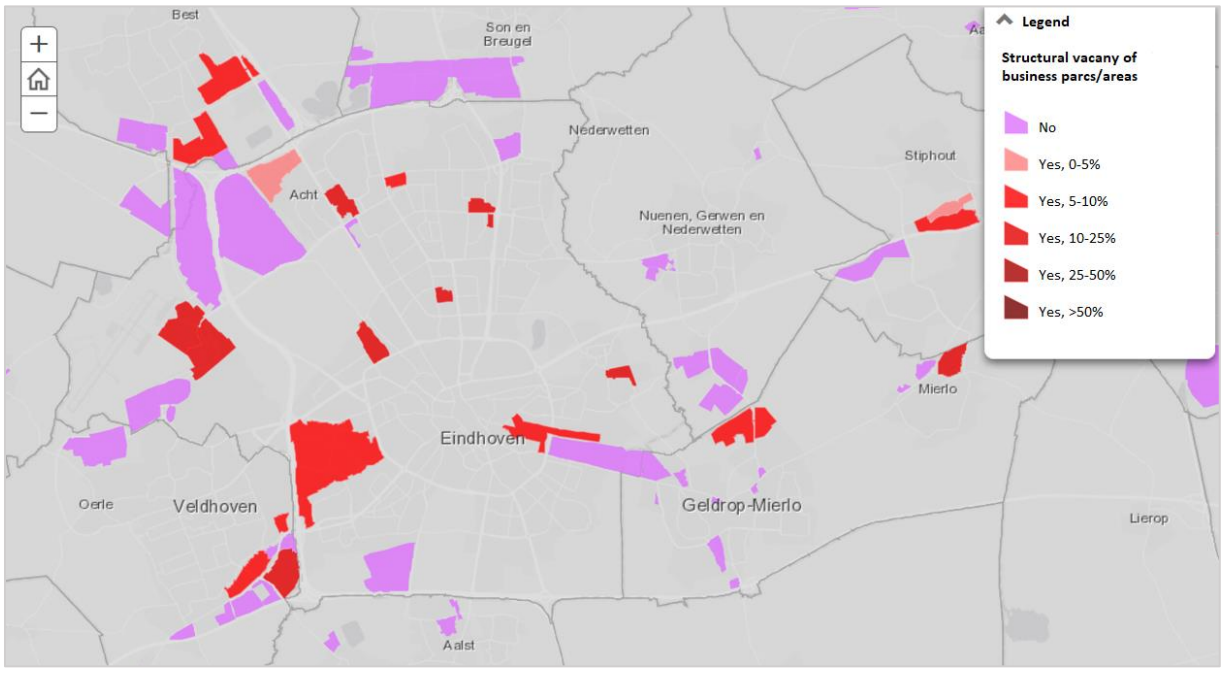


Figure 9: Screenshot of the vacancy map of Eindhoven and region (Province of Noord-Brabant, 2017)

2.3 Conclusion of literature review

The number of people aged 65 years and older will rise with 1.5 million from 2012 to 2040. With this the number of household from people aged 65 years and older will also rise. One-person households will also become more apparent, with this comes the potential increase of elderly feeling lonely. Besides loneliness elderly require a certain kind of house that meets their preferences . However, a significant share of the Dutch municipalities expects a shortage of houses for elderly in the future. So there is a growing group of elderly but not enough suitable houses are built for them.

Because of the aging population and housing shortage, several studies have been done in order to gain insight in elderly and their housing preferences. The main outcomes and important aspects of the studies were the reasons to move (or stay) at the current house and the preferences elderly have regarding housing. The most important reasons why elderly move (or not) are:

- Stay: People are satisfied with the current situation and have no reason to move;
- Stay: Attachment to neighbourhood and their social contacts;
- Stay: House can be adjusted to live in longer;
- Move: Living in a one level house because of trouble walking stairs;
- Move: Maintenance obligation of the house and garden;

Based on the preferences, the most important characteristics of an apartment are:

- Senior home designed for elderly;
- One level house;
- Private balcony present;
- Rent of €500 to €750 per month;
- Surface of 80-110 square meter;
- Important amenities which have to be close are:
    - Shops for daily supplies;
    - Family doctor;
    - Post office;
    - Bus station;
    - ATM.

So the relevant housing preferences of the aging population are determined now. The reasons for moving can be used with the design of a dwelling for elderly in a transformed office building at the edge of the city. An apartment which requires little maintenance and where all rooms are on one level is attractive for elderly who want to move. Furthermore, the attributes will be implemented in the alternatives in the experiment.

With the preferences and list of most important attributes (mentioned above) sub question 1 (section 1.1) is answered. These characteristics can be implemented in a transformed office building at the edge of the city to meet the preferences of the (future) elderly. The answer at sub question 2 is that green and sport facilities have a positive influence at the wellbeing of elderly. Therefore green and sport facilities might have a positive influence on the attractiveness of a transformed office building at the edge of the city. In order to test the attractiveness of green and sports facilities, they will be implemented in the experiment.

Common facilities might make a transformed office building at the edge of the city more attractive. Opportunities for social provided by common facilities might be a pull factor for elderly which are lonely. Therefore, common facilities might be interesting to implement in order to determine whether they can make a transformed office building more attractive or not.

Besides the aging population, the focus of the literature study was also on vacant office buildings at the edge of the city. About 5 million square meter of office buildings was structural vacant in 2017. Research mainly has been done on younger target groups and buildings in the city centre. Office buildings at the edge of the city tend to be structural vacant more often. Vacancy is a problem on different levels for both the municipality and building owner. Therefore it is needed to find a solution for these vacant buildings. Besides demolition, transformation provides a solution for vacant office buildings at the edge of the city. Transformation has several advantages amongst demolition and can lead to a revival of a location in a city or town. Regarding financials there is enough potential for profit and return on investment based on several reference projects when it comes to transformation.

3 Methodology

In chapter 3 the methodology of the research is discussed. The goal of this chapter is to explain how the findings from chapter 2 are implemented in the experiment. Furthermore, the goal is to explain how the results of the experiment are processed and which model is used to analyse the results. First, the theory behind the choice experiment is explained in section 3.1. In section 3.2, the setup of the experiment is explained. The processing of the results and the theory behind the model which is used to analyse the results, is explained in the last three sections (3.3, 3.4 and 3.5).

3.1 Choice theory: choice experiment

Ben-Avika and Lerman (1985) state that a choice can be viewed as an outcome of a sequential decision-making process that includes the following steps:

1. Definition of the choice problem;
2. Generation of alternatives;
3. Evaluation of attributes of the alternatives;
4. Choice;
5. Implementation.

An example of the steps mentioned above is the way someone travels to work. He can take the bus, train, car, bike or walk. Here the definition of the problem would be “What transport mode to use to get to work”. Now the choice is not dependent on the alternatives themselves, but rather on the attributes of the alternative: what is the price per alternative, how much time does each one take, what is the level of comfort etc. Eventually the decision maker applies some decision rule, which is some sort of calculation to select the best alternative (Wittink, 2011).

If there are multiple alternatives in a choice set, the decision maker (in this case an individual) needs a decision rule to choose from the available alternatives in the choice set. The decision rule describes the internal process used by a decision maker to process the available information and make a unique choice. There are four rules that can be classified into four categories (Wittink, 2011):

1. Dominance rule: The dominance rule is used when only one of the attributes of the alternative is better than the other one while the others are the same. This is usually used to exclude the worst alternatives and does not lead to a unique choice.
2. Satisfaction rule: The satisfaction rule is about that every attribute of an alternative must represent a minimum level of satisfaction. The alternatives with attributes which

do not represent the minimum level of satisfaction are excluded; this does also not lead to a unique choice.

3. Lexicographical rules: With lexicographical rules, attributes are sorted by importance. The decision maker first looks to the most important attribute. When both alternatives from a choice set have the same value for the most important attribute, the decision maker moves on to the second most important attribute. The choice is based on the value of the first attribute which has no equal values in both alternatives.
4. Utility rule: This utility rule assumes a vector that defines an objective function expressing the attractiveness of the attributes of an alternative. This attractiveness is referred to as the utility. The utility is a measure that the decision maker tries to maximize. The choice is based on the utility of an alternative.

Of these four categories utility has been used mostly in recent models. Utility is often referred to as a function, the utility function. The utility function describes the importance of each attribute and the overall preference for an alternative (Louviere, Hensher, & Swait, 2000):

$$U_{ni} = V_{ni} + \varepsilon_{ni} = \sum_{k=1}^{K} \beta_k x_{nik} + \varepsilon_{ni}$$

U_{ni} = overall utility that consumer n obtains from alternative i;
V_{ni} = structural utility of alternative i for individual n;
ε_{ni} = error term (random utility component);
β_k = utility weight for attribute level k;
x_{nik} = attribute variable k of alternative i.

When considering data needed to get insight into preferences, it is possible to divide these data in two distinct types: stated preference (SP) and revealed preference (RP) data. RP data refer to situations where the choice is actually made in real market situations; in contrast, SP data refer to situations where a choice is made by considering hypothetical situations (which are typically the same alternatives in the RP data set, but are described by different levels of the same attributes to those observed in actual markets as well as additional attributes not in the data collected from actual markets). SP data are especially useful when considering the choice among existing and new alternatives since the latter are not observed in RP data (Hensher, Rose and Greene 2005)

SP data are collected through experimental situations or surveys where the respondents are faced with hypothetical situations. For example, the respondent has to make a choice between five bikes which are described by means of a number of attributes. The bikes are the only ones available in this hypothetical situation. The response is the stated choice (Wittink, 2011).

3.2 The experiment

The steps taken in the process of setting up an experiment will be based on the stages defined by Hensher, Rose and Greene (2005)(figure 10).

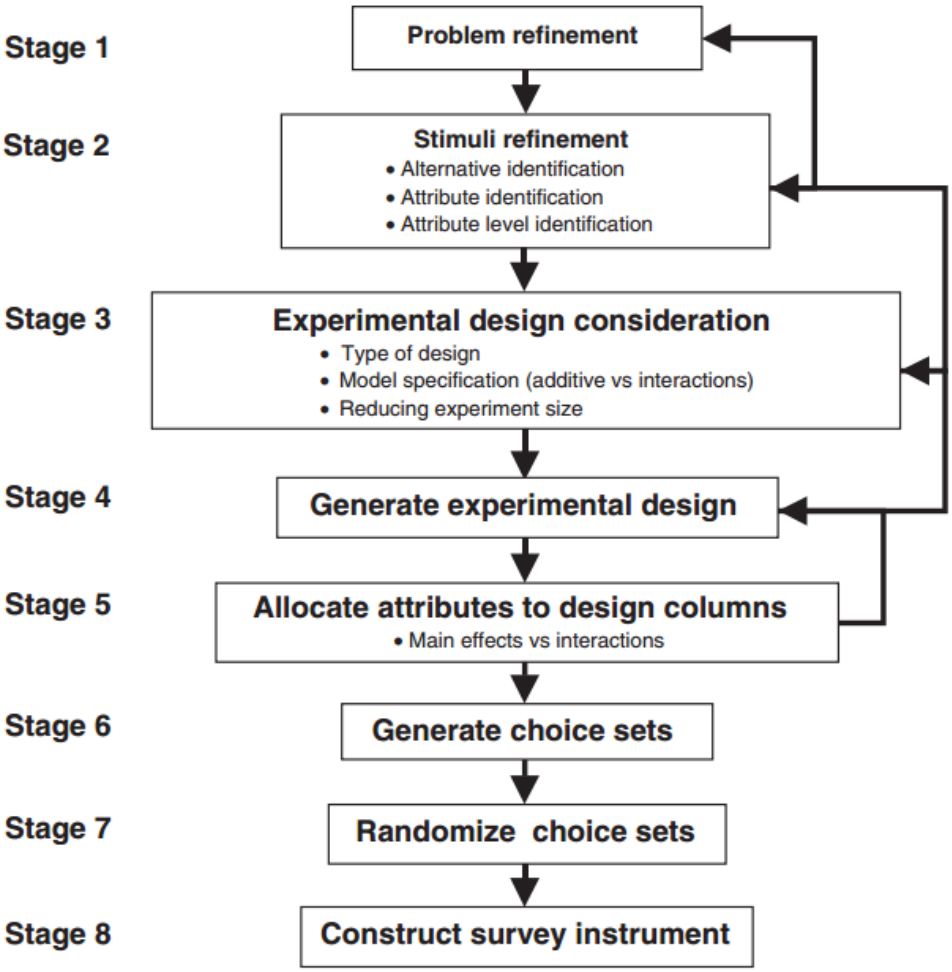


Figure 10: Stages of setting up an experiment (Hensher, Rose and Greene, 2005)

3.2.1 Problem refinement

According to Hensher, Rose and Greene (2005) the first stage in an analyst's journey towards deriving a SP choice experiment is to refine their understanding of the problem being studied. The analyst begins by asking the question: "Why is this research being undertaken?" By defining the problem clearly from the outset, the questions that "need" to be asked may be determined, as well as irrelevant questions that can be avoided.

This study is conducted in order to understand the preferences of (future) elderly regarding living in housing units for elderly which are created from transformed vacant office buildings which are located at the edge of the city. With the insight into the preferences an office building could be transformed to meet the preferences of the (future) elderly.

3.2.2 Stimuli refinement

In order to refine the problem further, research questions have to be asked to understand the different elements of the problem. Some research questions regarding the aim of the research are:

- What are the existing alternatives?
- What are the relevant attributes?
- What drives (future) elderly to live in a certain environment?
- What has not been researched regarding (future) elderly and housing?
- Who are the (future) elderly?

The detailed answers at the questions mentioned above are given in chapter 3 and 4. The attributes which are used in this research are described in section 3.2.3 and 3.2.4. The context of the experiment is to identify the preferences of (future) elderly by means of offering an alternative which is described by attributes (and attribute levels).

3.2.3 Refining of alternatives

The next stage of the experimental design process is the refining the alternatives. Beginning with alternative identification and refinement, there is a two-stage process. The first stage involves defining the universal but finite list of alternatives available to decision makers within the context being studied. In defining such a list, one must identify each and every possible alternative in order to meet the global utility maximizing rule (Hensher, Rose and Greene, 2005).

Based on the findings in the literature study, elderly prefer a dwelling where all (important) rooms are on one level. Therefore dwellings with one than one level such as a row house or detached house are excluded from the experiment. Alternatives such as an apartment or bungalow are possible alternatives.

Furthermore, from the shape of most vacant office buildings, it can be concluded that an office buildings are not suitable to be transformed into bungalows. This leaves an apartment as the only option. In order to identify and define the attributes in stage 2 better, the alternative has to be split in levels. Based on findings in the literature study, three levels were found. In this case the alternative will exist out of a combination from:

- **Apartment level**: Fixed as well as variable attributes from an apartment;
- **Building level**: A set of attributes from the building where the apartment is located in;
- **Environment level**: A set of attributes regarding environment.

3.2.4 Defining attributes and attribute levels

The next step in the process is to identify the attributes and the attribute levels. From the literature study it can be concluded that when elderly move, they have certain preferences regarding attributes of a dwelling and distances to amenities etc. First, a so called long list of all possible attributes is made; this is done so that all the aspects regarding this subject are taken into consideration. In order to keep a structured overview, the attributes are divided into three levels, namely apartment level, building level and environment level as mentioned in the section before. The long list is explained next.

Apartment level: First of all there is the rent per month (including water, gas and light), elderly look at this in order to determine whether an apartment is affordable. Furthermore, there is the number of rooms in the apartment, in the literature study it came forward that some elderly prefer an extra room for a small office or hobby room for example. The surface of the apartment in square meter is also considered, in the literature it was stated that most elderly prefer a surface of 80-100 square meter. Lastly, a large balcony was also mentioned as important in the literature, so the balcony surface in square meter is also considered.

Building level: Social contact can function as a pull factor in relation to loneliness as mentioned in the literature. Common rooms can help elderly to get social contact with other residents easier. Common rooms are rooms accessible for all residents in a building in which elderly can do activities together for example. Besides this certain housing types (mentioned in section 2.1.2) and organised activities such as a chess competition or aerobics might also stimulate social contact.

The average age of the residents in the building is also considered, some elderly prefer residents of the same age while other elderly prefer residents of all ages.

The presence of services (handyman, household help etc) was also mentioned in the literature, elderly prefer to pay for services only when they need it. Another kind of service is security, this can be provided by means of cameras for example.

Environment level: Outdoor green is taken into account because green is considered important for wellbeing of elderly. Furthermore, a significant share of elderly participates in sport, so sport facilities next to the building could be of added value.

Regarding mobility, the amount of parking space and distance to the closest bus stop are two attributes which are considered relevant. Besides mobility the distance to the closest shops/catering and distance to care facilities are also important

In order to keep the experiment at a size such that the respondent do not find it too long or get distracted, a rule of thumb is from Hensher, Rose, & Greene (2005) implemented which means that 7 to 10 attributes are the maximum. This prevents the survey from becoming too long or too sophisticated for the respondents. Only the key attributes were considered in the experiment, the short list looks as follows:

On **apartment level** the rent per month (including water, gas and light) and surface of the apartment in square meter are included. Regarding **building level** common rooms, average age of residents and organised activities are considered. For the **environment level** sport facilities (next to the building), distance to closest amenities (shops & catering) and distance to care centre (family doctor, pharmacy etc) are used.

First it is important to explain why some attributes were fixed in the experiment. The reason of including and "fix" attributes in the description is because of the fact that the opinion of elderly about the attribute is known (based on findings of the literature study). Furthermore, other attributes which are less known about can be examined and included in the experiment.

The outcome of some studies was that a balcony is preferred as an outdoor space when (future) elderly have an apartment. Because of this, a balcony is standard present in the hypothetical situation where the apartments are presented, in other words the attribute is fixed. The same counts for services, security, parking, closest bus station and outdoor green. These attributes will be described in the experiment as already present, for example (the complete description is presented in the survey):

> *"Every apartment has a balcony, kitchen, living room, bedroom, bathroom and a separate toilet. The entire complex and terrain are guarded with cameras, so security is provided"*

Besides the fixed attributes, some attributes were left out of the research because it is already known what the target group thinks about it, this is derived from the results of the literature study. The attribute "number or rooms" is left out because the number of rooms can always be changed, during the design as well when elderly live there.

Furthermore, the attribute "housing types" has been replaced by "common rooms" in the experiment. The reason is that common rooms can be divided into three levels easily as an attribute. There are plenty of housing types and alternatives, asking this in a short way would place cognitive burden on a respondent since most elderly do not know all the alternatives. The resulting attributes and attribute levels are presented in table 5. After table 5, each attribute and the levels of the attribute will be highlighted.

Table 5: Attributes and attribute levels

Attribute	Level	Label
Apartment level		
Rent per month (€)	0	€ 500
	1	€ 700
	2	€ 900
Apartment surface (square meter)	0	60
	1	80
	2	100
Building level		
Common rooms	0	None
	1	Common activity room
	2	Common kitchen/dining room
Residents	0	People of the same age
	1	People of all ages
Organised activities	0	None
	1	Once a week
	2	Every day
Environment level		
Outdoor facilities	0	Outdoor garden
	1	Jeu de boule
	2	Outdoor gym
Distance to shops/catering	0	0 minutes (present in building)
	1	5 minutes
	2	10 minutes
Distance to closest care facility	0	0 minutes (present in building)
	1	5 minutes
	2	10 minutes

Rent: Rent has always been an important aspect of housing. Based on location, facilities etc. a price is made for the dwelling. From the literature study it came forward that most (future) elderly are willing to pay €500-€750 rent per month, a smaller group is willing to pay €750-€1000 rent per month. Based on the fact that most elderly are or will be retired soon and might have a lower income the rent is kept low. Because the location of most structural vacant offices and the fact that these offices are vacant for a long time, it might be possible to keep the rent as low as €500. The levels which were determined are:

0. €500 rent per month;
1. €700 rent per month;
2. €900 rent per month.

Surface of the apartment: In the literature study it came forward that elderly consider the surface of a house important. From the studies of Van Aken and Kerkhof (2009) and Bureauvijftig (2015) could be derived that elderly consider 80-100 square meter a good size for their dwelling. Furthermore, in the study of Van Aken and Kerkhof (2009), the size of the

living room was considered the most important aspect in an apartment by the respondents. The levels set for the attribute apartment surface are:

0. 60 square meter;
1. 80 square meter;
2. 100 square meter.

Common rooms: The social aspect of housing (loneliness) is mentioned in studies as an underlying reason why elderly tend to choose for an environment where they have contact with other residents often. Common rooms might make it easier to contact with other residents of the apartment block. This is why the attribute common rooms was taken into consideration with the following levels:

0. None;
1. Common activity room (figure 11);
2. Common kitchen/dining room (figure 11).

Figure 11: Common activity room (www.gebouwvanhetjaar.nl)

Figure 12 Common kitchen/dining room (hobart-care.nl)

Age of residents: In several studies in the literature study respondents preferred both people of the same age and people of all ages as residents in the same building. An explanation might be that some elderly like people of the same age because they can do activities together and have social contact. On the other hand, elderly might like to live with people of all ages for other reasons. It might be interesting to research which of the two options are preferred by elderly in the experiment. The two levels of the attribute age of residents are:

0. People of the same age;
1. People of all ages.

Organised activities: Besides common rooms, it might be interesting to see what de influence of organised activities is. In the literature study, loneliness was not mentioned as a main reason to move. However, loneliness was often the underlying reason people tend to move

to a new place to place where they have more possibilities for social contacts (figure 13+14). Organised activities are a moment where people can socialize if they want to. Because of potential social contact and loneliness, it might be interesting if organised activities have a positive influence at the attractiveness of an alternative. The three levels are (figure 13+14):

1. None;
2. Once per week;
3. Every day.

Figure 14: Organised activities (buurtbalie-ohg.nl)

Figure 13: Organised activities (www.schaakacademieapeldoorn.nl)

Common outdoor facilities: From the literature can be derived that most elderly still sport on a weekly basis. Furthermore, sporting together is another potential moment for social contact with other residents. This is why it might be interesting to locate a sport facility right next to the building so the residents can use it all the time. Besides sport facilities it might be interesting to investigate whether people are interested in a common garden or not. From studies it can be derived that people (also elderly) like green. The levels are:

0. Common garden (figure 17);
1. Jeu de boules court (figure 15);
2. Outdoor gym (figure 16).

Figure 15: Jeu de boules court (www.vanommerenpark.nl)

Figure 16: Outdoor gym (www.huismanhoveniers.com)

Figure 17: Common garden (www.moestuintips.nl)

Distance to shops and catering – distance to care centre: Amenities are considered very important by elderly, in most studies it came forward that elderly want to live close to amenities. Amenities such as shops for daily shopping, restaurants and a family doctor are considered important. The reason why these amenities are split into two groups is that one group of elderly moves because they need more care. Besides that all elderly want to live close to shops and catering. The levels are:

0. 0 minutes travel time (general, present in building);
1. 5 minutes travel time (general);
2. 10 minutes travel time (general).

3.2.5 Experimental design considerations

Having identified the alternatives, attributes, the number of attribute levels, and the attribute-level labels, the analyst must now make decisions as to the design to be used. The first choice that has to be made is between a full factorial design and a fractional factorial design. Hensher, Rose and Greene (2005) define a full factorial design as a design in which all possible treatment combinations are enumerated. A full factorial design is a design in which all possible combinations of the attribute alternatives are used. The full enumeration of possible choice sets is equal to L^{MA} for labelled choice experiments and L^{A} for unlabelled experiments, where L is the number of levels, M the number of alternatives, and A the number of attributes. The total amount of treatment combinations in this study is $3^7 * 2^1 = 4374$ (7 attributes with 3 levels and 1 attribute with 2 levels).

Rather than use all 4374 possible treatment combinations, it is possible for the analyst to use only a fraction of the treatment combinations with keeping the basic requirement of orthogonality. Designs which use only a fraction of the total number of treatment combinations are called fractional factorial designs. There are fractional factorial designs available, the minimum amount of treatment combinations needed for the fractional factorial

design is 27 (Henser, Rose and Greene, 2005). In the next section the treatment combinations will be shown and explained.

3.2.6 Generating the experimental design

For this research, 27 treatment combinations were made with the use of the orthogonal design function in SPSS (see appendix 9: treatment combinations). This design only measures the main effects of each attribute separately. The numbers in the design stand for the levels of each attribute, the levels of each attribute are mentioned earlier in section 3.4.

The next stage in the process is the generation of choice sets (figure 18). According to Hensher, Rose and Greene (2005) a choice set represents the basic mechanism of conveying information to decision makers about the alternatives, attributes and attribute levels that exist within the hypothetical scenarios of a study. More than that, a choice set represents the machinery by which information is gathered on the choices made by sampled decision makers given the alternatives, attributes and attribute levels as determined through some experimental design.

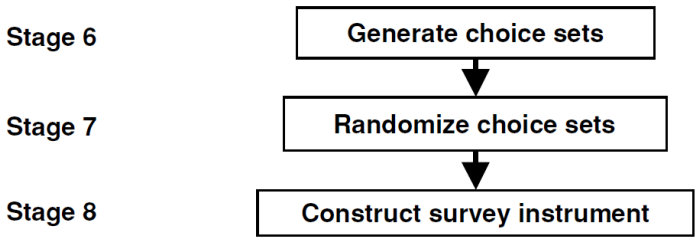


Figure 18: Stage 6,7 and 8 of setting up an experiment (Hensher, Rose and Greene, 2005)

With the generation of choice sets, the characteristics of the respondents have to be considered. The survey may not take too much time and the choice sets have to be clear. In figure 19 an example of a choice set is presented. Respondents can choose one of the two apartments or “none of both” (Dutch: geen van beide). The decision to include only two apartments is based on the number of attributes and the amount of choices a respondent has to make in a choice set between different attributes. Two apartments instead of three in a choice set prevent too much load on the cognitive burden of the respondents. The “none of both” choice is created because a respondent might not find any apartment attractive. A “forced” choice (by lack of “none of both” option) would not be the representative choice of the respondent.

Kenmerken	Appartement 1	Appartement 2	Geen van beide
Huur per maand incl gwe	€500	€700	
Grootte appartement in vierkante meter	60	80	
Gezamelijke ruimtes	Geen	Activiteitenruimte	
Leeftijd bewoners complex	Van dezelfde leeftijd	Van alle leeftijden	
Georganiseerde activiteiten	Geen	Elke dag	
Faciliteiten buiten naast het gebouw	Gemeenschappelijke moestuin	Jeu de boules baan	
Afstand tot winkels en horeca	10 minuten	5 minuten	
Afstand tot zorg	0 minuten aanwezig in complex zelf	5 minuten	
UW KEUZE:	O	X	O

Figure 19: Example of a choice set as presented to a respondent

Now that the choice sets are generated, the randomization of the choice sets has to be conducted. Excel can be used to do this. After the randomization there is a first combination of different choice sets (see appendix 6). Together 9 choice sets form a group of choice sets. In total 9 groups of choice sets are created (table 6). With this number the variety between different surveys is pursued. In the survey, the respondent will be directed to a group choice sets after the general questions and instruction page. The construction of the survey will be explained in the next section.

Table 6: Groups of choice sets

Profile	Profile		Profile	Profile		Profile	Profile	
15	16		14	24		1	4	⇨ Choice set
23	4		19	26		2	24	
6	19		8	2		3	11	
14	11		22	16		4	26	
16	27	1	20	27	2	5	1	3
22	6		16	17		6	8	
2	17		5	23		7	14	
13	20		23	13		8	2	
8	14		12	18		9	25	
3	22		26	15		10	19	⇨ Group of choice sets
7	13		6	20		11	12	
25	26		15	22		12	18	
19	3		18	19		13	22	
17	15	4	11	4	5	14	27	6
27	23		9	8		15	23	
21	25		17	10		16	13	
11	21		1	5		17	21	
18	12		21	6		18	20	
26	8		27	14		19	15	
20	2		13	25		20	17	
24	9		10	12		21	3	
12	7		4	11		22	5	
1	18	7	2	7	8	23	6	9
10	24		24	3		24	7	
9	5		7	21		25	10	
4	1		3	1		26	9	
5	10		25	9		27	16	

3.2.7 Construction of survey instrument

With the experimental design ready, the next step is the construction of the survey. For the survey the platform Berg Enquête System 2.2 is used. The following pages are present in the survey. Each of the pages will be explained in more detail:

1. Welcome/introduction page;
2. Current situation;
3. Questions about moving;
4. Explanation about experiment;
5. The experiment itself;
6. Personal questions;
7. End page.

Welcome/introduction page: In the welcome/introduction page the goal and the parts of the survey are explained. Besides, there is a note for the respondents that the survey has to be filled in completely to have usable data. Furthermore, the expected duration of the survey is mentioned, namely 10 minutes. With all these points mentioned, the respondents have an idea about the topic and duration of the survey.

Current situation: Data about the current situation is relevant for determining which groups with certain characteristics are interested in the specified alternatives presented in the experiment. The questions are about:

- Type of current house;
- Rental or owner-occupied property;
- Surface of the house;
- Current living situation (living together or alone);
- Current income per month;
- Current environment of the house (suburb, city centre etc.);
- Age of the respondents in the neighbourhood ;
- Pets (none, small or large pets);
- Distance to shops and catering;
- Distance to care facilities.

With questions about the current situation, the respondent will be introduced to the experiment which follows after the questions about the current situation. All the questions are multiple choices. With multiple choices, respondents are able to make decisions faster than with open questions. This saves time and load on the cognitive burden of the respondent.

Questions about moving: The goal of questions about moving is to gather data about the willingness of people to move or not. With this data insight can be gained in whether people who want to move are more attracted to the specified alternatives for example. The question is formulated as “are you planning to move?” The respondent can answer “yes”, “maybe”, “no” or “I just moved”. When the respondent answers “yes” or “maybe”, a second question with possible reasons to move will pop up on the screen. The second question is “what are possible reasons for moving?”. The reasons which were mentioned the most in the literature study are used in this list. The respondent can choose a maximum of three reasons from the list.

Explanation about experiment: The explanation of the experiment is divided over two pages. On the first page the situation and the basic attributes of the apartment complex will be described. The basic attributes are based on the on the findings in the literature study and are the following:

- It is a one level apartment;
- There is a balcony;
- Service (care, handyman etc.) can be delivered on request;
- There is enough parking space;
- There is a bus stop in front of the complex;
- The complex is surrounded by green;
- Security is provided in by means of camera’s;
- A gym is present in the complex;
- The complex always concerns a transformed office building.

Besides the basic attributes which every apartment has, there are also variable attributes. These attributes are described on the next page by means of figure 20. After the explanation of the attributes, the example of the choice set follows, this is the last page of the explanation.

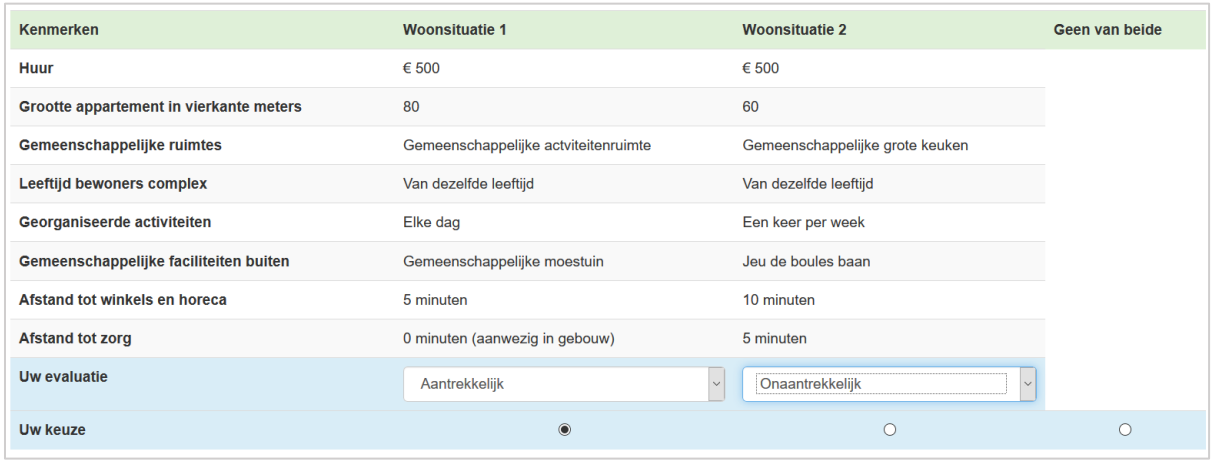
The table on the next page is in Dutch. Therefore, here follow the translation of the most important terms in order of appearance in the figure:

- Huur = Rent;
- Grootte apartment = Apartment size (surface);
- Gemeenschappelijke ruimtes = Common rooms;
- Leeftijd bewoners = Age of residents;
- Georganiseerde activiteiten = Organised activities;
- Gemeenschappelijke faciliteiten buiten = Common outdoor facilities;
- Afstand tot winkels en horeca = Distance to shops and catering;
- Afstand tot zorg = Distance to care (facilities).

Attribuut		Toelichting
Woningniveau		
	Huur	Huur per maand inclusief gas, water en licht.
	Grootte appartement	Grootte van het appartement in vierkante meters
Gebouwniveau		
	Gemeenschappelijke ruimtes	Aanwezigheid van gemeenschappelijke ruimtes in het gebouw voor bijvoorbeeld activiteiten of gezamenlijk koken (zie afbeeldingen).  
	Leeftijd bewoners	Leeftijd van de bewoners van het complex
	Georganiseerde activiteiten	De mate waarin gezamenlijke activiteiten georganiseerd worden  
Omgevingsniveau		
	Gemeenschappelijke faciliteiten buiten	Gemeenschappelijke faciliteiten die buiten direct naast het gebouw aanwezig zijn zoals sporttoestellen, jeu de boules baan of een moestuin  
	Afstand tot winkels en horeca	Afstand tot dichtstbijzijnde winkels/horeca in minuten reistijd
	Afstand tot zorg	Afstand tot dichtstbijzijnde zorgvoorziening (huisarts en apotheek) in minuten reistijd

Figure 20: Explanation of variable attributes in the survey

The experiment: The experiment consists of 9 choice sets where the respondent has to choose the alternative which attracts the most. A new question is visible in the choice set as presented in figure 21, namely *uw evaluatie (your evaluation)*. In this evaluation task, the respondents have to choose how attractive the alternative is. There are five options in the evaluation task, namely not attractive at all, not attractive, neutral, attractive and very attractive.



Kenmerken	Woonsituatie 1	Woonsituatie 2	Geen van beide
Huur	€ 500	€ 500	
Grootte appartement in vierkante meters	80	60	
Gemeenschappelijke ruimtes	Gemeenschappelijke actviteitenruimte	Gemeenschappelijke grote keuken	
Leeftijd bewoners complex	Van dezelfde leeftijd	Van dezelfde leeftijd	
Georganiseerde activiteiten	Elke dag	Een keer per week	
Gemeenschappelijke faciliteiten buiten	Gemeenschappelijke moestuin	Jeu de boules baan	
Afstand tot winkels en horeca	5 minuten	10 minuten	
Afstand tot zorg	0 minuten (aanwezig in gebouw)	5 minuten	
Uw evaluatie	Aantrekkelijk	Onaantrekkelijk	
Uw keuze	◉	○	○

Figure 21: Choice set in the experiment

Personal questions: Personal questions are about age, gender and postal code. This data is gathered in order to gain insight in the preferences of people of different age for example.

3.3 Processing of the data

When a certain number of respondents have completed the survey, the collection and processing of the data can commence. First of all, the data has to be retrieved from the Berg Enquête System, the data can be imported into SPSS. An overview of the data present in this file is shown in appendix 7.

It can be noted that all the variables are still in words, in order to process the data in Nlogit, these words have to be converted into numbers (appendix 7). To do this, effect coding or dummy coding can be used. In this research effect coding is used. Effects coding has the same advantage of dummy coding in that non-linear effects in the attribute levels can be measured, but dispenses with the disadvantage of perfectly confounding the base attribute level with the grand mean of the utility function (Hensher, Rose and Greene, 2005). All the attribute levels in effect coding are visible in table 8. The effect coding can be attached to the attribute levels in SPSS (appendix 7).

To calculate the value of the part-worth utility per attribute the formulas in table 8 are used. In the formula the following value is present:

- B_i is the weight (or parameter) associated with attribute $X_{i.}$

Table 7: Effect coding and utility

Level	Code 1	Code 2	Utility
0	1	0	B_{1i}
1	0	1	B_{2i}
2	-1	-1	$-(B_{1i} + B_{2i})$

Table 8: Attributes, levels and effect coding levels

Attribute	Level	Label	Code 1	Code 2
Apartment level				
Rent per month (€)	0	€ 500	1	0
	1	€ 700	0	1
	2	€ 900	-1	-1
Apartment surface (square meter)	0	60	1	0
	1	80	0	1
	2	100	-1	-1
Building level				
Common rooms	0	None	1	0
	1	Common activity room	0	1
	2	Common kitchen/dining room	-1	-1
Residents	0	People of the same age	1	-
	1	People of all ages	-1	-
Organised activities	0	None	1	0
	1	Once a week	0	1
	2	Every day	-1	-1
Environment level				
Outdoor facilities	0	Outdoor garden	1	0
	1	Jeu de boule	0	1
	2	Outdoor gym	-1	-1
Distance to shops/catering	0	0 minutes (present in building)	1	0
	1	5 minutes	0	1
	2	10 minutes	-1	-1
Distance to closest care facility	0	0 minutes (present in building)	1	0
	1	5 minutes	0	1
	2	10 minutes	-1	-1

The complete data file with the outcome of the experiment is shown in appendix 10. Now that the data file is ready, the data can be imported into Nlogit. In the following section the models which are used in Nlogit will be explained.

3.4 Analysis of the data: Multinomial Logit model and Latent Class model

3.4.1 Multinomial logit model

In most decision processes, the number of alternatives in the choice set is not limited to two. The type of model to analyse more than two choices is called a multinomial choice model. Again, the choice set is different for every individual, as each individual has their own index of attributes and a different subset of the universal set. In the case where more than two alternatives can be chosen, the derivation of choice models and estimation are more complex than those for binary choice models (Wittink, 2011). For the Multinomial Logit (MNL) model the choice probability is (Louviere, Hensher, & Swait, 2000):

$$P_{ni} = \frac{e^{V_{ni}}}{\sum_{j=1}^{J} e^{V_{nj}}}$$

P_{ni} = probability of consumer n choosing alternative *i* out of the set of available alternatives;
V_{ni} = structural utility of alternative *i* for individual *n*.

For the MNL model, maximum likelihood estimation is commonly used to estimate the parameters as well. For the maximum likelihood estimation procedure for the MNL model there are no big differences with binary logit, but their computational burden grows with the number of alternatives. McFadden (1974) showed that the MNL model has some special properties that can simplify estimation of its parameters under certain circumstances (Wittink, 2011).

3.4.2 Latent Class model

Latent class models are used to uncover possible different preference patterns among assumed respondent segments (Hensher, Rose and Greene, 2005). This can be interesting in this research because different age groups for example could have different preferences. Furthermore, when a significant part of the respondents uses the “none of both” option in the experiment in this research, two respondent segment groups might arise, in the results this subject will be discussed further.

Traditional models used in regression, discriminant and log-linear analysis contain parameters that describe only relationships between the observed variables. LC models (also known as

finite mixture models) differ from these by including one or more discrete unobserved variables (Magidson & Vermunt, 2002).

Respondents who have similar observed variable distributions are grouped into the same latent class with parameters to be estimated. For each latent class a set of parameters is estimated similar as in the MNL model. Usually, not all respondents belong exactly to one group. Therefore, LC models consider the uncertainty of a person's group membership (Vermunt & Magidson, 2002). The probability of belonging to a class can be specified by individual characteristics which are situation invariant, such as socio-demographics and psychographic characteristics (Greene and Hensher, 2003):

$$P_n(class = c) = Q_{nc} = \frac{e^{\theta_c z_n}}{\sum_{c=1}^{C} e^{\theta_c z_n}}$$

Q_{nc} = the probability of individual n belonging to class c;
ϑ_c = vector of utility weights belonging to characteristics z specified for class c;
z_n = vector of observed individual, situation invariant, characteristics of individual n.

Within the classes, the probability of alternative i being chosen is estimated the same as in the MNL model. In sum, the actual probability of consumer n choosing alternative i can be defined as the weighted sum of choice probabilities per class (Nijenstein, 2012):

$$P_{ni} = \sum_{c=1}^{C} Q_{nc} P_{ni|c}$$

3.5 Testing the model

To determine whether a model is statistically significant, the LL (log likelihood) function of the estimated model is compared to that of the base model. If the LL function of an estimated model can be shown to be a statistical improvement over the LL function of the base model (i.e. statistically closer to zero), then the model may be thought of as being statistically significant overall. Put another way, the base model represents the average utility for each of the alternatives and through represents the market shares present within the data set. If an estimated model does not improve the LL function in comparison to the base model, then the additional parameters estimated do not add to the predictive capability of the base model (Hensher, Rose and Greene, 2005).

The test to compare the LL function of an estimated model against the LL of its related base model is called the LL *ratio-test*. The formula for the test is (Hensher, Rose and Greene, 2005):

-2(*LLBase model - LLEstimated model*)

Logistic regression models are fitted using the method of maximum likelihood estimation - i.e. the parameter estimates are those values which maximize the likelihood of the data which have been observed.

Another formula to compare the estimated model to the base model is mentioned by McFadden (1977). McFadden (1977) describes a pseudo R^2 value between 0.2 and 0.4 as an "good fit.". The pseudo R^2 is calculated with the following formula:

$$R^2 = 1 - \frac{LLEstimated\ model}{LLBase\ model}$$

3.6 Conclusion

The type of experiment which will be used in the survey is a stated choice experiment. Stated choice experiments are used to test situations where a choice is made by considering hypothetical situations. In the hypothetical situation, the respondent has to choose an alternative from a set of alternatives which are described by a number of attributes. In the experiment of this research, the alternative is an apartment which is described by attributes on apartment level, building level and environment level.

For the survey, Berg Enquête System is used. In the survey, the respondent has to answer questions about the current situation and personal questions. Furthermore, the respondents have to choose an alternative in 9 choice situations. The part of 9 nine choice situations is the actual experiment.

For the description of the importance of each attribute and the overall preference for an alternative, the utility function is used. In order to calculate the part-worth utility per attribute, effect coding is used. For the analysis of the results, both MNL model and LC model are used. These models are used when there are more than two choices in a choice set. A LC model can be used to uncover possible different preference patterns among assumed respondent segments. To test both the MNL and LC model, the LL ratio test and Pseudo R^2 are used.

4. Results

In this chapter all the results will be presented and discussed. Furthermore, the research question – ***What are the housing preferences of the aging population and can vacant office space at the edge of the city be transformed to meet these preferences?*** *– will be answered. First, the response rate and the general characteristics of the respondents will be presented. The general characteristics and outcomes will be analysed and compared to the findings in the literature research. Second, the results of the analysis of the data in both MNL model and LC model will be discussed. The MNL model and LC model will also be tested for goodness of fit in order to find out whether the model is viable or not. Third, the most important outcomes will be highlighted and explained.*

From the 630 respondents who entered the survey, 205 respondents filled in the survey completely. From the 630 respondents who entered, 425 did not finish the questionnaire. The survey was conducted from the start of June to halfway July (2018). The respondents were reached through personal network and contact with organisations for elderly.

4.1 Characteristics of respondents

The frequencies for all age classes are shown in figure 25. The highest frequency appears in the age category 70-74. In total, this class represents about 26% of the respondents. It seems that many elderly know how to use a computer or mobile device because most respondents are aged 65 years and older. From the respondents 56.1% is male and 43.9% is female. Compared to data from the CBS (2018) the frequency per age and the male-female ratio are different. Regarding frequency and age there should be more respondents who are 55-69 years old because there are more people who are 55-69 years old than people who are 70-75 years old in the Netherlands. Regarding the male-female ratio there should be more females because there are more females than males aged 55 years and older.

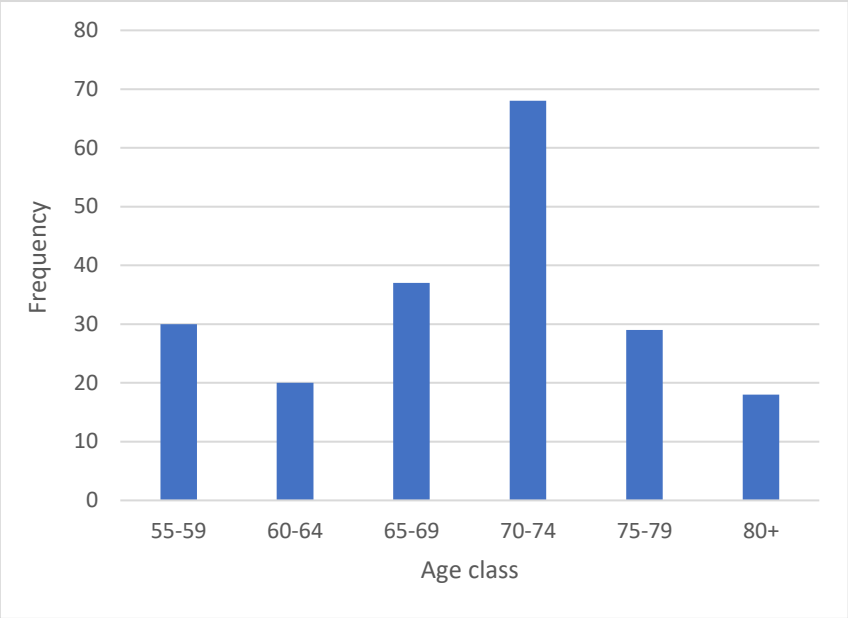


Figure 22: Frequency of respondents related to age

Some common characteristics are described next. The current house percentages are visible in table 9, it can be noted that most respondents live in detached house followed by semi-detached, apartment and row house, which have similar percentages. About 80% of the respondents live in an owner-occupied property and 20% percent in a rental property (table 10). From the respondents about 75% lives together with another person and about 25% lives alone (table 11). It might be interesting to investigate the possible differences between these groups in the Latent Class model. The model run with the LC model is described in section 4.3.

Table 9: Types of dwellings respondents live in

House type	Frequency	Percent
Detached	64	31.2
Semi detached	42	20.5
Corner house	23	11.2
Row house	32	15.6
Apartment	37	18
Something else	7	3.4
Total	205	100

Table 10: Owner occupied property vs. rental property

	Frequency	Percent
Owner-occupied	165	80.5
Rental	40	19.5
Total	205	100

Table 11: Frequency of living alone or together

	Frequency	Percent
Together	154	75.1
Alone	51	24.9
Total	205	100

The answer at the question “Are you planning to move?” shows similarities with other studies of the literature study. Despite that a small part of the respondents (15%) planned to move and answered “yes”, the people who answered “no” are no majority. There is no majority because a group of 38% from all respondents doubts about moving (answer: maybe). So 53.2% of the respondents do want to move or are in doubt about moving (table 12).

Table 12: Frequency per answer at the question "are you planning to move?"

	Frequency	Percentage
Yes	31	15,1
Maybe	78	38,0
No	91	44,4
I just moved	5	2,4
Total	205	100

When the numbers from table 13 are compared to the ones in the literature review (table 13), a few things can be noted. The percentage of people who want to move is similar in some studies compared to the percentage in underlying research. Most percentages vary from 8% to 21%, only the percentage of the research form ANBO is higher (31%). Furthermore the percentage of (future) elderly in this research who want to stay or might want to move is similar to the ones in the other studies.

Table 13: Willingness to move

Group	Results	Voogd[3] (2005)	Nivel (2014)	Bureauvijftig (2015)	ANBO (2015)	Nijmegen (2015)
Percentage of people who want to stay (answer: no)	44.4	58,2	79,0	31,0	34,0	85,0
Percentage of people who might move (answer: maybe)	38,0	27,3	-	57,0	28,0	-
Percentage of people who want to leave (answer: yes)	15,1	14,6	21,0[4]	8,0	31,0	15,0

In several studies in the literature study, the connection between age and willingness to move was shown. It came forward that the older people are, the less they tend to move. Because of this connection, it might be interesting to analyse the willingness to move in relation to age in this research. In order to do this, the willingness to move per age class in analysed (figure 23). One thing seems to be standing out, namely that there is no direct connection between age and willingness to move. Although the observation per age group is not large (18-68 persons) there are notable differences per age group. For example from the people aged 65-69 years and 70-74 years a larger percentage answered "yes" at the question about moving than in other groups. Furthermore, a large percentage of people aged 80 years and older do not want to move. In the case of people older than 80 years the connection between age and willingness to move - mentioned in chapter 2 - is visible. In other age groups there is no clear connection visible between age and willingness to move.

[3] Within five years
[4] Only when elderly need more care

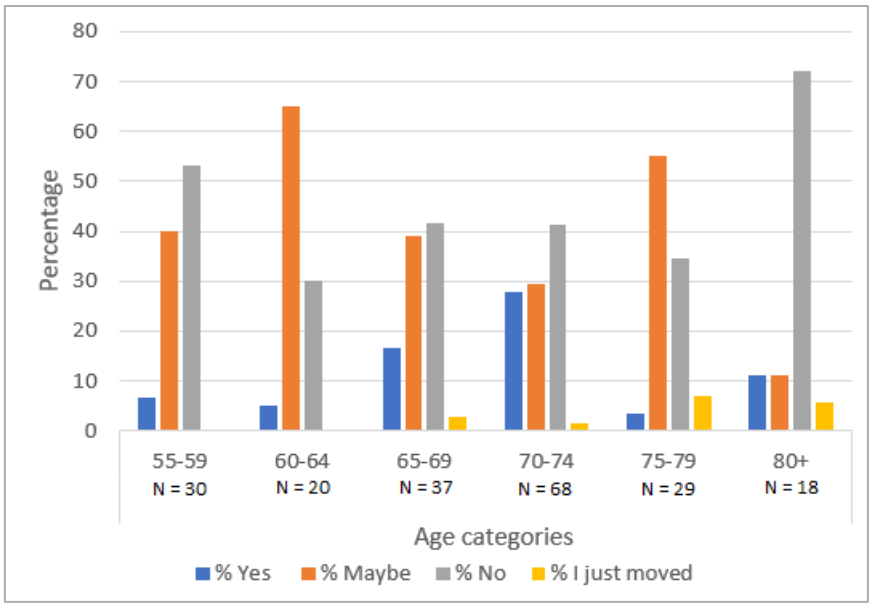


Figure 23: Answer at "are you going to move" question per age class

When people answered “yes” or “maybe” in the survey on the question whether they are planning to move, a new question appeared. This question was about reasons to move, a maximum of three reasons could be chosen from a list. The results show that people have similar reasons to move compared to the research of Van Aken and Kerkhof (2009) for example (figure 24). In total 109 people answered yes or maybe, the percentages in figure 24 stand for the share of the 109 people who chose that reason. The most important reason to move is living on one floor. The second most important reasons are maintenance of the house and living in a smaller house.

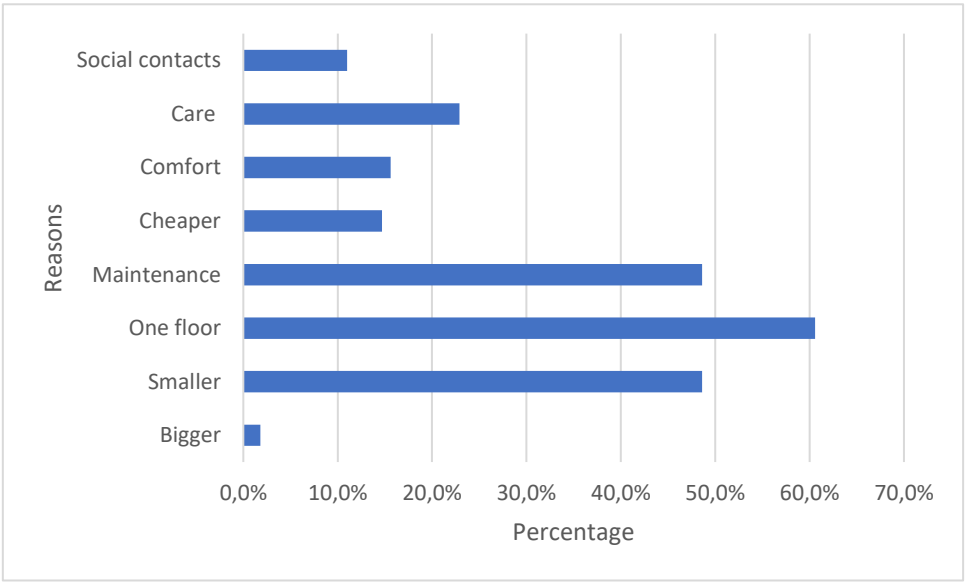


Figure 24: Reasons for moving (N = 109)

4.2 Model analysis: Multinomial logit model

From the model estimation, the model in table 14 is the result (appendix 1A is the detailed output). This can be considered as the optimal model because all the parameters are present and no parameter is fixed. With a coefficient of -0.62 and >95% significance it can be noted that the values for the constant confirm that a notable share of people chose the "none of both" option. Other significant attributes are common activity room, common kitchen/dining room, outdoor garden, outdoor gym, age of residents, apartment surface of 60 m^2 and the rent (€500/€700/€900) per month(table 14).

Table 14: Overview of MNL Model (bolt numbers are significant values)

Choice	Part-worth utility
Constant	**-0.6246**
No organised activities	-0.0422
Weekly organised activities	0.0800
Daily organised activities*	-
No common rooms	0.0824
Common activity room	**0.2712**
Common kitchen/dining room*	**-0.2712**
Outdoor garden	**-0.1171**
Jeu de boule court	0.0196
Outdoor gym*	**0.1171**
Residents of the same age	**-0.0751**
Residents of all ages*	**0.0751**
5 minutes travel distance to shops	0.0456
10 minutes travel distance to shops	0.0202
15 minutes travel distance to shops*	-
5 minutes travel distance to care facilities	-0.0222
10 minutes travel distance to care facilities	0.0206
15 minutes travel distance to care facilities*	-
Apartment surface of 60 m2	**-0.3782**
Apartment surface of 80 m2	0.0447
Apartment surface of 100 m2*	0.3782
Rent of €500 per month	**0.1860**
Rent of €700 per month	**0.0916**
Rent of €900 per month*	**-0.2776**

* Part-worth utility of the attribute level is calculated with significant part-worth utility of the first attribute(s) level(s)

In order to test the goodness of fit, the model has to be tested. This is done with the likelihood ratio test described in section 3.5. How closer the LL of the estimated model is to zero, how better. In the current model, the outcome of the likelihood ratio test will be:

$$LRS = -2[-2046.71 + 1890.23] = -2 * -156.48 = 312.96$$

The critical Chi-square value with *p* = 0.10 and 15 degrees of freedom is 22.30. If the value is larger than 22.30, then the models differ significantly from each other. In this case the value is higher than 22.30 so the models do significantly differ from each other. Therefore, the alternative model has a significant better score than the base model. It can be said that the alternative model has added value.

The pseudo R^2 of the model in the current model is:

$$R^2 = 1 - \frac{(-1890.23)}{(-2046.71)} = 0.087$$

The outcome for a good model is between 0.2 and 0.4, so this model has no good fit. The MNL model is not able to predict the observed choices well. In order to make a better fit, the LL of the estimated model has to get closer to zero. To do this, a latent class model as described in section 3.4.2 can be used.

4.3 Model analysis: Latent Class Model

The results of the complete latent class model in Nlogit are visible in appendix 1B, the overview is shown in table 16. Two segments were included in the model estimation. The LL of the estimated model is -1515.59 now instead of the -1890.23 before the run with a latent class model. This can be seen as an improvement of the ability of the model to predict observed choices. The pseudo R^2 is now:

$$R^2 = 1 - \frac{(-1515.59)}{(-2046.71)} = 0.260$$

Now the model has a much better fit because the outcome is between 0.2 and 0.4. The model is able to predict the outcome of observed choices better. Furthermore, the linear effects per significant attribute level can be calculated based on the effect coding (page 63 and further).

Table 15: Overview of latent class model (bold numbers are significant values)

Choice	Part-worth utility latent class 1	Part-worth utility latent class 2
Constant	**-3.0278**	**0.6408**
No organised activities	**0.4014**	**-0.1673**
Weekly organised activities	-0.0866	**0.1653**
Daily organised activities*	**-0.4014**	**0.0020**
No common rooms	0.1562	0.0327
Common activity room	0.1604	**0.3705**
Common kitchen/dining room*	-	**-0.3705**
Outdoor garden	-0.1620	**-0.1391**
Jeu de boule court	0.1419	.02130
Outdoor gym*	-	**0.1391**
Residents of the same age	-0.1336	-0.0553
Residents of all ages*	-	-
5 minutes travel distance to shops	**0.5330**	-0.0057
10 minutes travel distance to shops	-0.1601	0.1124
15 minutes travel distance to shops*	**-0,5330**	-
5 minutes travel distance to care facilities	-0.0317	-0.0141
10 minutes travel distance to care facilities	0.1492	0.0057
15 minutes travel distance to care facilities*	-	-
Apartment surface of 60 m2	-0.0711	**-0.4652**
Apartment surface of 80 m2	-0.2243	0.0688
Apartment surface of 100 m2*	-	**0.4652**
Rent of €500 per month	0.0058	**0.2668**
Rent of €700 per month	-0.0914	**0.1607**
Rent of €900 per month*	-	**-0.4275**

* Part-worth utility of the attribute level is calculated with significant part-worth utility of the first attribute(s) level(s)

The next step is to find out which respondents belong to which class. Based on the classes, an indication of the potential target group of future transformation projects can be made. In the latent class model (table 15) it becomes clear that there are two latent classes when the constant is taken into consideration. The two classes include:

- The respondents who tend to choose none of the specified options: latent class 1;
- The respondents who actually chose one of the specified options: latent class 2.

The respondents in the database were sorted based on the class probabilities, each respondent belongs to either class 1 or 2. A detailed overview of all frequencies per personal charcteristic per class can be found in appendix 3. In order to see whether there is an actual difference between the classes in terms of characteristics (for example age), the chi-square test can be used. After conducting chi-square tests with all characteristics, three significant differences were found. First, with partipation in organised activities the significance was 0.057, which means that there is a chance of 94,3% that the difference is plausible. Second, with age higher than 70 years there was a significant difference between the groups. Third, there was a significant different between the classes regarding (future) elderly who live in apartments. The chi-square tests can be found in appendix 4. With other characteristics there was no significant difference between the groups.

So class 1 consists of respondents who tend to choose none of the specified options. The respondents from class 1 participate less in organised activities than respondents from class 2. Furthermore, respondents from class 1 live proportionally more in apartments than respondents from class 2. Class 2 consists of respondents who tend to choose one of the specified options. The respondents from class 2 participate – as mentioned above – more in organised activities. Furthermore, respondents aged 70 years and older are proportionaly more part of class 2.

The difference in living in apartments might explain why a part of the respondents from class 1 tend not to choose one of the specified options. Respondents from class 1 already live in an apartment where all rooms usually are on one floor. Therefore, the most important reason to move might not be applicable in the case of respondents from class 1 who live in an apartment. Besides having all the rooms on one floor, the reason to move because of maintencance obligations might also not be applicable.

In the first latent class, two parameters are significant. These two parameters are “no organised activities” and “5 minutes travel distance to shops” (table 15). In figure 25 and 26 the part-worth utility is presented. From these utilities it can be derived that shops inside the building and no organised activities make an alternative more attractive. However, it can be noticed that also with shops in the building and no activities included the total score is still negative (-3,0278 + 0,4014 + 0,5330 = -2,0934)(table 15). This means that also with shops in the building and no organised activities; respondents from class 1 still tend not to choose one of the specified options.

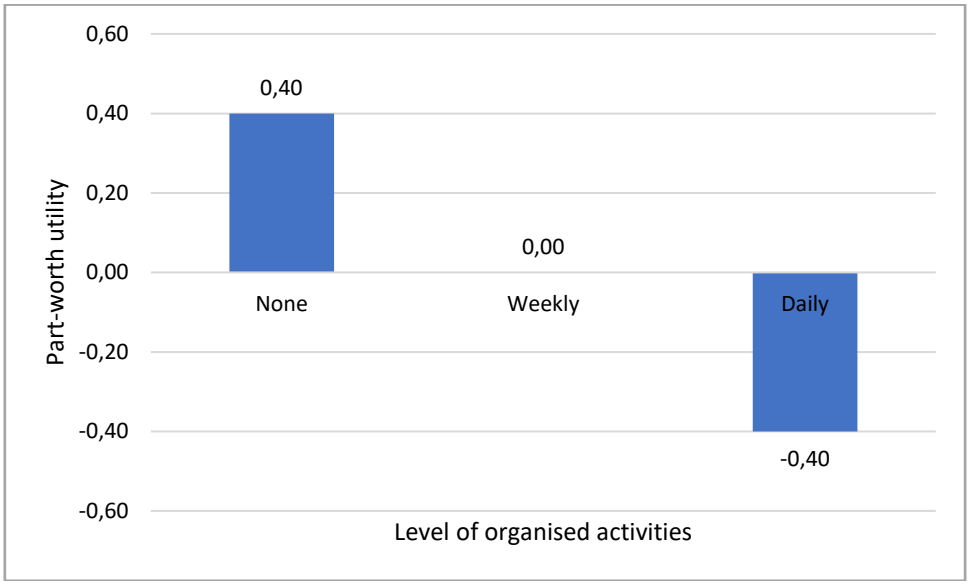


Figure 25: Part-worth utility and organised activities, latent class 1 (linear effect)

Figure 26: Distance to shops/catering and part-worth utility, latent class 1 (linear effect)

In the second latent class – the respondents who tend to choose one of the specified options – more attributes are significant (table 15). The first attribute is organised activities. In the previous section it was concluded that the difference between latent class 1 and 2 was present in the participation in organised activities. Presence of activities does not stimulate respondents from class 1 to choose a specified alternative. However, respondents from the second latent class are stimulated by organised activities to choose a specified alternative (figure 27).

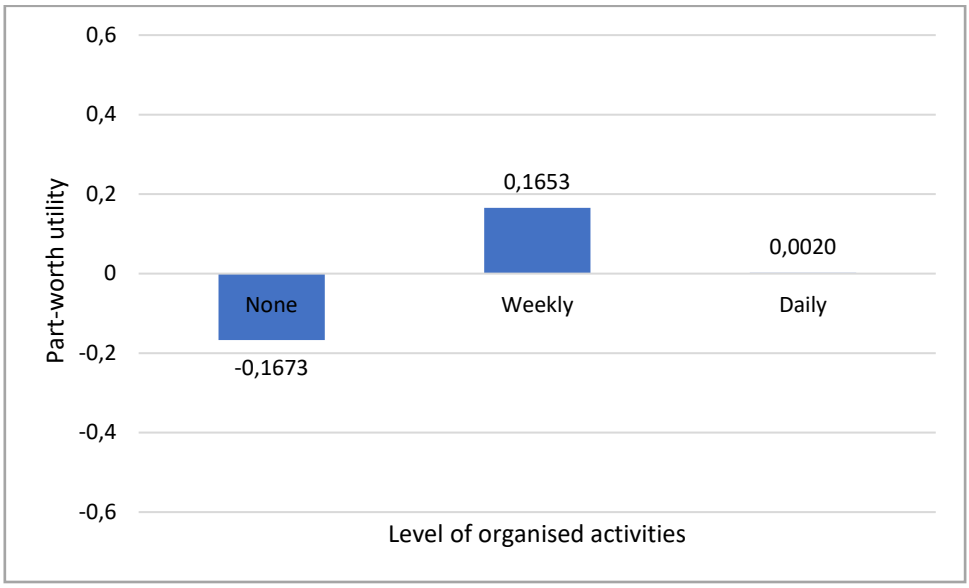


Figure 27: Part-worth utility and organised activities, latent class 2 (non-linear effect)

Another attribute which is important for the second latent class, is the presence of common rooms. From the part-worth utility (figure 28) can be concluded that respondents prefer the presence of an activity room, a kitchen/dining room is not preferred.

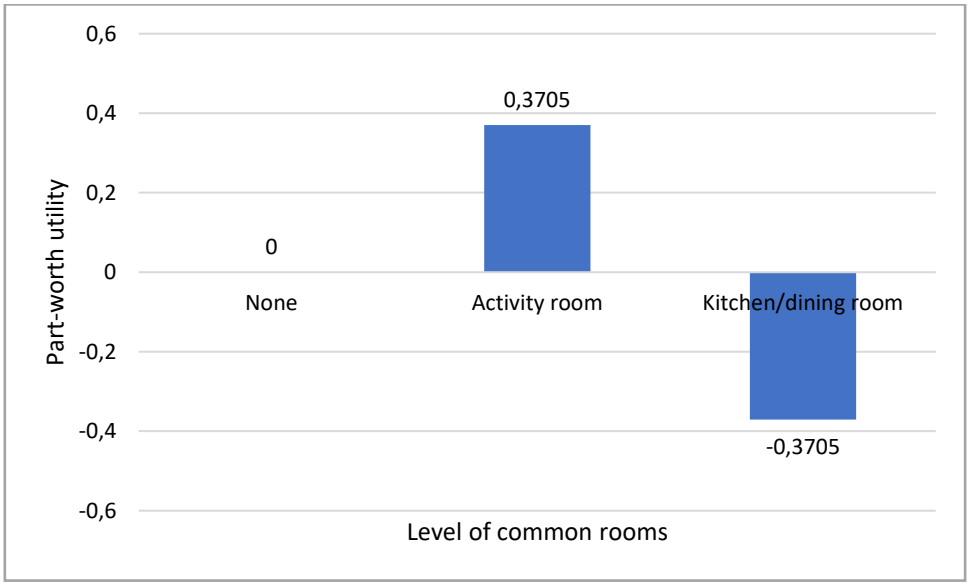


Figure 28: Part-worth utility and common rooms, latent class 2 (non-linear effect)

From the preferences of the second latent class related to outdoor facilities, two things can be noticed (figure 29). First, respondents from the class do not prefer an (common) outdoor garden. An explanation for this might be that an outdoor garden requires maintenance while maintenance obligation of a garden is one of the most important reasons why respondents think about moving. An outdoor gym is preferred by the respondents from class 2. The explanation for this could be that because elderly – as mentioned earlier in section 2.3.4 – regularly participate in sports. The parameter of Jeu de boules was not significant. Therefore the value is zero in figure 29. The respondents might not consider a Jeu de boules court important or based the decision on another attribute when Jeu de boules was present in a specified alternative.

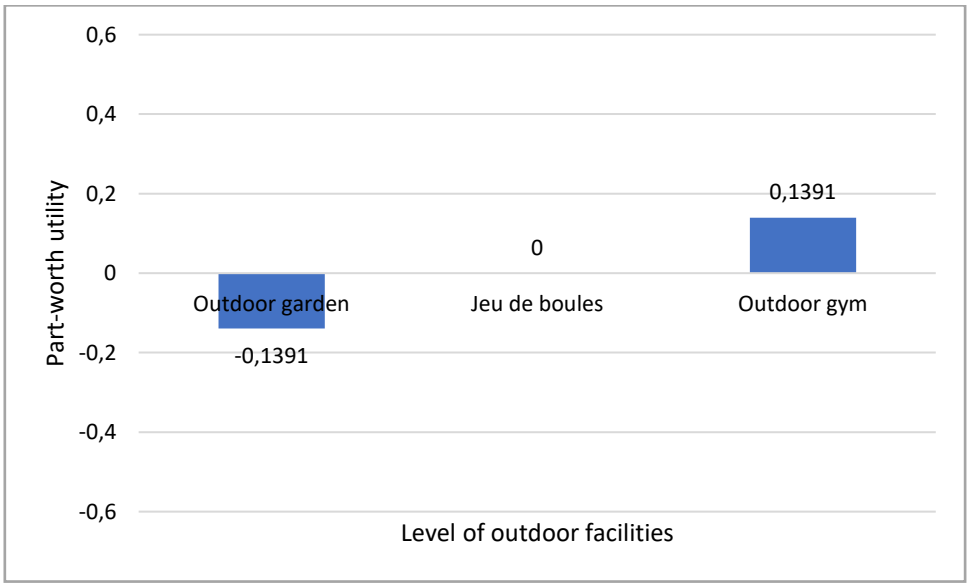


Figure 29: Part-worth utility and outdoor facilities, latent class 2 (linear effect)

Regarding apartment surface (figure 30) and rent (figure 31) the outcome is similar to the outcome of the literature study. Respondents from the second latent class prefer an apartment surface of 100 square meter, everything above 80 square meter has a positive effect on the utility. A rent of €500-€700 per month is preferred while €900 is considered too high.

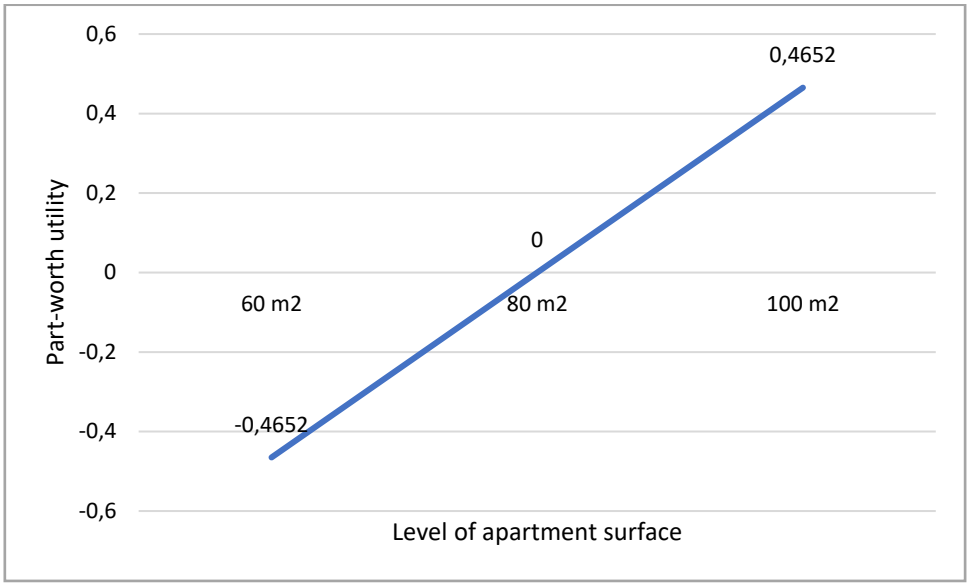


Figure 30: Part-worth utility and apartment surface, latent class 2 (linear effect)

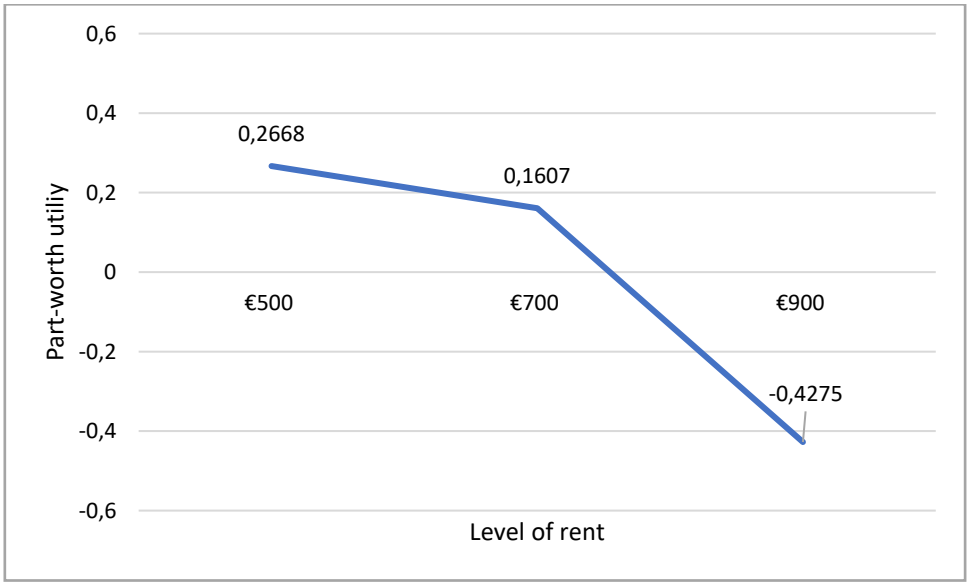


Figure 31: Part-worth utility and rent, latent class 2 (non-linear effect)

4.4 Conclusion

To make an apartment in a transformed office building at the edge of the city meet the preferences of (future) elderly, several things have to be considered. First it seemed – based on the results of the MNL model – that no elderly want to live in an apartment in a transformed office building at the edge of the city. However, the results of the LC model show something different. The results of the LC model show that there are two groups of elderly.

The first group consist of respondents who tend not to choose one of the specified options from the experiment. Elderly of the first group proportionally live more in apartments than elderly of the second group. The preferences of the first group cannot be met with any of the specified alternatives. Therefore, an apartment in a transformed office building at the edge of the city is not able to meet the preferences of the elderly of the first group.

The second group consists of elderly who tend to choose one of the specified options from the experiment. Elderly of the second group participate more in organised activities than elderly of the first group. Furthermore, elderly aged 70 years and older proportionally are more part of the second group. To meet the preferences of the second group, several attribute levels have to be applied on apartment level, building level and environment level. When the apartment in a transformed office building at the edge of the city has the right attributes, it can meet the preferences of elderly of the second group.

On apartment level, the rent and apartment surface are important. To make the alternative as attractive as possible, it is recommended to keep the rent below €700 per month. The apartment surface has to be about 100 square meters. However, everything above 80 squares meter is also considered somewhat attractive.

Regarding building level the presence of organised activities, common rooms and outdoor facilities are important. Weekly organised activities and a common activity room can make an apartment complex more attractive for (future) elderly. Furthermore, an outdoor gym is considered attractive by (future) elderly.

On environment level, an outdoor gym can make the apartment complex also more attractive. The distance to amenities like a care centre or shops was not of significant importance in this study. However, it is recommended to keep the travel distance 15 minutes or lower in order to prevent decreasing attractiveness.

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5 Conclusion and recommendations

Much research has been done on transformation of vacant office buildings and the potential target groups which can live in the transformed office building. It is a subject that keeps many instances busy. However, the focus of most researchers is on vacant office buildings in the city centre and young people like expats or students. Meanwhile, many office buildings at the edge of the city are structurally vacant and this causes problems on economic, environment and society level. Furthermore, no focus was on the aging population in the Netherlands as a potential target group to live in transformed office buildings. Between 2015 and 2040, a growth of 1.3 million elderly households is expected and there already is a housing shortage for this group. Therefore it is needed to search for new opportunities to create new dwellings for the elderly now and in the future.

This research focuses on both vacant office buildings at the edge of the city and the aging population. The aim of this research is to gain insight in how to make vacant offices on the edge of a city attractive for elderly to live in. With the literature study, insight was gained in which attributes on house, building and environment level make a dwelling more attractive for elderly. Besides these attributes, the focus of this research was also on the social aspect of dwellings for elderly. Many of the future elderly households will be one-person households, therefore loneliness might become a bigger problem than it is now. The pull factor of possibilities for social contact was implemented in the variable attributes. This was done in order to make the specified alternatives in the experiment (which is a part of the survey) as attractive as possible. The experiment consists of a stated choice experiment where stated preference is used.

The results were analysed by means of a Multinomial Logit (MNL) model and Latent Class Model (LCM). The results of the LCM show that two groups of respondents exist. One group is attracted to the specified alternative and the other group is not. The group that is attracted, participates in the current situation in organised activities more often than the other group. Therefore, it seems that the “attracted” group seeks more social contact. This is also visible in the results of the LCM. The group clearly prefers weekly organised activities, an activity room in the building and an outdoor gym next to the building. Besides these attributes a rent between €500 and €700 and an apartment surface of 100 m^2 are recommended to make the apartment more attractive.

What remains to be learned is more insight into the different groups among elderly and the preferences per group. The sample of this research was not so large (205 in total). The questionnaire should be conducted on larger scale to provide more general results. It is difficult to identify groups based on the participation in organised activities and living in apartments only. However, the results of this research give an indication on which things

municipalities, building owners and developers should focus when transforming office buildings into dwellings for elderly. Therefore, the objective of this study has been achieved. Insight has been gained in how to make transformed office buildings meet the preference of (future) elderly.

Besides the small sample there was more room for improvement. A note should be placed that the choice task was extended with an evaluation part after the launch of the survey. After a couple of days, it appeared that a significant percentage of the respondents chose the “none of both” option. Too many “none of both” choices would lead to a result which is not usable for this research. To get a result which was usable for the research an evaluation per alternative was added. The evaluation of the alternatives could function as a backup when to many “none of both” responses appeared. This remains a difficult matter, on the one hand many “none of both” could frustrate the estimation process. However, on the other hand people should not be forced to decide. When people are forced to decide by lack of the “none of both” option they might choose something they not actually want. Therefore, the results can become unreliable.

The stated preference experiment used in this research can be optimized in several ways. First, the attributes “apartment surface” and “rent” can be fixed based on the results of this research. For example, the apartment surface can be fixed at 90-100 square meter and the rent can be fixed at €600-€700 per month. The fixation of these two attributes leaves space for new attributes to be implemented in the experiment. Second, the evaluation task should be implemented at the start of the experiment. Because of the evaluation task, respondents have to look at the alternatives more detailed to give the evaluation of the alternative. Third, the size and amount of choice tasks should be made smaller if possible. From the survey data, it could be noticed that many respondents stopped about halfway the stated choice experiment.

Based on this research, further research can be conducted on several aspects. Case studies on vacant office building on the edge of a city can provide more detailed insight into the possibilities of transforming the building into dwellings for elderly. The model used in this research can be applied is case studies. This can be done by using the framework of the model (experiment). For example, the specified alternative exists of detailed designs for a transformed office building at the edge of city. The attributes of the alternatives from this research can be used, but new attributes such as architecture can be added. Respondents (potential residents) can choose the specified alternative (design) which they prefer the most or choose “none of the alternatives”.

Research on different groups of elderly and their housing preferences is also recommended to identify potential residents for transformed office buildings at the edge of the city. Furthermore, the social aspect of housing is a recommended topic for research, research on

this subject in combination with housing preferences of (future) elderly is scarce. Further research is needed because of the aging population and the shortage of dwellings for this group. Every research that gains insight into this area helps understanding in dealing with this challenge.

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Appendices

Appendix 1: Model output in Nlogit

Appendix 1A: MNL model with all parameters

```
---------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -1890.23046
Estimation based on N =   1863, K =  16
Inf.Cr.AIC  =   3812.5 AIC/N =    2.046
Model estimated: Aug 03, 2018, 16:56:08
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only  -1964.3323   .0377 .0336
Response data are given as ind. choices
Number of obs.=  1863, skipped    0 obs
---------+-----------------------------------------------------------------
         |                     Standard                Prob.      95% Confidence
   KEUZE |  Coefficient          Error       z        |z|>Z*          Interval
---------+-----------------------------------------------------------------
   CONST |    -.62464***        .04940   -12.65      .0000      -.72146   -.52782
    ACT1 |    -.04228           .05553     -.76      .4464      -.15112    .06656
    ACT2 |     .08002           .05453     1.47      .1422      -.02685    .18689
    GEM1 |     .08242           .05409     1.52      .1276      -.02360    .18844
    GEM2 |     .27127***        .05221     5.20      .0000       .16894    .37360
    FAC1 |    -.11708**         .05608    -2.09      .0368      -.22700   -.00717
    FAC2 |     .01958           .05275      .37      .7105      -.08380    .12297
   LEEFT |    -.07508*          .04009    -1.87      .0611      -.15365    .00348
   WINK1 |     .04560           .05522      .83      .4090      -.06264    .15383
   WINK2 |     .02020           .05612      .36      .7190      -.08980    .13019
   ZORG1 |    -.02222           .05387     -.41      .6800      -.12782    .08337
   ZORG2 |     .02059           .05413      .38      .7037      -.08550    .12668
    GRO1 |    -.37823***        .05833    -6.48      .0000      -.49255   -.26391
    GRO2 |     .04465           .05323      .84      .4016      -.05968    .14898
   HUUR1 |     .18597***        .05602     3.32      .0009       .07617    .29577
   HUUR2 |     .09164*          .05554     1.65      .0990      -.01723    .20050
---------+-----------------------------------------------------------------
Note: ***, **, * ==>  Significance at 1%, 5%, 10% level.
---------------------------------------------------------------------------
```

Appendix 1B: Latent class model

```
---------------------------------------
Latent Class Logit Model
Dependent variable                KEUZE
Log likelihood function     -1515.58889
Restricted log likelihood   -2046.71469
Chi squared [  33 d.f.]      1062.25161
Significance level             .00000
McFadden Pseudo R-squared      .2595016
Estimation based on N =   1863, K =  33
Inf.Cr.AIC  =   3097.2 AIC/N =    1.662
Model estimated: Aug 04, 2018, 15:42:48
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
No coefficients -2046.7147   .2595 .2529
Constants only  -1964.3323   .2284 .2216
At start values -1890.2159   .1982 .1910
Response data are given as ind. choices
Number of latent classes =            2
Average Class Probabilities
     .388   .612
LCM model with panel has     207 groups
Fixed number of obsrvs./group=        9
Number of obs.=  1863, skipped    0 obs
```

KEUZE	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
	Utility parameters in latent class -->> 1					
CONST|1|	-3.02776***	.23962	-12.64	.0000	-3.49741	-2.55811
ACT1|1|	.40144*	.21466	1.87	.0615	-.01929	.82216
ACT2|1|	-.08655	.24500	-.35	.7239	-.56674	.39364
GEM1|1|	.15622	.23036	.68	.4977	-.29528	.60771
GEM2|1|	.16042	.24569	.65	.5138	-.32112	.64196
FAC1|1|	-.16190	.21095	-.77	.4428	-.57535	.25155
FAC2|1|	.14188	.20647	.69	.4920	-.26280	.54656
LEEFT|1|	-.13358	.14843	-.90	.3682	-.42449	.15734
WINK1|1|	.53294***	.20355	2.62	.0088	.13399	.93188
WINK2|1|	-.16011	.22991	-.70	.4862	-.61073	.29051
ZORG1|1|	-.03173	.20208	-.16	.8752	-.42780	.36433
ZORG2|1|	.14922	.20760	.72	.4723	-.25767	.55611
GRO1|1|	-.07117	.20810	-.34	.7324	-.47903	.33670
GRO2|1|	-.22431	.21016	-1.07	.2858	-.63622	.18760
HUUR1|1|	.00578	.24470	.02	.9811	-.47383	.48540
HUUR2|1|	-.09138	.22066	-.41	.6788	-.52387	.34111
	Utility parameters in latent class -->> 2					
CONST|2|	.64081***	.09856	6.50	.0000	.44763	.83398
ACT1|2|	-.16731**	.06773	-2.47	.0135	-.30007	-.03456
ACT2|2|	.16527**	.06695	2.47	.0136	.03405	.29650
GEM1|2|	.03269	.06771	.48	.6293	-.10003	.16540
GEM2|2|	.37045***	.06404	5.78	.0000	.24493	.49597
FAC1|2|	-.13907**	.06815	-2.04	.0413	-.27264	-.00550
FAC2|2|	.02130	.06254	.34	.7334	-.10128	.14389
LEEFT|2|	-.05528	.04973	-1.11	.2664	-.15275	.04220
WINK1|2|	-.00574	.06806	-.08	.9328	-.13914	.12766
WINK2|2|	.11246	.07085	1.59	.1124	-.02640	.25131
ZORG1|2|	-.01415	.06410	-.22	.8252	-.13979	.11148
ZORG2|2|	.00570	.06584	.09	.9310	-.12335	.13475
GRO1|2|	-.46519***	.07126	-6.53	.0000	-.60486	-.32552
GRO2|2|	.06884	.06450	1.07	.2858	-.05757	.19525
HUUR1|2|	.26675***	.07448	3.58	.0003	.12078	.41272
HUUR2|2|	.16072**	.07144	2.25	.0245	.02071	.30074
	Estimated latent class probabilities					
PrbCls1|	.38790***	.03780	10.26	.0000	.31381	.46199
PrbCls2|	.61210***	.03780	16.19	.0000	.53801	.68619

Note: ***, **, * ==> Significance at 1%, 5%, 10% level.

Appendix 2: Characteristics per latent class (1=left 2=right)

Huidige_woning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	22	27,8	27,8	27,8
	1	11	13,9	13,9	41,8
	2	11	13,9	13,9	55,7
	3	12	15,2	15,2	70,9
	4	20	25,3	25,3	96,2
	5	3	3,8	3,8	100,0
	Total	79	100,0	100,0	

Huidige_woning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	42	33,3	33,3	33,3
	1	31	24,6	24,6	57,9
	2	12	9,5	9,5	67,5
	3	20	15,9	15,9	83,3
	4	17	13,5	13,5	96,8
	5	4	3,2	3,2	100,0
	Total	126	100,0	100,0	

Koophuur

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Koopwoning	60	75,9	75,9	75,9
	Huurwoning	19	24,1	24,1	100,0
	Total	79	100,0	100,0	

Koophuur

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Koopwoning	105	83,3	83,3	83,3
	Huurwoning	21	16,7	16,7	100,0
	Total	126	100,0	100,0	

Oppervlak

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50-70 m2	8	10,1	10,3	10,3
	70-90 m2	16	20,3	20,5	30,8
	90-110 m2	17	21,5	21,8	52,6
	Meer dan 110 m2	37	46,8	47,4	100,0
	Total	78	98,7	100,0	
Missing	System	1	1,3		
Total		79	100,0		

Oppervlak

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 50 m2	3	2,4	2,4	2,4
	50-70 m2	10	7,9	8,1	10,6
	70-90 m2	26	20,6	21,1	31,7
	90-110 m2	23	18,3	18,7	50,4
	Meer dan 110 m2	61	48,4	49,6	100,0
	Total	123	97,6	100,0	
Missing	System	3	2,4		
Total		126	100,0		

Woonsituatie

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Samenwonend	57	72,2	72,2	72,2
	Alleenstaand	22	27,8	27,8	100,0
	Total	79	100,0	100,0	

Woonsituatie

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Samenwonend	97	77,0	77,0	77,0
	Alleenstaand	29	23,0	23,0	100,0
	Total	126	100,0	100,0	

Inkomen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 1000 euro	2	2,5	2,5	2,5
	1000 tot 2000 euro	15	19,0	19,0	21,5
	Meer dan 2000 euro	51	64,6	64,6	86,1
	Wil ik niet zeggen	11	13,9	13,9	100,0
	Total	79	100,0	100,0	

Inkomen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 1000 euro	7	5,6	5,6	5,6
	1000 tot 2000 euro	29	23,0	23,0	28,6
	Meer dan 2000 euro	80	63,5	63,5	92,1
	Wil ik niet zeggen	10	7,9	7,9	100,0
	Total	126	100,0	100,0	

Woonomgeving

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Buitengebied	5	6,3	6,3	6,3
	Buitenwijk van een dorp/stad	50	63,3	63,3	69,6
	Centrum van een dorp/stad	24	30,4	30,4	100,0
	Total	79	100,0	100,0	

Woonomgeving

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Buitengebied	14	11,1	11,1	11,1
	Buitenwijk van een dorp/stad	83	65,9	65,9	77,0
	Centrum van een dorp/stad	29	23,0	23,0	100,0
	Total	126	100,0	100,0	

Leeftijd_bewoners

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ongeveer dezelfde leeftijd	22	27,8	27,8	27,8
	Alle leeftijden	57	72,2	72,2	100,0
	Total	79	100,0	100,0	

Leeftijd_bewoners

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ongeveer dezelfde leeftijd	27	21,4	21,4	21,4
	Alle leeftijden	99	78,6	78,6	100,0
	Total	126	100,0	100,0	

Huisdier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nee	61	77,2	77,2	77,2
	Ja, een klein huisdier (kat, parkiet etc.)	9	11,4	11,4	88,6
	Ja, een groot huisdier (hond etc.)	9	11,4	11,4	100,0
	Total	79	100,0	100,0	

Huisdier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nee	95	75,4	75,4	75,4
	Ja, een klein huisdier (kat, parkiet etc.)	13	10,3	10,3	85,7
	Ja, een groot huisdier (hond etc.)	18	14,3	14,3	100,0
	Total	126	100,0	100,0	

Winkels

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 5 minuten	20	25,3	25,3	25,3
	5 tot 10 minuten	47	59,5	59,5	84,8
	11 tot 15 minuten	9	11,4	11,4	96,2
	Meer dan 15 minuten	3	3,8	3,8	100,0
	Total	79	100,0	100,0	

Winkels

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 5 minuten	48	38,1	38,1	38,1
	5 tot 10 minuten	63	50,0	50,0	88,1
	11 tot 15 minuten	12	9,5	9,5	97,6
	Meer dan 15 minuten	3	2,4	2,4	100,0
	Total	126	100,0	100,0	

Zorgvoorzieningen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 5 minuten	17	21,5	21,5	21,5
	5 tot 10 minuten	46	58,2	58,2	79,7
	11 tot 15 minuten	14	17,7	17,7	97,5
	Meer dan 15 minuten	2	2,5	2,5	100,0
	Total	79	100,0	100,0	

Zorgvoorzieningen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minder dan 5 minuten	41	32,5	32,5	32,5
	5 tot 10 minuten	55	43,7	43,7	76,2
	11 tot 15 minuten	28	22,2	22,2	98,4
	Meer dan 15 minuten	2	1,6	1,6	100,0
	Total	126	100,0	100,0	

Vereniging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	59	74,7	74,7	74,7
	Nee	20	25,3	25,3	100,0
	Total	79	100,0	100,0	

Vereniging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	96	76,2	76,2	76,2
	Nee	30	23,8	23,8	100,0
	Total	126	100,0	100,0	

Org_activiteiten

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	30	38,0	38,0	38,0
	Nee	49	62,0	62,0	100,0
	Total	79	100,0	100,0	

Org_activiteiten

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	65	51,6	51,6	51,6
	Nee	61	48,4	48,4	100,0
	Total	126	100,0	100,0	

Verhuisgeneigdheid

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	12	15,2	15,2	15,2
	Misschien	26	32,9	32,9	48,1
	Nee	39	49,4	49,4	97,5
	Ik ben net verhuisd	2	2,5	2,5	100,0
	Total	79	100,0	100,0	

Groter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	79	100,0	100,0	100,0

Kleiner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	56	70,9	70,9	70,9
	True	23	29,1	29,1	100,0
	Total	79	100,0	100,0	

Gelijkvoers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	58	73,4	73,4	73,4
	True	21	26,6	26,6	100,0
	Total	79	100,0	100,0	

Onderhoud

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	62	78,5	78,5	78,5
	True	17	21,5	21,5	100,0
	Total	79	100,0	100,0	

Goedkoper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	72	91,1	91,1	91,1
	True	7	8,9	8,9	100,0
	Total	79	100,0	100,0	

Comfort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	76	96,2	96,2	96,2
	True	3	3,8	3,8	100,0
	Total	79	100,0	100,0	

Zorg

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	73	92,4	92,4	92,4
	True	6	7,6	7,6	100,0
	Total	79	100,0	100,0	

Sociale_contacten

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	75	94,9	94,9	94,9
	True	4	5,1	5,1	100,0
	Total	79	100,0	100,0	

Leeftijd

	Frequency	Percent	Valid Percent	Cumulative Percent

Verhuisgeneigdheid

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	19	15,1	15,1	15,1
	Misschien	52	41,3	41,3	56,3
	Nee	52	41,3	41,3	97,6
	Ik ben net verhuisd	3	2,4	2,4	100,0
	Total	126	100,0	100,0	

Groter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	124	98,4	98,4	98,4
	True	2	1,6	1,6	100,0
	Total	126	100,0	100,0	

Kleiner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	95	75,4	75,4	75,4
	True	31	24,6	24,6	100,0
	Total	126	100,0	100,0	

Gelijkvoers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	80	63,5	63,5	63,5
	True	46	36,5	36,5	100,0
	Total	126	100,0	100,0	

Onderhoud

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	89	70,6	70,6	70,6
	True	37	29,4	29,4	100,0
	Total	126	100,0	100,0	

Goedkoper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	117	92,9	92,9	92,9
	True	9	7,1	7,1	100,0
	Total	126	100,0	100,0	

Comfort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	112	88,9	88,9	88,9
	True	14	11,1	11,1	100,0
	Total	126	100,0	100,0	

Zorg

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	107	84,9	84,9	84,9
	True	19	15,1	15,1	100,0
	Total	126	100,0	100,0	

Sociale_contacten

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	118	93,7	93,7	93,7
	True	8	6,3	6,3	100,0
	Total	126	100,0	100,0	

Leeftijd

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	54	1	1,3	1,3	1,3
	55	2	2,5	2,5	3,8
	57	2	2,5	2,5	6,3
	58	2	2,5	2,5	8,9
	59	3	3,8	3,8	12,7
	60	1	1,3	1,3	13,9
	61	1	1,3	1,3	15,2
	62	2	2,5	2,5	17,7
	63	1	1,3	1,3	19,0
	64	2	2,5	2,5	21,5
	65	3	3,8	3,8	25,3
	66	4	5,1	5,1	30,4
	67	5	6,3	6,3	36,7
	68	4	5,1	5,1	41,8
	69	1	1,3	1,3	43,0
	70	4	5,1	5,1	48,1
	71	3	3,8	3,8	51,9
	72	7	8,9	8,9	60,8
	73	11	13,9	13,9	74,7
	74	4	5,1	5,1	79,7
	75	3	3,8	3,8	83,5
	76	1	1,3	1,3	84,8
	77	2	2,5	2,5	87,3
	79	3	3,8	3,8	91,1
	80	1	1,3	1,3	92,4
	81	2	2,5	2,5	94,9
	84	1	1,3	1,3	96,2
	85	1	1,3	1,3	97,5
	86	1	1,3	1,3	98,7
	89	1	1,3	1,3	100,0
	Total	79	100,0	100,0	

Leeftijd

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	,8	,8	,8
	37	1	,8	,8	1,6
	50	1	,8	,8	2,4
	52	1	,8	,8	3,2
	54	4	3,2	3,2	6,3
	55	4	3,2	3,2	9,5
	56	8	6,3	6,3	15,9
	57	1	,8	,8	16,7
	58	1	,8	,8	17,5
	59	2	1,6	1,6	19,0
	60	3	2,4	2,4	21,4
	61	2	1,6	1,6	23,0
	62	2	1,6	1,6	24,6
	63	1	,8	,8	25,4
	64	5	4,0	4,0	29,4
	66	2	1,6	1,6	31,0
	67	4	3,2	3,2	34,1
	68	5	4,0	4,0	38,1
	69	8	6,3	6,3	44,4
	70	10	7,9	7,9	52,4
	71	10	7,9	7,9	60,3
	72	5	4,0	4,0	64,3
	73	4	3,2	3,2	67,5
	74	10	7,9	7,9	75,4
	75	2	1,6	1,6	77,0
	76	5	4,0	4,0	81,0
	77	4	3,2	3,2	84,1
	78	7	5,6	5,6	89,7
	79	2	1,6	1,6	91,3
	80	1	,8	,8	92,1
	81	3	2,4	2,4	94,4
	82	3	2,4	2,4	96,8
	83	1	,8	,8	97,6
	86	1	,8	,8	98,4
	90	1	,8	,8	99,2
	91	1	,8	,8	100,0
	Total	126	100,0	100,0	

Geslacht

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	42	53,2	53,2	53,2
	Vrouw	37	46,8	46,8	100,0
	Total	79	100,0	100,0	

Geslacht

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	73	57,9	57,9	57,9
	Vrouw	53	42,1	42,1	100,0
	Total	126	100,0	100,0	

Appendix 4: Chi-square test

Org_activiteiten * Group_P Crosstabulation

			Group_P		
			1,00	2,00	Total
Org_activiteiten	Ja	Count	30	65	95
		% within Org_activiteiten	31,6%	68,4%	100,0%
		% within Group_P	38,0%	51,6%	46,3%
	Nee	Count	49	61	110
		% within Org_activiteiten	44,5%	55,5%	100,0%
		% within Group_P	62,0%	48,4%	53,7%
Total		Count	79	126	205
		% within Org_activiteiten	38,5%	61,5%	100,0%
		% within Group_P	100,0%	100,0%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,618[a]	1	,057		
Continuity Correction[b]	3,092	1	,079		
Likelihood Ratio	3,643	1	,056		
Fisher's Exact Test				,063	,039
Linear-by-Linear Association	3,601	1	,058		
N of Valid Cases	205				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 36,61.

b. Computed only for a 2x2 table

Group_P * Apartment Crosstabulation

Count

		Apartment		
		Apartment	No apartment	Total
Group_P	Group 1	20	59	79
	Group 2	17	109	126
Total		37	168	205

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,590[a]	1	,032		
Continuity Correction[b]	3,825	1	,050		
Likelihood Ratio	4,480	1	,034		
Fisher's Exact Test				,040	,026
Linear-by-Linear Association	4,567	1	,033		
N of Valid Cases	205				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 14,26.

b. Computed only for a 2x2 table

Leeftijd * Group_P Crosstabulation

			Group_P		
			1,00	2,00	Total
Leeftijd	71	Count	3	10	13
		% within Leeftijd	23,1%	76,9%	100,0%
		% within Group_P	7,3%	16,7%	12,9%
	72	Count	7	5	12
		% within Leeftijd	58,3%	41,7%	100,0%
		% within Group_P	17,1%	8,3%	11,9%
	73	Count	11	4	15
		% within Leeftijd	73,3%	26,7%	100,0%
		% within Group_P	26,8%	6,7%	14,9%
	74	Count	4	10	14
		% within Leeftijd	28,6%	71,4%	100,0%
		% within Group_P	9,8%	16,7%	13,9%
	75	Count	3	2	5
		% within Leeftijd	60,0%	40,0%	100,0%
		% within Group_P	7,3%	3,3%	5,0%
	76	Count	1	5	6
		% within Leeftijd	16,7%	83,3%	100,0%
		% within Group_P	2,4%	8,3%	5,9%
	77	Count	2	4	6
		% within Leeftijd	33,3%	66,7%	100,0%
		% within Group_P	4,9%	6,7%	5,9%
	78	Count	0	7	7
		% within Leeftijd	0,0%	100,0%	100,0%
		% within Group_P	0,0%	11,7%	6,9%
	79	Count	3	2	5
		% within Leeftijd	60,0%	40,0%	100,0%
		% within Group_P	7,3%	3,3%	5,0%
	80	Count	1	1	2
		% within Leeftijd	50,0%	50,0%	100,0%
		% within Group_P	2,4%	1,7%	2,0%
	81	Count	2	3	5
		% within Leeftijd	40,0%	60,0%	100,0%
		% within Group_P	4,9%	5,0%	5,0%
	82	Count	0	3	3
		% within Leeftijd	0,0%	100,0%	100,0%

		% within Group_P	0,0%	5,0%	3,0%
	83	Count	0	1	1
		% within Leeftijd	0,0%	100,0%	100,0%
		% within Group_P	0,0%	1,7%	1,0%
	84	Count	1	0	1
		% within Leeftijd	100,0%	0,0%	100,0%
		% within Group_P	2,4%	0,0%	1,0%
	85	Count	1	0	1
		% within Leeftijd	100,0%	0,0%	100,0%
		% within Group_P	2,4%	0,0%	1,0%
	86	Count	1	1	2
		% within Leeftijd	50,0%	50,0%	100,0%
		% within Group_P	2,4%	1,7%	2,0%
	89	Count	1	0	1
		% within Leeftijd	100,0%	0,0%	100,0%
		% within Group_P	2,4%	0,0%	1,0%
	90	Count	0	1	1
		% within Leeftijd	0,0%	100,0%	100,0%
		% within Group_P	0,0%	1,7%	1,0%
	91	Count	0	1	1
		% within Leeftijd	0,0%	100,0%	100,0%
		% within Group_P	0,0%	1,7%	1,0%
Total		Count	41	60	101
		% within Leeftijd	40,6%	59,4%	100,0%
		% within Group_P	100,0%	100,0%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27,265[a]	18	,074
Likelihood Ratio	33,145	18	,016
Linear-by-Linear Association	,411	1	,521
N of Valid Cases	101		

a. 31 cells (81,6%) have expected count less than 5. The minimum expected count is ,41.

Appendix 5: Overview table literature study

Aspect	Voogd (2005)	Nivel (2014)	Bureauvijftig (2015)
Groups based on	Age and income	Indepedence and direction	Age, income, education, living environment and current situation. Moving plans, recently moved, never want to move.
Kind of survey	Questionairre	Questionairre	Questionairre
Percentage of people who want to stay in their homes	58,2%*	79%	31%
Percentage of people who doubt about staying	27%*	-	57%
Percentage of people who want to leave or are looking	15%*	21%**	8%
Reasons for not moving	Satisfied with current situation.	Satisfied with current situation.	Satisfied with current situation. Shops close by.
Reasons for moving	Amount of maintenace in current house. Not all rooms are on one level.	Need for more care, health, house too large, not all rooms on one level.	Smaller house, current house was not suitable anymore, one level house.
Preferred kind of house	Detached house, apartment with elevator or apartment with garden.	Seniorenwoning, apartment, "aanleunwoning" and service flat.	Apartment with balcony
Preferred characteristics of house	One level house, two or three bedrooms, elevator, garden.	One level house	3 rooms, 80-100 m2, balcony, one level, ground floor.
Preferred location	33% prefer city centre, close to amenities	Close to care centre, stay in own neighbourhood and close to all amenities.	Close to amenities
Preferred amenities near house	Daily shopping shops, family doctor, bus station, post office, ATM.	Shops, public transport and care services	Not explicitely mentioned, but amenities are important.
Preferred services	Luch service, serveillance, household	-	Handyman
Preferred neighbours	-	People of all ages	No particular preference
Preferred costs of house	-	-	500-750 euro per month
Percentage rent/buy preferred when moving	25/50%	-	-
*Within five years			
**When people need more care			

Lijzinga en van der Waals (2014)	ANBO (2015)	Van Aken & Kerkhof (2009)	Nijmegen (2015)
House type and home care	Age	Age and income	Age, education, income, "zelfredzaamheid"
Depth interviews	Questionaire	Questionaire	-
-	34%	-	-
-	28%	-	-
-	31%	-	18%/12%
-	Satisfied with current situation, no reason to move.	-	Attached to current situation
Health, death of partner, maintenance of house.	Move to one level house, death of partner	Maintenance, smaller house, one level house.	Health
-	Seniorenwoning	-	Apartment with elevator
One level and smaller than previous house.	One level and wide doors/hallways	Large balcony, large living room, traditionalarchitecture, 80-100m2.	Good accessibility, one level house.
-	-	-	In or close to old neigbourhood
-	-	-	Society amenities to meet other elderly in the complex. Shops, public transport etc.
-	-	-	
People of the same age	-	-	People of the same age
-	-	-	-
-	65/35%	-	-

Appendix 6: Excel sheet with randomization of treatment combinations

L	M	N	O	P	Q	R	S	T
CARD_	Huur	Oppervlak	Gem_ruim	Bewoners	Georganis	Buitenfaci	Afstand_w	Afstand_z
4	€ 500	60	Gemeensc	Van dezelf	Een keer p	Jeu de bou	10 minute	5 minuten
24	€ 700	100	Geen	Van dezelf	Elke dag	Sport toes	10 minute	5 minuten
11	€ 500	80	Gemeensc	Van dezelf	Elke dag	Gemeensc	5 minuten	0 minuten
26	€ 500	60	Geen	Van dezelf	Geen	Gemeensc	0 minuten	0 minuten
1	€ 500	100	Gemeensc	Van alle le	Elke dag	Jeu de bou	5 minuten	5 minuten
8	€ 500	100	Geen	Van alle le	Geen	Sport toes	0 minuten	10 minute
14	€ 700	80	Gemeensc	Van alle le	Geen	Sport toes	5 minuten	5 minuten
2	€ 700	60	Geen	Van dezelf	Elke dag	Gemeensc	10 minute	10 minute
25	€ 500	80	Gemeensc	Van dezelf	Een keer p	Sport toes	10 minute	10 minute
19	€ 500	80	Geen	Van dezelf	Geen	Jeu de bou	0 minuten	5 minuten
12	€ 700	100	Gemeensc	Van dezelf	Geen	Gemeensc	5 minuten	10 minute
18	€ 700	80	Gemeensc	Van alle le	Een keer p	Gemeensc	0 minuten	10 minute
22	€ 900	60	Gemeensc	Van alle le	Elke dag	Jeu de bou	0 minuten	10 minute
27	€ 900	100	Gemeensc	Van dezelf	Geen	Jeu de bou	10 minute	10 minute
23	€ 900	80	Geen	Van dezelf	Een keer p	Jeu de bou	5 minuten	10 minute
13	€ 900	100	Gemeensc	Van dezelf	Elke dag	Gemeensc	0 minuten	5 minuten
21	€ 500	60	Gemeensc	Van dezelf	Elke dag	Sport toes	5 minuten	10 minute
20	€ 900	80	Gemeensc	Van dezelf	Geen	Gemeensc	10 minute	5 minuten
15	€ 700	60	Gemeensc	Van dezelf	Een keer p	Sport toes	0 minuten	5 minuten
17	€ 700	80	Geen	Van alle le	Elke dag	Jeu de bou	10 minute	0 minuten
3	€ 900	60	Geen	Van alle le	Een keer p	Gemeensc	5 minuten	5 minuten
5	€ 900	100	Geen	Van dezelf	Een keer p	Sport toes	5 minuten	0 minuten
6	€ 500	100	Gemeensc	Van alle le	Een keer p	Gemeensc	10 minute	0 minuten
7	€ 700	60	Gemeensc	Van dezelf	Geen	Jeu de bou	5 minuten	0 minuten
10	€ 900	80	Gemeensc	Van dezelf	Elke dag	Sport toes	0 minuten	0 minuten
9	€ 700	100	Gemeensc	Van dezelf	Een keer p	Jeu de bou	0 minuten	0 minuten
16	€ 900	60	Gemeensc	Van alle le	Geen	Sport toes	10 minute	0 minuten

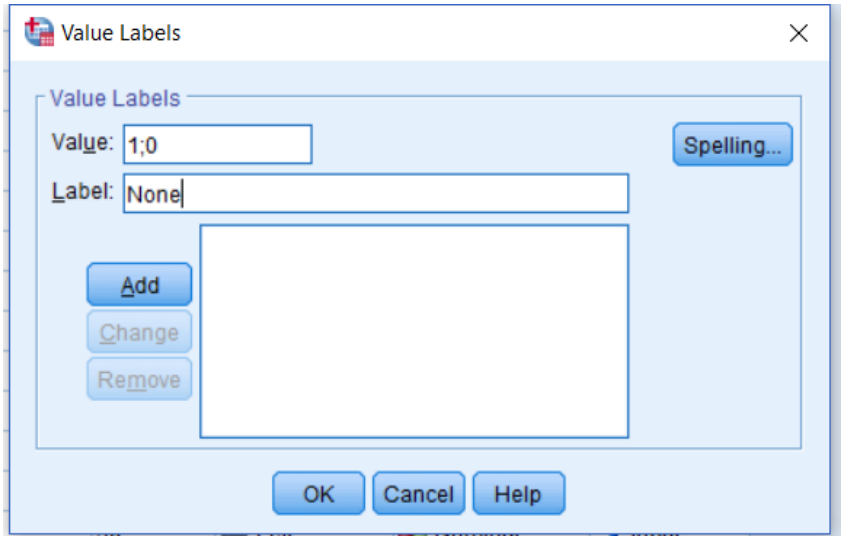
Appendix 7: SPSS file from survey system

The SPSS file exists out of:

- Id, which is task id
- Parent_id, which is the id of the respondent
- All the variables
- The choice for one the alternatives or none of both
- The evaluation of both alternatives by the respondent

1 : sub_position | 0

	id	finished	parent_id	sub_position	prop.Activiteit1
1	190688	0	190658	0	Geen
2	190689	0	190658	1	Een keer per week
3	190690	0	190658	2	Een keer per week
4	190691	0	190658	3	Een keer per week
5	190692	0	190658	4	Elke dag
6	190693	0	190658	5	Een keer per week
7	190694	0	190658	6	Elke dag
8	190695	0	190658	7	Elke dag
9	190696	0	190658	8	Elke dag
10	191405	0	191404	0	Geen
11	191406	0	191404	1	Geen
12	191407	0	191404	2	Elke dag
13	191408	0	191404	3	Elke dag



Appendix 8: Housing types for elderly

Aanleunwoning: Is a house in or next to a care centre where the residents can make use of the care and the services/amenities of the care centre.

Woonzorgcomplex: A “woonzorgcomplex” exists out of a building with independent houses, in the design attention has been paid to living safe and protected. For the entire block service and care have been arranged via a contract. Furthermore there is a communal room for activities for example.

Serviceflat: Is an apartment block where people can make use of paid services like a handyman, cleaning service or food delivery.

Levenloopbestendige woning: This is an independent house suited for living in all live phases with minimal physical effort and a minimal change at accidents.

Kangoeroewoningen: Exist out of independent houses or units which are connected to each other with a connection inside for elderly with a handicap and their family. In this way family and the person who needs care can live with each other.

Gemeenschappelijk wonen voor ouderen: In this housing type people choose to live with each other in one house together without the presence of family ties. The elderly live in their own houses/rooms, share common rooms and do activities together.

Gemeenschappelijk wonen met verschillende leeftijden: People of different ages live in independent houses, but share common rooms and do activities together.

Thuishuis: Is a small-scale housing accommodation for lone elderly with involvement of volunteers.

Gestippeld wonen: Is a type of housing in which members of a house group live spread across a house block. Every resident has his/her own apartment, but residents help each other with care etc. They also undertake activities together.

Harmonicawonen: Same as “gestippeld wonen” but people lit clustered in a building block.

Kleinschalig wonen: Small scale living is applicable when a small group of people who need intensive care and support live together in a group accommodation. This makes it possible to live as normal as possible.

Appendix 9: treatment combinations

Profile	Rent	Surface	Common rooms	Age of residents	Organised activities	Outdoor facilities	Distance shops	Distance care
1	0	2	1	1	2	1	1	1
2	1	0	0	0	2	0	2	2
3	2	0	0	1	1	0	1	1
4	0	0	2	0	1	1	2	1
5	2	2	0	0	1	2	1	0
6	0	2	2	1	1	0	2	0
7	1	0	2	0	0	1	1	0
8	0	2	0	1	0	2	0	2
9	1	2	1	0	1	1	0	0
10	2	1	2	0	2	2	0	0
11	0	1	1	0	2	0	1	0
12	1	2	2	0	0	0	1	2
13	2	2	2	0	2	0	0	1
14	1	1	2	1	0	2	1	1
15	1	0	1	0	1	2	0	1
16	2	0	1	1	0	2	2	0
17	1	1	0	1	2	1	2	0
18	1	1	1	1	1	0	0	2
19	0	1	0	0	0	1	0	1
20	2	1	1	0	0	0	2	1
21	0	0	1	0	2	2	1	2
22	2	0	2	1	2	1	0	2
23	2	1	0	0	1	1	1	2
24	1	2	0	0	2	2	2	1
25	0	1	2	0	1	2	2	2
26	0	0	0	0	0	0	0	0
27	2	2	1	0	0	1	2	2

Appendix 10: Data file

In the table/file the following things are listed:

- Task ID;
- Parent ID;
- Alti (alternative);
- Choice: the choice will also be presented in numbers, this is done by giving a point to the alternative which has been chosen. For example alti 1 gets one point and 2/3 get zero points, in this way alti 1 is selected.;
- Attributes and their levels (in total 15 columns);
- Evaluation.

id	parent_id	alti	keuze	const	Act1	Act2	Gem1	Gem2	Fac1	Fac2	Leeft	Wink1	Wink2	Zorg1	Zorg2	Gro1	Gro2	Huur1	Huur2
190688	190658	1	1	1	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
190688	190658	2	0	1	0	1	0	1	-1	-1	1	1	0	0	1	1	0	0	1
190688	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190689	190658	1	1	1	0	1	-1	-1	1	0	-1	-1	-1	1	0	-1	-1	1	0
190689	190658	2	0	1	1	0	0	1	1	0	1	-1	-1	0	1	0	1	-1	-1
190689	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190690	190658	1	1	1	0	1	0	1	-1	-1	1	1	0	0	1	1	0	0	1
190690	190658	2	0	1	-1	-1	-1	-1	0	1	-1	1	0	-1	-1	1	0	-1	-1
190690	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190691	190658	1	1	1	0	1	0	1	1	0	-1	1	0	-1	-1	0	1	0	1
190691	190658	2	0	1	1	0	1	0	0	1	1	1	0	0	1	0	1	1	0
190691	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190692	190658	1	1	1	-1	-1	0	1	1	0	1	0	1	1	0	0	1	1	0
190692	190658	2	0	1	1	0	-1	-1	0	1	1	-1	-1	0	1	1	0	1	0
190692	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190693	190658	1	1	1	0	1	0	1	0	1	1	1	0	1	0	-1	-1	0	1
190693	190658	2	0	1	1	0	1	0	-1	-1	-1	1	0	-1	-1	-1	-1	1	0
190693	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190694	190658	1	1	1	-1	-1	1	0	0	1	-1	-1	-1	1	0	0	1	0	1
190694	190658	2	0	1	-1	-1	-1	-1	-1	-1	1	1	0	1	0	0	1	-1	-1
190694	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190695	190658	1	1	1	-1	-1	0	1	0	1	-1	0	1	0	1	-1	-1	1	0
190695	190658	2	0	1	0	1	1	0	-1	-1	1	0	1	1	0	-1	-1	-1	-1
190695	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190696	190658	1	1	1	-1	-1	0	1	-1	-1	1	0	1	-1	-1	1	0	1	0
190696	190658	2	0	1	0	1	-1	-1	1	0	-1	-1	-1	1	0	-1	-1	1	0
190696	190658	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 11: Survey

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Nieuwe huisvesting voor (toekomstige) ouderen

Huidige situatie

Wat voor soort woning is uw huidige woning?

- ○ Vrijstaande woning
- ○ Twee onder een kap
- ◉ Hoekwoning
- ○ Tussenwoning
- ○ Appartement
- ○ Overig

Woont u in een koop- of huurwoning?

- ◉ Koopwoning
- ○ Huurwoning

Wat is de oppervlakte van uw huidige woning in vierkante meters?

- ○ Minder dan 50 m2
- ◉ 50-70 m2
- ○ 70-90 m2
- ○ 90-110 m2
- ○ Meer dan 110 m2

Wat is uw huidige woonsituatie?

- ◉ Samenwonend
- ○ Alleenstaand

Wat is uw huidige besteedbare inkomen per maand?

- ◉ Minder dan 1000 euro
- ○ 1000 tot 2000 euro
- ○ Meer dan 2000 euro
- ○ Wil ik niet zeggen

Hoe ziet uw huidige woonomgeving er uit?

- ○ Buitengebied
- ◉ Buitenwijk van een dorp/stad
- ○ Centrum van een dorp/stad

In welke leeftijdscategorie vallen de bewoners van uw buurt ?

- ○ Ongeveer dezelfde leeftijd
- ◉ Alle leeftijden

Heeft u een huisdier?

- ○ Nee
- ◉ Ja, een klein huisdier (kat, parkiet etc.)
- ○ Ja, een groot huisdier (hond etc.)

Wat is de afstand (in minuten reistijd) tot de winkels van uw dagelijkse boodschappen?

- ○ Minder dan 5 minuten
- ◉ 5 tot 10 minuten
- ○ 11 tot 15 minuten
- ○ Meer dan 15 minuten

Wat is de afstand (in minuten reistijd) tot uw zorgvoorziening (huisarts, apotheek)?

- ○ Minder dan 5 minuten
- ◉ 5 tot 10 minuten
- ○ 11 tot 15 minuten
- ○ Meer dan 15 minuten

Bent u actief in een vereniging (bijvoorbeeld een sportvereniging)?

- ◉ Ja
- ○ Nee

Doet u in uw buurt wel eens mee aan georganiseerde activiteiten?

- ◉ Ja
- ○ Nee

Na deze vragen volgt de uitleg over het experiment.

Bent u nog van plan om te verhuizen?

- ○ Ja
- ◉ Misschien
- ○ Nee
- ○ Ik ben net verhuisd

Wat is een reden (of zijn redenen) om te verhuizen?

- ☐ Groter wonen
- ☑ Kleiner wonen
- ☑ Gelijkvloers wonen
- ☐ Onderhoud van de woning (en tuin)
- ☐ Goedkoper wonen
- ☐ Comfortabeler wonen
- ☐ Behoefte aan zorg
- ☐ Behoefte aan sociale contacten

U mag hier meerdere (maximaal drie) antwoorden aankruisen

Na de uitleg volgen er meerdere denkbeeldige keuzesituaties waarin aan u steeds twee woonsituaties worden voorgelegd.

Het appartement dat bij de woonsituaties hoort is steeds hetzelfde en heeft de volgende basiskenmerken:

- Het is gelijkvloers;
- Het beschikt over een balkon;
- Het beschikt over een keuken, woonkamer, badkamer, toilet etc. en is verder vrij naar smaak in te delen;
- Service (bijv. zorg of klusjesman) kan geleverd worden indien gewenst;
- Er zijn voldoende parkeerplaatsen;
- Er is een bushalte voor het complex;
- Het complex is omringd door groen;
- Er is beveiliging aanwezig op het complex in de vorm van camera's en een omheining;
- Er is een sportschool aanwezig in het complex;
- Het complex betreft een kantoorgebouw dat getransformeerd is naar een appartementencomplex.

Naast de basiskenmerken variëren de appartementen op een aantal kenmerken. U vindt deze kenmerken op de volgende pagina.

Vorige | Volgende

In onderstaande tabel zijn de variabele kenmerken weergeven. Deze kenmerken bevinden zich op **woningniveau, gebouwniveau en omgevingsniveau**. Hierna is een voorbeeld te zien van een denkbeeldige keuzesituatie.

Attribuut		Toelichting
Woningniveau		
€	Huur	Huur per maand inclusief gas, water en licht.
m²	Grootte appartement	Grootte van het appartement in vierkante meters
Gebouwniveau		

Attribuut		Toelichting
Woningniveau		
	Huur	Huur per maand inclusief gas, water en licht.
	Grootte appartement	Grootte van het appartement in vierkante meters
Gebouwniveau		
	Gemeenschappelijke ruimtes	Aanwezigheid van gemeenschappelijke ruimtes in het gebouw voor bijvoorbeeld activiteiten of gezamenlijk koken (zie afbeeldingen).  
	Leeftijd bewoners	Leeftijd van de bewoners van het complex
	Georganiseerde activiteiten	De mate waarin gezamenlijke activiteiten georganiseerd worden  
Omgevingsniveau		
	Gemeenschappelijke faciliteiten buiten	Gemeenschappelijke faciliteiten die buiten direct naast het gebouw aanwezig zijn zoals sporttoestellen, jeu de boules baan of een moestuin  
	Afstand tot winkels en horeca	Afstand tot dichtstbijzijnde winkels/horeca in minuten reistijd
	Afstand tot zorg	Afstand tot dichtstbijzijnde zorgvoorziening (huisarts en apotheek) in minuten reistijd

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Nieuwe huisvesting voor (toekomstige) ouderen

Experiment

Page: StatedVb

Hieronder ziet u een voorbeeld van een denkbeeldige keuzesituatie. Stelt u zich voor dat op zoek bent naar een woning en deze opties aangeboden krijgt. Wij vragen u eerst aan te geven hoe aantrekkelijk u de aangeboden woonsituaties vindt. Daarna vragen wij u aan te geven welke woonsituatie u het meest aanspreekt? U kunt "geen van beide" aanvinken als geen van de woonsituaties u aanspreekt.

Voorbeeld

Kenmerken	Woonsituatie 1	Woonsituatie 2	Geen van beide
Huur	€500	€700	
Grootte appartement in vierkante meters	60	80	
Gemeenschappelijke ruimtes	Geen	Activiteitenruimte	
Leeftijd bewoners complex	Van dezelfde leeftijd	Van alle leeftijden	
Georganiseerde activiteiten	Geen	Elke dag	
Gemeenschappelijke faciliteiten buiten	Gemeenschappelijke moestuin	Jeu de boules baan	
Afstand tot winkels en horeca	10 minuten	5 minuten	
Afstand tot zorg	0 minuten aanwezig in complex zelf	5 minuten	
Uw evaluatie	Aantrekkelijk	Zeer onaantrekkelijk	
Uw keuze	X	O	O

Nu volgen er 9 unieke keuzesituaties. Klik op "volgende" om te beginnen met het experiment.

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Transformatie kantoren en ouderen

Uitleg experiment

Page: StatedVb

Wij vragen u eerst aan te geven hoe aantrekkelijk u de aangeboden woonsituaties vindt. Daarna vragen wij u aan te geven welke woonsituatie u het meest aanspreekt? U kunt "geen van beide" aanvinken als geen van de woonsituaties u aanspreekt.

Kenmerken	Woonsituatie 1	Woonsituatie 2	Geen van beide
Huur	€ 500	€ 900	
Grootte appartement in vierkante meters	100	80	
Gemeenschappelijke ruimtes	Gemeenschappelijke grote keuken	Gemeenschappelijke actviteitenruimte	
Leeftijd bewoners complex	Van alle leeftijden	Van dezelfde leeftijd	
Georganiseerde activiteiten	Een keer per week	Geen	
Gemeenschappelijke faciliteiten buiten	Gemeenschappelijke moestuin	Gemeenschappelijke moestuin	
Afstand tot winkels en horeca	10 minuten	10 minuten	
Afstand tot zorg	0 minuten (aanwezig in gebouw)	5 minuten	
Uw evaluatie	Zeer aantrekkelijk	Onaantrekkelijk	
Uw keuze	○	◉	○

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Nieuwe huisvesting voor (toekomstige) ouderen

Algemene vragen

Page: Algemene vragen

Wat is uw geslacht?

- ○ Man
- ○ Vrouw

Wat is uw leeftijd ?

Wat zijn de 4 cijfers van uw postcode?

Vorige | Volgende

Technische Universiteit Eindhoven University of Technology

Nieuwe huisvesting voor (toekomstige) ouderen

Slot

Page: Endpage

Dit is het einde van de enquête, hartelijk dank voor uw deelname. Uw bijdrage wordt gewaardeerd en zal bijdragen aan een beter inzicht in nieuwe huisvestingmogelijkheden voor ouderen.

Kent u mensen die ook deze enquête zouden willen invullen ? Delen wordt gewaardeerd en kan via de volgende link naar deze enquête:
https://vragen9.ddss.nl/q/Ouderenhuisvesting

Naast deze link kunt u ook eventueel het bericht - dat u op de hoogte bracht van deze enquête - doorsturen.

Nogmaals hartelijk dank en een fijne dag toegewenst,
Tom Hennink

U kunt op "volgende" klikken om de enquête af te sluiten.

Vorige | Volgende

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T.H.J. HENNINK