Consumers' preferences regarding department stores

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Preface

This report is the result of my graduation thesis, with the title: Consumers' preferences regarding department stores. For me, this research is the closure of the master track Real Estate Management & Development at Eindhoven University of Technology. Besides that, it is also the closure of my graduate internship at Syntrus Achmea Real Estate & Finance.

The aim of this study is to provide an insight in what characteristics a department store in the Netherlands should have according to consumers. Department stores were widely in the news the past two years, which made me want to investigate why these stores are such an established phenomenon in the world of retailing and what they should look like today.

This study was not possible without the supervision of Aloys Borgers and Pauline van den Berg of the Eindhoven University of Technology. I would like to thank them for their guidance, input and feedback that made this report to what it is right now.

Secondly, I want to thank Syntrus Achmea Real Estate & Finance for the possibility of this internship. Moreover, I would like to thank Roel Willems and Nienke Maatje for their useful comments on my thesis, for conveying their enthusiasm for retail real estate and for giving me an insight in different retail development projects.

Finally, I want to thank my parents for giving me the opportunity of following this master at the Eindhoven University of Technology and for their endless faith and support.

Please enjoy reading this thesis,

W.J.M. (Willem) van Laarhoven

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Summary

The retail market is under pressure at the moment. The financial crisis and the rise of online retailing are two reasons why traditional brick-and-mortar retailers have to keep innovating in order to remain competitive (CBW-Mitex, 2010). An example of that innovation is the 'shopping experience', something for which there is a growing demand: consumers want personalized products and service, and retailers are responding to this demand (Klaver, 2016).

A shopping experience was traditionally provided by large department stores with a wide variety of products of a good quality and a high level of service. Department stores enabled hedonic shopping and provided consumers with a premium shopping experience. However, these are not characteristics of all department stores anymore. Because of the lack of experiential value and the absence of distinctive characteristics, department stores are struggling to keep competitive with other retailers (Bressers, 2011).

The main goal of this research is to find out what characteristics a department store in the Netherlands should have according to the consumers. In particular: what the preferences of consumers are regarding department store composition and what role experiential value has to play in the department store sector.

To find out what experiential value is and what role it plays in department stores, a literature review was conducted. Experiential value can be divided in experiential value of a wider shopping area and that of a single store. To have a high experiential value, a shopping area must be accessible, have a right mix of functions, and the ambiance has to be right. The experiential value of a (department) store itself can be intrinsic (derived from the shopping experience) and extrinsic (derived from obtaining the shopping goal). These two values can again be divided into an active value and a reactive value. The presence of these four kinds of value distinguishes the dimensions: consumer return on investment (CROI), aesthetics, service excellence and playfulness. When an in-store shopping experience is created, there are retail factors and consumer factors to be distinguished. Retail factors can be provided by the department store, personnel, price, lay out, atmospherics, inspiration, innovations, opportunity to try out products, services, stimulation of senses, recreation and special activities (such as events). Finding the right balance by implementing these assets, the optimal experiential value will be created (Mathwick et al, 2001; Bäckström & Johansson, 2006).

This study measured consumers' preferences regarding department stores by a survey among 544 respondents. There were six different departments selected that a department store could contain, namely: 1) Fashion, 2) Food, 3) Beauty, 4) Living, 5) Electronics and 6) Active/outdoor. All of these six departments could contain several sub-departments and extras (services) from which consumers could choose. The consumers also had to choose their favourite departments. Stated choice modelling forced consumers to choose several times between department stores containing four out of the six possible departments. After this, consumers had to indicate their favourite floor composition for several department stores.

Discrete choice modelling was used to predict and analyse consumers' preferences. Different MNL-models were estimated, giving insight into consumers' preferences. In general, the order of preference for the six departments is as follows: 1) Fashion, 2) Food, 3) Living, 4) Electronics, 5)

Active/outdoor and 6) Beauty. Assuming that a department store can contain only four different departments, based on this order of preference the most preferred department store contains Fashion, Food, Living and Electronics departments. The preferred floor composition for this department store is: Food at the ground floor, Fashion at the 1st floor, Living at the 2nd floor and Electronics at the 3rd floor. The preferences of sub-departments and extras were extracted using descriptive analysis. The Food department should contain: a bakery, a patisserie, delicatessen, and a restaurant. The Fashion department should consist of: apparel, shoes, lingerie & underwear, virtual fitting rooms, and a section for clothing reparation. Home accessories, garden attributes, furniture and furnishing advice are elements that should be available at the Living department. For the Electronics department, vision and sound, appliances, and computer are the most favourite sub-departments; demonstration and installation of devices are tied for 'most popular extras' (service).

It has also been examined whether there are different preferences between gender and age groups. The favourite department store of the male respondents is the same as that of the general group of respondents. Female respondents would rather see a Beauty department instead of an Electronics department. Men were more into the extra services than women, and had a stronger preference for a catwalk, virtual fitting rooms, clothing reparation and a dry cleaner (all at the Fashion department). Regarding sub-departments, men were more likely to choose a butcher, a fish department and a liquor store (all Food), do-it-yourself (Living), telecom & navigation, and electric tools (Electronics). Female respondents were more into apparel (Fashion), a patisserie (Food), home decoration, a florist, and books and magazines (Living), and also more into makeup (Beauty). Regarding extras, women preferred a restaurant more than men did.

Regarding age, no significant differences compared to the general most favourite department store composition were found. Only when looking at the sub-departments and extras there were significant differences in preferences. For this part of the research there were five age categories: 1) 18-24 years old, 2) 25-34 years old, 3) 35-44 years old, 4) 45 – 54 years old and 5) 55 – 65 years old. Respondents aged 18-24 preferred jewellery & watches (Fashion), vegetables & fruit (Food), photography and music, movies, games (Electronics) more than the other age categories did. A cinema (Electronics) is appreciated the most by consumers between the ages of 25 and 34. Respondents between 35 and 44 years old were more likely to choose baby and child (Fashion); lingerie & underwear is preferred by respondents between the ages of 45 and 54. Consumers aged 55-65 are more into appliances, kitchen devices, tutorials and demonstrations of devices (Electronics) than the other age categories are.

Managers of department stores can use the results of this research to help compose their department stores in the future. Also, when aiming for different genders or age groups the results may be helpful. One striking finding is that it is not a Beauty department that is wished for on the ground floor, but that a Food department is preferred there. When the target group for a certain department store is 'females', then the management should consider implementing a Beauty department into a department store instead of an Electronics department. Owners of retail real estate can use the results to select proper department store formulas, or they can use them to find appropriate tenants for their real estate (the shop-in-shop principle).

Table of contents

1. Introduction

This chapter is an introduction to the study that is to be conducted to determine what the position of a department store has to be in the Dutch retail market in the future. In the first section the context of this study is described. Section 1.2 provides the problem definition, the main research question and sub research questions. Finally, in section 1.3 an overview of the content is displayed in chapters.

1.1 Context

Retail is a sector that affects almost everyone in our society. Because it affects so many people, it is an industry that is constantly changing at a rapid pace. Shopping patterns of consumers are changing due to current trends; whereby consumers are getting more and more power in the shopping process. Among others, online shopping is a major cause of the enhanced power of consumers. This phenomenon affects traditional (brick-and-mortar) retailing, wherein changes have to be made in order to be able to compete with the gaining popularity of online shopping. The division between offline and online shopping is fading, whereby retailers have to implement omnichannel retailing in order to remain competitive with others (CBW-Mitex, 2010).

This is especially true for the Dutch retail market, where in the last decade the amount of retail space has increased with 25%. A growth of this kind in the amount of retail space does not fit in the current developments anymore. Therefore it resulted in an overkill of retail space in the Dutch market. The financial crisis contributed to this problem even more and showed retailers that changes have to be made in order to keep adding value for consumers. A lot of retail square meters will have to be taken out of the market in order to establish a healthy retail market again (DTNP, 2015).

Because consumers can shop online, it is not necessary to visit the shopping areas in town anymore. Only for daily groceries are people inclined to visit the shopping centre in their neighbourhood. The result is that when people actually do pay a visit to the city centre for non-daily purchases, they seek a pleasant shopping experience. These shopping trips are seen as a day out by consumers (Wagner and Rudolph, 2010).

With demand for a shopping experience growing, retailers are responding to this trend in order to keep consumers coming to their stores. To facilitate in a shopping experience, blurring of distinctions between specialities occurs. Since the retail market finds itself in a demand-specific market, retailers are not expected to stick to one specific speciality anymore. Nowadays consumers want to go to a clothing store, fit and buy some new items, get a new haircut in the same shop and maybe buy some make-up as well. In other words: each consumer wants to be treated as an individual with his or her own wishes and specific needs. They will go for customized products with personal service instead of mass products (Klaver, 2016).

These developments led to problems for the traditional department stores. The unique selling point of traditional department stores used to be having many specialities combined into one building, with a high level of service. With the current trend and developments we see that other retailers are implementing these assets as well, making it harder for department stores to be distinctive. In the news are several examples of department stores struggling to keep up with current trends in the retailing business (Johnson, & Kim, 2009).

In the United States, department stores are facing a general decrease of turnover in the past decade (see figure 1). Established stores in the US are: Macy´s, Nordstrom, J.C. Penney and Kohl's. Besides decreasing turnovers, these stores also face a decrease in stock value. As a result of these disappointing numbers, a lot of stores are being closed. J.C. Penney is closing 40 stores; Macy´s is closing more than 40 stores. This is a result of the strategy to reduce costs up to 400 million dollars (RetailWatching, 2015).

Retail Trade: Department Stores (Excluding Leased Departments)

Figure 1: Turnover department stores in the US. (Source: Federal Reserve Bank of St. Louis, 2015)

Also in the Netherlands department stores are struggling to keep their heads above the water. The well-established Dutch department store 'Vroom & Dreesman' (V&D) went bankrupt at the end of 2015. This bankruptcy was the turning point in a long process of cost reductions throughout 2015. In January 2015, V&D announced the intention of reducing the costs of staff and housing. Several stakeholders had to work out a plan in order to keep V&D alive. The owner (Sun Capital), the banks, real estate owners and personnel had to make sacrifices with no end. In September V&D discharged 400 of their employees and two months later the department store requested deferral of payment at the court of Amsterdam on which the bankruptcy followed at the end of December 2015 (Keuning, 2016).

Another leading department store in the Netherlands, de Bijenkorf, noticed on time that the retail market was shifting. To adapt their business to this changing market they implemented a combative strategy. De Bijenkorf had to provide their customers a premium experience: brand, service, consumer experience of international excellence. To achieve this international excellence, de

Bijenkorf wants to upgrade seven of their twelve stores to a flagship store level. These stores met the following three necessary requirements: 1) the store must be in an excellent catchment area, 2) the store must have an iconic appearance, and 3) the store must have expansion capabilities. The five stores that did not meet the right combination of these requirements are being closed. With the implementation of this strategy de Bijenkorf is not aiming on cost reduction but they invest 200 million dollar and create 500 jobs eventually (De Bijenkorf, 2013).

These Dutch department stores show a successful and an unsuccessful way of adapting strategies in order to survive in the changing retail landscape. It is important to research how department stores have to respond to changes in the retail market and to find common factors, which are applicable in general to department stores in the Netherlands in order to have added value.

1.2 Problem definition and research goal

The traditional department stores have different types of departments under one roof. The key asset of these traditional department stores was to provide a high level of service for all the different specialties they had under one roof. However, recent events show that traditional department stores are not all functioning as well as they used to do. Looking at current trends and developments in the retail market, consumers expect a high level of service and they expect having a shopping experience, facilitated by retailers. These assets used to be some of the unique selling points of department stores, but are now applied by other kinds of retailers as well. If department stores will not be able to keep up with the developments in the market, they could lose their added value.

The goal of this research is to find out how department stores have to respond in a right way to the current trends and developments. Therefore it is necessary to research what consumers expect of department stores in the Netherlands and in what way they will be adding value to shopping environments in the Netherlands.

1.3 Research questions

The main research question of this thesis is:

'Which characteristics should a department store have in order to add (experiential) value to shopping environments in the Netherlands for Dutch consumers?'

In order to be able to answer this question, the following sub-questions are to be answered:

1. How can department stores be defined?
2. What are the characteristics of department stores?
3. How can experiential value of a retail environment be defined? And what role does it play in department stores?
4. What composition should a department store have in order to be attractive to consumers?

1.4 Relevance

1.4.1 Theoretical relevance

Literature on department stores is mostly about experiential value or the history of traditional department stores. What is missing is an insight on consumer preferences regarding the composition of department stores. This research gives an actual insight on what departments a modern Dutch department store should contain and how these departments are composed and how the layout of the store should be.

1.4.2 Practical relevance

All the data will lead to an advice for current department store chains on what characteristics are the most important to Dutch consumers. But this thesis is also part of an internship at investor Syntrus Achmea Real Estate & Finance. Syntrus Achmea (or other investors) could use the conclusions for their own vacant real estate. Syntrus Achmea had rented out six retail units to the recently bankrupt V&D. These units, which are all suitable for a new department store, are located in Emmen, Dordrecht, Enschede, Rijswijk, Roosendaal and Rotterdam Zuidplein. Syntrus Achmea can use this data to attract the right department store chain. When there´s not a suitable department store chain for these locations, they could consider renting out the large retail units in smaller parts, using the knowledge gathered through the collected data. When they want to use a shop-in-shop formula, they would know in which product categories the tenants should be and how they should be organized at the different floors within the buildings.

1.5 Structure of the thesis

The structure of this thesis is displayed in figure 2. In this chapter an introduction has been given on the subject of this thesis. In the next chapter the literature review will be discussed in which subjects like department stores, experiential value and multichannel retailing will be explained.
In chapter 3, the research design and the research methodology will be discussed. The 4th chapter contains a descriptive analysis of the first two parts of the survey; the second two parts of the survey will be analysed and discussed in chapter 5. The last chapter contains general conclusions and a discussion about this research.

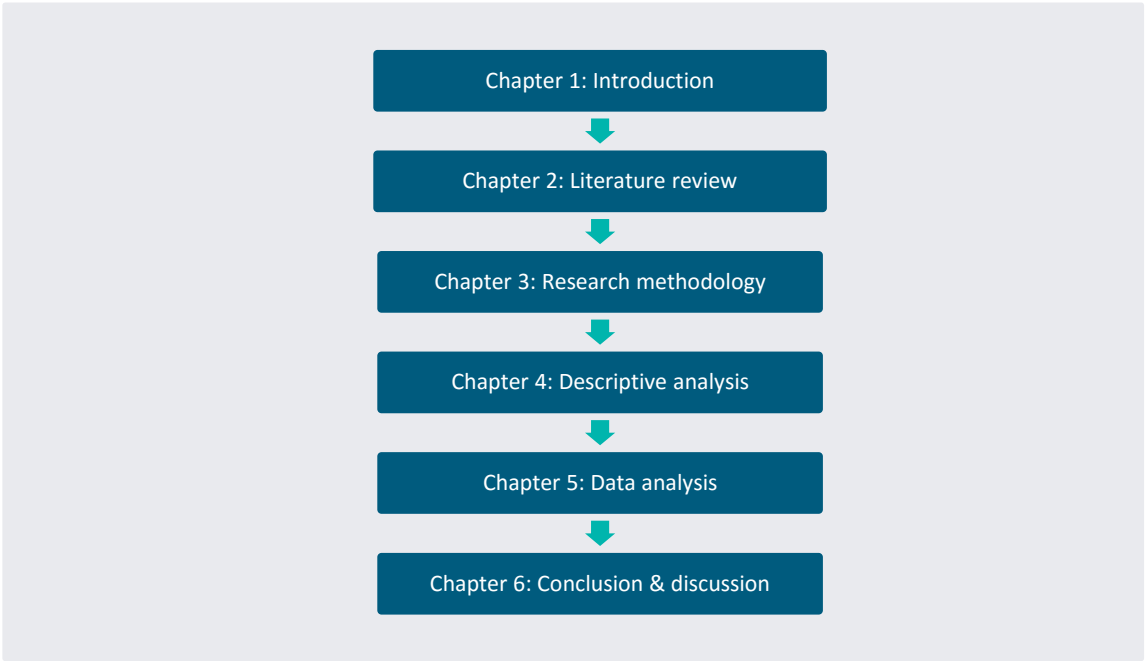

Figure 2: Structure of the thesis

2. Literature review

This literature review first elaborates on the definition of department stores and the history of department stores. Then the position and characteristics of department stores in the Netherlands are compared with department stores abroad. Thereafter different aspects of experiential value and multichannel retailing will be discussed in relation to department stores.

2.1 Department stores

There are many ways to define a department store and there are different types of department stores to be distinguished. The first definition describes the department store in a general way:

> '*A department store is a large retail establishment with an extensive assortment in variety and range of goods, organized into separate departments. All departments are housed under the same roof to facilitate buying, customer service, merchandising, and control.'* (BD, 2015).

Since this definition doesn´t describe what kinds of departments are common at department stores, the next definition also has to be mentioned to indicate what categories of products department stores generally sell:

> *'A department store is a retail establishment which specializes in selling a wide range of products without a predominant merchandise line. Department stores generally sell a wide variety of products, including apparel, furniture, appliances, electronics, and additional select lines of products such as paint, hardware, and so on arranged departments.'* (Johnson, & Kim, 2009).

This definition describes the four most important product lines that all department stores should have in their assortment. Depending on the size of a department store, additional product lines can be included into the assortment of the store.

There are three different segment types of department stores to be distinguished: high-end department stores, mid-range department stores and discount department stores. High-end department stores sell clothes and perfumes of the high brand segment (e.g. Chanel, Dior), at the makeup section there are specialists in cosmetics and the store has a luxurious appearance and wide aisles. The mid-range department store sells some less expensive brand names, but also non-brand names. The layout of the store is less distinctive than high-end department stores and not that inviting. The last segment is further classified as discount stores. These stores sell all kinds of products for a competitive price, without a high quality. These stores generally do not sell brand names. The stores have a monotonous appearance, narrow aisles and cluttered shelves. Another common feature of discount stores is having a centralized checkout area. This is contrary to traditional department stores, where each department has their own checkouts (NWE, 2013). Because a discount store is not a traditional department store, this type of department store will not be included in this literature research.

Department stores have an attraction to consumers because they offer a wide variety of products. Since their inception, department stores are known for their quality of service, quality of products, and the shopping experience consumers have in department stores. Department stores attract customers because of their in-store shopping value. They have features that create in-store

shopping experiences, but also the store itself looks imposing and heightens sense of quality. Therefore department stores evoke hedonic shopping: consumers go shopping for their entertainment and the experience, contrary to utilitarian shopping: shopping for necessities (Davis, & Hodges, 2012).

When department stores are serving a shopping experience, they add something to the retail environment, which contributes to the liveliness of the environment (NEPROM, 2012). Department stores are celebrated for their one-stop shopping model: they sell a wide variety of products at a good location (Burke, 2002).

Nowadays these characteristics are not customary anymore in every department store. Due to changing consumer needs and changing shopping behaviour, department stores need to adapt their strategies to current trends and developments, such as online retailing and the rising demand of experiential value in retailing, in order to stay an acquainted phenomenon in city centres. Arnold and Reynolds (2012) are saying that today, retailers should focus on maximizing the fun and excitement of shopping. By lacking experiential value department stores lose their unique selling point. In addition, it becomes harder and harder to characterize different kinds of retailers because of the blurring of distinctions (Bressers, 2011). Retailers are offering a wider range of products, which also narrows down the competitive advantage of department stores.

2.2 History of department stores

The concept of the department store has a rich history that goes back to the mid-1800s when manufactured goods and rail transportation experienced a rise as well (Johnson, & Kim, 2009). The first department store was called Au Bon Marché and was founded in Paris in 1838. The department store was the successor of the shopping arcade. The biggest difference with a shopping arcade was instead of having multiple shops underneath one unifying arcade, a department store was just one store with a wide variety of products (Kooijman, 1999). Department stores caused what is known as the first retail revolution: fixed prices for all the products. Therefore employees were no longer at the store for bargaining, but for serving the customers (RPB, 2005). Around 1852 it developed into a department store that we are used to today.

The concept of department stores started to spread around the world. By the 1920s, the growth of department stores stabilized, there was a new world of retailing and they experienced unrivalled prosperity (Johnson, & Kim, 2009). During this rise of department stores, the physical stores, buildings that were specially built for housing a department store, began to increase in size, with numerous floors and departments. Some of them even covered a full city block or had a façade completely made out of marble (Johnson, & Kim, 2009). The beautifully dressed windows were used to attract customers into the store, wherein the exclusive shopping experience could take place (Miellet, 2001). Customers were not forced to buy something directly when entering the building, but they could be inspired and surprised by the department store. This in combination with fixed prices was the first sign of ‘fun shopping’, whereby recreation plays a big role (Zukin, 2004). The success of department stores did not wane until after the Second World War.

After WWII, a lot of people moved to suburban areas. Those areas had to be furnished with supportive amenities, therefore shopping centres were built in areas with new housing

developments. Department stores had to become regional chains in order to serve the needs of the shopping centres. Independent department stores were withering in the shadow of the department store chains (Johnson, & Kim, 2009). Another threat to department stores was the upcoming discount store model of the 1960s (e.g. Wall-Mart, founded in 1962) and the 'category killers'. However, these kinds of stores were excluded in shopping malls, were badly organized and had little financial impact on the traditional industry. Therefore, they did not intimidate department stores in the beginning (Johnson, & Kim, 2009).

In the 1970s, department stores began to face financial problems, due to the rise of the specialized chain stores. At that moment they also faced the financial consequences of the presence of discount stores and category killers. Because department stores had to react on these financial developments, they started to adapt their business model in order to prevent their demise. Concessions were made on the quality and the high degree of service, whereby some of the department stores started to lose their distinctiveness.

Notwithstanding the fact that some department stores made some wrong choices, there are still various department stores localized in every large city centre all over the world. The stores are and have been a great contribution to the layout of the retail landscape and for the design that is standard in today´s stores. Because of the giant buildings department stores required, there had to be innovative architectural choices to be made due to building materials and technologies. This contributed to and enhanced the retail landscape.

2.3 Department stores abroad (traditional versus modern)

2.3.1 Traditional department stores

When thinking of typical traditional department store cities, Paris, London, and New York come to mind. In fact, also mentioned above, the first department store originates in Paris. Au Bon Marché was the first one to implement four managerial innovations: free access to the store, payments in cash, fixed prices and the possibility to return your purchases with a refund (Kooijman, 1999). Au Bon Marché was also innovative in marketing. They organized a parade in front of the store and were also advertising in a creative way. Parisian department stores are known for their beautiful architecture. The facades were inspired by important buildings to attract customers. Also the interiors of the department stores have big atria with glass domes on top. These stores started to function as semi-public spaces where mostly women – from different social classes – came together for the same experience. Nowadays Le Bon Marché (as it is now called) is still the most exquisite department store in Paris. The store is also known for having art exhibitions and for their extraordinarily high-quality food department, La Grande Épicerie de Paris. Other well-known French department stores are: Le Printemps (founded in 1865) and Galeries Lafayette (founded in 1893). Both department stores focus on fashion and beauty and have very impressive flagship stores (Kooijman, 1999). In Europe, London is also a typical department store city. The most common names are Harrods, and Marks & Spencer. Harrods was originally a tea store (opened in 1834) that grew into a department store. Marks & Spencer´s (M&S) was founded in 1884 and has over 1.330 stores worldwide (M&S, 2015). The biggest share of turnover at M&S comes from food (57%), which is due to their 'Simply Food'-stores (M&S, 2015).

In the United States, the first department store opened in New York City. Macy´s opened its doors in 1858 and by 1877 it was a fully functioning department store and has ever since been a common name in retailing; now it is even one of the largest retailers in the world. Macy´s is known for their big events (such as the Thanksgiving Parade) and omnichannel retailing (Macy´s, Inc., 2015a). Another well-known department store from the US is Bloomingdale´s, founded in 1861 and grown into a department store in 1872. In 1929, the Bloomingdale´s building even covered an entire Manhattan city block. Bloomingdale´s was the first department store wherein designers opened their in-store boutiques. Also, Bloomingdale´s was the first store to use designer shopping bags with their own name on the label. Bloomingdale´s is the more luxurious department store in the US and focuses on customer services and relationships (Macy´s Inc., 2015b).

2.3.2 Modern department stores

In Asia, the department store culture is different. Department stores were founded in the late 20th century and are not as traditional as the department stores described above. In China for instance, the department stores are almost of the same format as a shopping mall. (FBIC, 2013). The market in China is highly competitive and department stores have to differentiate themselves to survive. Established names in China are: Golden Eagle, Parkson, Wanda, Wangfuijing and New World. Department stores in China are like a shopping mall because of the facilities they offer. For instance, there are playgrounds, beauty and hair salons, cinemas, spas, and karaoke bars. China is facing high competition from online retailing. Consumers expect entertainment from department stores, so that is what the latter will have to provide. Some department stores even downsized their retail activities from 80% to 20% and upgraded their entertainment to 60%, and their catering to 20%. This shows that in China, department stores are all about experiential value (FBIC, 2013).

2.2.3 Lessons from department stores abroad

There are some key elements, which department stores should be constantly enhancing. At first, multichannel retailing is the main thing that department stores should enhance. The integration of digital and physical retailing is happening fast. Digital devices multiply the possibilities for getting information about a product, but also to order, receive and return products or even evaluate them (CBW-Mitex, 2010). For instance, Macy´s is leading when it comes to their digital/mobile strategy. They have a responsive webpage (adaptive website for all mobile devices), several mobile apps for serving different kinds of customers and also other features that require multiple retail channels (RI, 2015). A few examples of features combining different channels are: staff assisted ordering (using iPads), fulfilment and pickup of orders in store, iBeacon technology, mobile navigation, virtual fitting rooms, digital mannequins, and digital signage. Other digital features are marketing via social media and gathering big data for optimizing personal services (RI, 2015). Macy's also developed the backstage pass in 2011, which is a huge success. This pass allows customers to scan several QR-codes throughout the store and receive information on their mobile device about the manufacturing of the product or receive styling tips about how to combine the item with other products in the store (RI, 2015). More about omnichannel retailing in general will be introduced in section 2.6.

Another area wherein department stores can make a difference is in the in-store experience. Earlier in this report it has already been stated that in-store experience is one of the key assets of department stores. Many services can be added to a department store to attain the ideal shopping experience. Department stores are often known for the events they organize. Macy´s is known for their annual Thanksgiving parade, but also for celebrity visits, fashion launches, flower show and

tree lightings at Christmas. Events can also be sale events or other promotions (Macy´s, Inc., 2015). Additional services that can be found in the stores of Harrods are: beauty salons, perfumeries, pharmacies, opticians, a gift-wrapping service, photo printing service, and furniture and furnishing department (Harrods, 2015). Another service they offer is customer collections, whereby a consumer can leave their purchases at central points on each floor of the store to be collected in the end at the collection point on the ground floor near the check outs. Harrods (and others) are also offering a free personal shopper service to support consumers in finding the right clothes or combination of items (Harrods, 2015).

One of the most important services is the presence of a restaurant or selling point for food. In the Netherlands, V&D was leading with their La Place formula, which has now been bought by a grocery store chain after the V&D went bankrupt. In Asia, department stores function more as small shopping malls, with additional services as playgrounds, beauty and hair salons, cinemas, spas and karaoke bars. These services allow consumers to stay longer in the store and therefore enhance the chance of spending more at the store (FBIC, 2013).

The third aspect that is important is customer engagement. Several department stores are offering loyalty programs or club cards. With these programs, certain consumers become VIPs and gain extra perks throughout the years. In addition, Bloomingdale's is also using the mobile app for exclusive offers (Bloomingdale's, 2015).

2.4 Department stores in the Netherlands

2.4.1 Retail market in the Netherlands

The retail market in the Netherlands is different from other countries. The Dutch policy was to have a hierarchical and intricate structure that discouraged peripheral retail (Evers et al., 2005). Dutch planners adapted their zoning policies to the Central Place Theory of Christaller, which claims that there has to be a certain number of square meters of retail for a certain amount of citizens (0,8 m2 per inhabitant) (Zonneveld and Verwest, 2005). Distances between shopping centres were adapted to the Dutch biking culture, which led to the intricate structure that characterizes the Netherlands (Evers et al., 2005). Later on, zoning policies are getting more regulated by the 'PDV-beleid' (translated: Peripheral Retail Facility policy). This policy prohibited the settlement of new establishments in peripheral retail areas, and it led to scarcity of retail space in the Netherlands. A disadvantage of this scarcity is that rent costs of stores are higher. Larger retail chains are able to pay these higher rents, but smaller independent retailers are not. This is the reason why there are so many affiliates in the Netherlands. In contrary, a positive side of the scarcity is the on-going investments and redevelopments in inner cities (HBD, 2004).

Furthermore; in the Netherlands, department stores are seen and treated as anchor stores. Retail areas are being designed in a way that creates a pedestrian flow between several anchor stores. Therefore a department store is an interesting tenant for a certain retail area, because it creates economic activity where other retailers can also benefit from (Finn and Louviere, 1996). In 2008, a new law, the 'Wet ruimtelijke ordening (Wro)' was enacted. The Wro, which translates into 'Spatial Planning Act', introduced the 'ladder duurzame verstedelijking' (translation: the sustainable urbanisation procedure). With this tool, spatial planning was no longer the state's responsibility, but the provinces' (PBL, 2011).

2.4.2 Dutch department stores

The two largest department store chains that originate in the Netherlands, were both founded in the 19th century. De Bijenkorf was founded in 1870 and is therefore the oldest department store chain in the Netherlands. In 1914 De Bijenkorf was a fully operating department store with their brand new building in Amsterdam, inspired by the German 'palaces of retail'. Their strategy was to focus on trends and more luxurious products for the middle class (Kooijman, 1999). Nowadays De Bijenkorf has ten stores, with a total of over 95.000 m^2 of retail space (Locatus, 2014). The luxury department store is situated in the high segment, for wealthy consumers. They are executing a premium experience strategy, which contributes to the ambition to serve consumers at an international top level. To achieve this international top level, De Bijenkorf is doing large investments in its stores to get the look and feel of a flagship store in every store. Apart from the physical stores, De Bijenkorf also launched a luxurious web shop, which contributes to the integration of physical and virtual shopping experience.

Willem Vroom and Anton Dreesmann – Vroom and Dreesmann – founded V&D in 1887. During that time there were no fixed prices in the retail business, V&D introduced low and fixed prices in their store, which was unique. They opened their first new department store in 1912, but at that time V&D already had 18 stores throughout the Netherlands, mostly in lower-class neighbourhoods. With their strategy they tried to serve a big group of consumers from different kinds of social classes (Kooijman, 1999). V&D operated with a shop-in-shop formula in the 62 stores they operated in the Netherlands. They sold products in the mid-range segment, and had a mediocre store layout. V&D also had a successful food and beverage formula, La Place, which had 250 selling points in the Netherlands and provided for 20% of the total V&D revenue (V&D, 2015). Because the ownership of V&D went to Sun Capital, the department store suffered from a financial crisis from which they could never recover. V&D went bankrupt in the beginning of 2016 and left 62 large stores empty in busy Dutch shopping streets.

In general, department store chains are not flourishing as they used to do before. Different department stores had to adapt their strategies. V&D failed to adapt their strategy successfully; De Bijenkorf seems to be on the right track again. In the Netherlands there are not only department store chains, but also solitaire department stores. The best-known solitaire department store in the Netherlands is Vanderveen in Assen. This department store first opened its doors in 1897 and grew into a phenomenon in the rural province of Drenthe. This department store also uses a shop-in-shop formula that brings certain benefits. Each shop-in-shop brings its own staff with a specific expertise so that professionalism is guaranteed. The management of Vanderveen selects the different shops by knowing that they are able to adapt to the changing retail environment. Vanderveen also strives to provide a shopping experience and stimulates the different shops not to compete with each other, but to complement one another. This synergy reduces the overall costs, because the retailers can share facilities and fixed costs. Vanderveen added different kind of services in order to add experiential value. Featured are a Fresh Plaza, an art gallery, a wellness centre, and a room for events and shows (Guit, 2015).

2.5 Experiential Value

2.5.1 Experiential value in the shopping area

In a shopping area there are several aspects that contribute to the overall retail experience (Teller & Elms, 2010). First of all the location of the shopping area is important. Accessibility, available parking spots and routing are important factors of location. Secondly, the mix of functions is an important determinant of the overall experiential value (the right mix of retail, leisure, services etc.). Another important aspect is the mix of retailers in the shopping area. The right balance between retail sections, segmentation and affiliate/independent retailers has to be found. The most important aspect contributing to experiential value of a shopping area is ambiance: enjoyment of the stay, safety of the environment etc. With the right mix of these aspects, a certain level attractiveness is attributed to the shopping area. According to Teller & Elms (2010), attractiveness is created by three different dimensions: satisfaction with the shopping area, the propensity of staying in the shopping area, and retention proneness. The NRW (2010) defines 'attractiveness' as the right cohesion of hardware of the shopping area (location, size, architecture) with the software of a shopping area (experiential value, marketing, and ambiance).

2.5.2 Experiential value of department stores

Experiential value is an important asset of department stores. Due to fast environmental changes, department stores have to be able to create the right value for the right consumers. To understand experiential value, the right definition has to be found:

'*Experiential value is a perceived preference for product attributes or service performances arising from interaction within a consumption setting that facilitates or blocks achievement of customer goals or purpose.*' (Mathwick et al, 2002).

In general, experiential value is divided in two different kinds of value: intrinsic and extrinsic value. Intrinsic value is the value of the shopping experience itself, rather than completing a certain shopping task. Extrinsic value is derived from achieving a certain shopping objective. Besides these two values, two other, activity-based values in another dimension are distinguished. The value based on the purchase and use of the product is called 'active value', and reactive value is derived from the appreciation, response, and comprehension of the consumer towards a product or experience (Mathwick et al, 2001; Bäckström & Johansson, 2006).

When putting the two dimensions in a matrix, there are four quadrants to distinguish: consumer return on investment (CROI), aesthetics, service excellence, and playfulness (see figure 3). CROI is the return (economic or efficient) a consumer can get from investments of financial, behavioural and psychological nature. The aesthetics of a store contain visual elements that are divided in two dimensions: visual appeal/atmospherics, and aspects regarding entertaining. Service Excellence contains appreciation of and admiration for a certain retailer in providing in the consumers' needs, living up to expectations regarding expertise or task related performance, which results in optimizing the shopping process for the consumer. The last quadrant represents playfulness, which enables consumers to escape from their everyday life or everyday reality (Mathwick et al., 2001; Bäckström & Johansson, 2006).

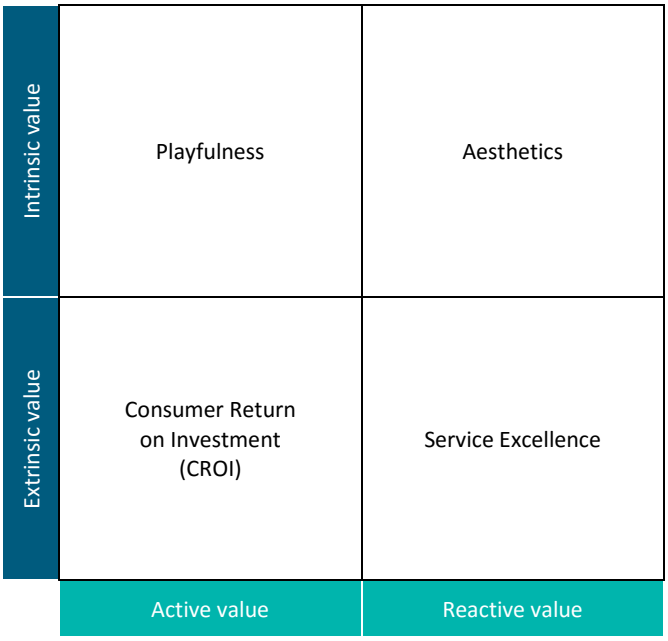

Figure 3: Typology of experiential value (Source: Mathwick et al., 2001).

All of these aspects are responsible for the consumers' in-store shopping experience. In-store shopping value is the experience consumers have because of the service that is provided by a store. This is an element where department stores should put emphasis on, because it is seen as a key asset (Davis, & Hodges, 2012). Bäckström & Johansson (2006) distinguish two different kinds of factors that contribute to a consumers' in-store shopping experience: retailer factors and consumer factors. Retailer factors are: personnel, service elements, selection/assortment, price, design, layout and atmospherics. Consumer factors are: social aspects, tasks (completion), the purchase, time and mood/state of being. When it comes to mood/state of being; age, gender and income are important demographics that a retailer should take into account. Age reflects different (shopping) preferences per generation, and hedonic or utilitarian shopping differs for gender and income.
Other contributors to a pleasurable in-store shopping experiences are: the education/knowledge of the intermediary, inspiration/product displays, innovations/ new combinations of products, opportunity to try out products/services, stimulation of senses, recreation, and special activities (Bäckström & Johansson, 2006).

As stated above, a critical factor is the in-store atmosphere of a department store. If that atmosphere is right, consumers are likely to stay longer in a store (Turley and Milliman, 2000). Basically atmosphere can be divided into five categories, namely: external (e.g. building, display window, surroundings), general interior (e.g. colors, lighting, music), layout and design (e.g. placement of merchandise, furniture, department locations), point-of-purchase (e.g. signing, decoration, price displays), and human (e.g. employees, customers) (Turley and Milliman, 2000).

The store layout can be a competitive advantage for specialist stores, because the store layout can be perfectly adapted to the product category the store sells. In department stores, it can be that the décor of the store and the lighting are not suitable for every product category (Wilcox & O'Callaghan, 2001). Third, the product assortment and merchandising are important aspects of experiential value: what are the core products, and how deep is the assortment of different product segments. Related to the product are the price and the promotion of products. Price determines the

most if a consumer wants to buy a product (Ailawadi and Keller, 2004). Lam (2001) splits the environment of a store up into three factors: the ambient factor, which contains temperature, lighting, music. The second one is the design factor and depends on architecture, material use and colors. A third factor is the social one, which depends on the expertise and behavior of employees.

Consumers can have different motivations when it comes to shopping. In-store shopping experience fulfils the demand-specific motivation. This motivation relates to certain elements of retailing expected/desired by the consumer. Another shopping motivation is the activity-specific motivation. This motivation is in effect when consumers are accomplishing a certain aim of the shopping trip (e.g. gift shopping, bargain hunting). The most basic shopping motivation is the purpose-specific motivation, which decides whether the shopping trip is utilitarian or hedonic (Wagner and Rudolph, 2010).

The most important aspects of experiential value of department stores are service and entertainment. A department store has to create a unique selling point so store loyalty will arise (Moers, 2015). To be able to deliver high-quality service, staff members have to be professional and well trained. As for entertainment, department stores have to plan different events and provide different food facilities to attract hedonic shoppers and create consumer patronage (Allard et al, 2009). Hedonic shoppers want to spend their time in a pleasant and enjoyable way, in contrary to utilitarian shoppers who want to go directly to their shopping goal (Chebat et al., 2014). An important effect of offering a high level of service and providing an entertaining environment is creating customer patronage and store loyalty. This commitment towards the store is influenced by trust and satisfaction and mainly caused by staff members building relationships with consumers (Rabbanee et al., 2012).

Besides experiential value there´s another term that is widely used to describe the relationship between people and the physical environment: 'sense of place'. Sense of place describes the emotional bond people can have with a certain spatial setting and is divided into four dimensions. Jorgensen & Stedman (2001) identified the first three dimensions, namely: place attachment, place identity, and place dependence. Place attachment is the positive bond people create with a certain physical setting. Place identity is the way wherein a certain environment reflects a consumer's own identity. Place dependence represents the perceived strength of association between a person and a certain environment. The fourth dimension, later added by Deutsch and Goulias (2009), is place satisfaction and is described as the provision of satisfaction with services, environment and needs by a certain place to a consumer.

Because of the competition, department stores found themselves in a strategic drift and they started to focus on cost reduction. Therefore they started to neglect on their most important assets: service and quality (Wilcox, & O'Callaghan, 2001).

2.6 Multichannel retailing in department stores

The retail landscape is experiencing a shift. Due to the Internet, consumers have more knowledge about products and they know where to find them for the best price. To be distinctive, retailers have to focus on creating a shopping experience for consumers. In the future, there will no longer be a clear separation between online and offline shopping. Rather, these channels will be more and more integrated. Digitalization will lead to a better fulfilment of consumer needs and an enhancement of the shopping experience (CBW-Mitex, 2010).

Because of digitalization, retailers are increasingly choosing to engage in multi-/omnichannel retailing. This all-channel retailing approach also contributes to the shopping experience of department stores. Innovation is also more important for consumers. They're constantly seeking for new concepts in order to experience their visit as unique (NRW, 2010). Another way of creating distinctive experience at a department store is to focus on high-end retailing and facilitating the experience by having suitable real estate.

Since online retailing got more and more complex, nearly every brick-and-mortar brand has found a way to represent itself online via an online sales strategy (Colao, 2014). Retailers will have to continue enhancing their multiple channels and interact between those channels to keep the sales process smooth and seamless (Vend, 2013). There are different ways to combine the diverse channels. There are three different types of multiple channels retailing to be distinguished: multi-channel, cross channel and omnichannel. With multi-channel retailing, a certain brand has different types of channels, all operating separately from each other. Each channel chooses its own prices, stock and rules. When cross channel retailing is used, the retailer creates multiple channels with the same appearance. From these channels consumers can choose at what channel they purchase a product and at what channel the product gets delivered to them. Omnichannel retailing is the most promising way of multiple channels shopping and the most important for department stores to enhance their shopping experience. The consumer can purchase something via a completely transparent and fully integrated process. Every channel is interactive with all other channels during the visit (Unic, 2012).

Because most of the traditional brick-and-mortar retailers use multiple channels as well, department stores still have to think about how to be as distinctive as they used to be before. A way to be distinctive is to focus on the high-end segment of retailing. In the Netherlands De Bijenkorf is the department store that is in the higher segment. However the presence of luxurious retailing in the Netherlands is far below the standard of other European countries (Haussmann, 2015). The benefit of having high-end department stores is that not only locals will spend money in the store, but it also attracts foreign money.

The distinctiveness does not only have to be displayed online, in products, or the presence of facilities, but also has to be housed in proper real estate. Department stores are large buildings, with large floors. To bring back the allure and experience into the buildings of department stores, the stores have to satisfy some criteria. The floor space has to be maximized (but still have wide aisles), there has to be a maximum amount of daylight to connect with the community on the street and the stores need the right level of finish of the décor (DiNardo, 2012).

The right balance has to be found in online and offline retailing. When adapting both channels in the right way, sales volume and market share can improve. Consumers will orientate for products online (getting information about specifications, prices, peer reviews), or compare them with alternatives (Burke, 2002). This may result in less consumers walking by the physical store, but it can also attract extra customers who can find the online store better than the physical store (CBW-Mitex, 2010). The preference for a channel, among others, depends on the product category. E.g. information about music, movies and books can be searched for online. When it comes to expensive, infrequent products like furniture, appliances, etcetera, people are more likely to go to the store for information (Burke, 2002) because in a physical store consumers are able to experience products in a multisensory way (Childers, et al., 2001). Therefore, the Internet is not a substitution for the physical store, but an addition. People want to use multiple channels for different kind of products or different stages of the purchasing process. A negative side effect of multi-channel retailing is that consumers can be free riding across channels: consumers use one retailer's channel to get information, but purchase the product at another retailer (Heitz-Spahn, 2013). With this phenomenon, consumers regained their power and control of the decision-making process in purchasing products (Watthieu et al. 2002). Therefore managers have to find a way to turn this into something positive for their department store.

2.7 Conclusion

Department stores are originally known for their diversity, high level of customer service and the shopping experience they offer. Recently, department stores have been suffering from changes in the retail landscape. Not only social aspects, but also the rise of specialist stores and technological advances forced department stores not to stand still and adjust to these changes. The choices that department stores made to adapt to these changes were not always the right ones. Some of the choices made the department stores lose their distinctiveness, and therefore led to financial problems. Retailers who merely accommodate brands and do not add any further value do not have a great chance to survive. This applies even more to department stores, because traditional department stores create in-store value that provides a hedonic shopping experience.

To come back to the same level as before, and to strengthen their market position, department stores have to focus on shopping experience, exclusiveness and a high level of customer service. Department stores also need to focus on organising different events to amplify that experience. Furthermore, online and offline retailing should be fully integrated in order to serve consumers in the best way. Real estate plays a big part in shopping experience too. Buildings have to be large and wide-ranging with a luxurious appearance that is inviting to consumers. They have to have large windows to connect the in-store environment with the outside area. The equipment in the building also has to be of good quality and there have to be enough facilities contributing to the experience of fun shopping.

Consumers can have different motivations to go shopping, depending on their needs at that moment. A purpose-specific motivation determines whether a shopping trip is hedonic or utilitarian; an activity-specific motivation applies when the consumer has a certain goal for the shopping trip and a demand-specific motivation is based on certain elements of retailing that are desired or expected by consumers. Most studies on department stores is about purpose-specific motivation. It

will be described that a department store should facilitate in a hedonic shopping experience by offering a high quality services in an entertaining environment. However, the demand-specific motivation is mainly neglected. This study focuses on the elements of retailing that are desired or expected by consumers. It examines what kind of departments or sub-departments consumers desire, but also which services consumers prefer. Expected is that consumers seek the right balance of the implementation of the different retail elements such as assortment and services.

3. Research design and methodology

In this chapter the research design and research methodology that are used during the research will be described. In the previous chapter it became clear that a consumer experience is very important to consumers when it comes to department stores. A lot of research has been done about this shopping experience, but there was no research conducted about other characteristics of a department store, namely the preferred composition of department stores by consumers. First the research methodology will be described, thereafter the method of analysis and finally, the method of data collection.

3.1 Research design

A department store traditionally provides in experiential value for consumers. As described in the literature study, department stores traditionally offer a great service and shopping experience. But the core business of a department store remains providing shopping goods for consumers. This research focusses on which characteristics a department store has to have in order to add (experiential) value to shopping environments in the Netherlands. Therefore there is a survey conducted on the preferred department store composition to consumers.

Department stores sell a wide variety of products in different categories. Based on common product categories in the Dutch market, a selection has been made of six main product categories. These categories are:

1. Fashion;
2. Food;
3. Beauty (personal care);
4. Living;
5. Electronics;
6. Active/outdoor.

In this research these product categories are considered the possible main departments of department stores. The main departments (from now on departments) can be divided into different sub departments and into extras. For each department the sub departments and extras are displayed in table 1. The sub departments provide the consumers for shopping goods, the extras (which can also be seen as services) facilitate a shopping experience.

Table 1: Sub departments and extras

Sub departments and extras		
Fashion - Baby and child - Apparel (ladies & men) - Lingerie & underwear - Shoes - Jewellery & watches - Fashion accessories - Personal shopper - Catwalk (for shows) - Virtual fitting rooms - Clothing reparation - Dry cleaning	Food - Bakery - Butchery - Fish department - Vegetables and fruit - Liquor store - Delicatessens - Sweets - Patisserie - Supermarket - Restaurant - Bar	Beauty (personal care) - Perfumes - Drugstore - Makeup - Visagie - Hair dresser - Beauty & Wellness (spa) - Optician - Hearing care - Pharmacy
Living - Furniture - Home decoration - Garden - Pets - Do-It-Yourself (DIY) - Florist - Books & magazines - Toys and gifts - Furnishing advice - Gift wrapping - Photo printing - Space for workshops	Electronics - Computer - Telecom and navigation - Vision and sound - Photography - Appliances - Electric tools - Kitchen - Personal care - Music, movies, games - Cinema - Tutorials/demonstrations - Installation of devices	Active/outdoor - Sports - Outdoor (cycling, hiking, camping etc.) - Traveling (Bags, suitcases) - Travel agency - Playground - Test space for different sport items

The first part of the survey consists of socio-demographic questions to visualize the demographics of the respondents and their engagement with department stores in the Netherlands.
The second part will be about the sub departments and different extras. To determine which sub departments and extras consumers find most important, respondents are asked to compose imaginary departments. A certain amount of square meters has been assigned to each sub department or extra. The respondents have to fill a floor of approximately 1,500 m2 with the sub departments and extras of their preference. To prevent that the 1,500 m2 will restrict consumers from choosing departments that they don´t prefer, a margin has been built into the survey, allowing respondents to fill a department of 1,250 to 1,750 m2. Each respondent has to compose six different departments so their preferences for all of the departments will become clear.
The amount of square meters per sub department and extra can be found in table 2.

Table 2: Division of square meters sub departments and extras

Division of square meters					
Fashion	**m^2**	**Food**	**m^2**	**Beauty (personal care)**	**m^2**
Baby and child	400	Bakery	200	Perfumes	400
Apparel (ladies & men)	800	Butchery	200	Drugstore	300
Lingerie & underwear	200	Fish department	200	Makeup	300
Shoes	300	Vegetables and fruit	200	Visagie	100
Jewellery & watches	200	Liquor store	200	Hair dresser	100
Fashion accessories	200	Delicatessens	200	Beauty/Wellness (spa)	800
Space personal shopper	50	Sweets	100	Optician	300
Catwalk (for shows)	50	Patisserie	100	Hearing care	300
Virtual fitting rooms	50	Supermarket	800	Pharmacy	300
Clothing reparation	50	Restaurant	500		
Dry cleaning	100	Bar	300		
Living	**m^2**	**Electronics**	**m^2**	**Active/outdoor**	**m^2**
Furniture	800	Computer	200	Sports	600
Home decoration	400	Telecom & navigation	100	Outdoor	600
Garden	200	Vision and sound	300	Traveling	300
Pets	100	Photography	100	Travel agency	200
Do-it-yourself	400	Appliances	500	Playground	300
Florist	50	Electric tools	200	Test space for sports	400
Books & magazines	400	Kitchen	200		
Toys and gifts	400	Personal care	200		
Furnishing advice	50	Music, movies, games	500		
Gift wrapping	50	Cinema	300		
Photo printing	50	Tutorials/demonstrations	200		
Space for workshops	100	Installation of devices	100		

When respondents come to the third part of the survey, they already indicated their preferences regarding sub departments and extras within the different departments. Therefore respondents are acquainted with which sub departments and extras a department could contain. In the third part respondents can indicate their preferred departments in a department store. The method for this part of research will be 'stated choice'. There are six main product categories: 1=Fashion, 2=Food, 3=Beauty, 4=Living, 5=Electronics and 6=Active/outdoor. We assume that a department store only can have four different departments. To determine how many combinations of departments can be made, the next formula is used: $\binom{6}{4} = 15$ possible department stores.

According to this formula there are 15 different department stores possible from which respondents can point out their preferences. The possible department stores are as follows (see table 3):

Table 3: Possible department stores

Dept. Store 1
Fashion
Food
Beauty
Living

Dept. Store 2
Fashion
Food
Beauty
Electronics

Dept. Store 3
Fashion
Food
Beauty
Active/outdoor

Dept. Store 4
Fashion
Food
Living
Electronics

Dept. Store 5
Fashion
Food
Living
Active/outdoor

Dept. Store 6
Fashion
Food
Electronics
Active/outdoor

Dept. Store 7
Fashion
Beauty
Living
Electronics

Dept. Store 8
Fashion
Beauty
Living
Active/outdoor

Dept. Store 9
Fashion
Beauty
Electronics
Active/outdoor

Dept. Store 10
Fashion
Living
Electronics
Active/outdoor

Dept. Store 11
Food
Beauty
Living
Electronics

Dept. Store 12
Food
Beauty
Living
Active/outdoor

Dept. Store 13
Food
Beauty
Electronics
Active/outdoor

Dept. Store 14
Food
Living
Electronics
Active/outdoor

Dept. Store 15
Beauty
Living
Electronics
Active/outdoor

Respondents have to choose seven times between two different department stores. In this way each respondent has to choose between 14 of the possible 15 department stores. But not every respondent will get the same choices. The same formula can be used to determine how many unique choices can be made by respondents: $\binom{15}{2} = 105$ unique choices between two department stores that can be made. In table 4 is displayed which possible choices can be presented to the consumers.

Table 4: Possible choices between two combinations

Possible choices between two department stores		
First dept. store	**Possible dept. stores**	**Amount of choices**
1	2,3,4,5,6,7,8,9,10,11,12,13,14,15	14
2	3,4,5,6,7,8,9,10,11,12,13,14,15	13
3	4,5,6,7,8,9,10,11,12,13,14,15	12
4	5,6,7,8,9,10,11,12,13,14,15	11
5	6,7,8,9,10,11,12,13,14,15	10
6	7,8,9,10,11,12,13,14,15	9
7	8,9,10,11,12,13,14,15	8
8	9,10,11,12,13,14,15	7
9	10,11,12,13,14,15	6
10	11,12,13,14,15	5
11	12,13,14,15	4
12	13,14,15	3
13	14,15	2
14	15	1
Total amount of choices		**105**

When all these data are collected, it becomes clear which departments are most important to the respondents. Besides this it can also become clear if certain combinations have extra value to consumers.

The last part of the survey gives consumers the opportunity to express their wishes regarding the layout of the store. It can be important to consumers at which floor a certain department is located in a store. In this last part consumers will be presented 3 of the 15 possible department stores of which the can indicate their preferred layout divided over four different floors. For example, when department store number 1 is presented to respondents, they can indicate their preference as follows:

Table 5: Example of dividing a combination of departments into a floor plan

Combination 1
Fashion
Food
Beauty
Living

Leads to:

Floor plan	
Floor	**Dept.**
3	Beauty
2	Fashion
1	Living
GF	Food

The example in table 5 represents one of the 24 possible floor plans a respondent could make. Each department store contains four departments that can be organized in 4! = 24 different ways. Based on these data, a conclusion can be made of which departments are most popular on a certain floor. Retailers and investors can use this when determining the layout of a store.

3.2 Method of analysis

The first part of the survey contains socio-demographics and will be analysed using descriptive analysis methods in SPSS. With mainly the use of frequency tables, the composition of the population will be described. The second part of the survey is the part where consumers had to indicate their preferred composition of sub departments in a certain department. For analysing these data SPSS will also be used to produce cross tables and chi-square tests. For the third and fourth part of the survey, discrete choice models are analysed by NLOGIT and are used to understand and predict choices between the 15 alternatives that are possible department stores. This collection of alternatives is called a choice set which usually needs to contain three characteristics, whereof the first and second characteristics are not mandatory. The first is mutual exclusivity, which means that when respondents choose one alternative they cannot choose another alternative in the same moment of choice. The choice set also needs to be exhaustive, which means that all possible alternatives are included. And last, the amount of alternatives has to be countable by the researcher (Train, 2003). In the third part of the survey the answer option 'None of the above' is added, which implies the original choice set is not exhaustive anymore. When adding this option as the 16th alternative to a new choice set, then this expanded choice set is exhaustive. The other 15 alternatives are the 15 possible department stores as shown in the previous section. In the third part of the survey, respondents have to choose between three alternatives: two alternatives varying between alternative (combination) 1 to 15, and the third alternative is always alternative 16, which represents the choice 'Neither the first nor the second alternative'. In the fourth part of the survey for each department store (combination) there are 24 answer options, each option representing a different way of organizing the departments onto the different floors of a department store.

A random utility model (RUM) is applied, assuming each respondent always chooses the maximum-utility alternative. With this model an estimation can be made of which departments are the most important to consumers. The respondents who represent Dutch consumers which allot a certain level of utility to each alternative or possible department store. It is assumed that the department store with the highest utility level is most likely to be chosen by any consumer in the Netherlands. For the different departments it can also be indicated which level of utility they reflect and therefore which departments are the most and least popular. At last it is also interesting to explore whether certain combinations of departments are popular or not.

In this research the Multinomial Logit model (MNL model) is used, which is a type of discrete choice model. When using this model, it can be determined what impact a certain department (variable) has on the choice of a certain department store (alternative). The 'impact' of a department is indicated by the part worth utility of each department. When adding up the part worth utilities of four departments of a department store, the total utility of the department store becomes clear. Each department has its own contribution to the total utility of a department store (alternative). By observing the choices made by the respondents the weight of the utilities can be estimated. These can be used to predict the probability that a certain combination (alternative) will be chosen. The utility can be calculated by the formula below, to which a random utility component is added to not exclude the possible chance on biases (Train, 2003)

$$U_{iq} = V_{iq} + \varepsilon_{iq}$$
$$= \sum_n \beta_n X_{inq} + \varepsilon_{iq}$$

U_{iq}: the overall utility of alternative *i* for respondent *q*;

V_{iq}: the structural utility of alternative *i* for respondent *q*;

ε_{iq}: the random utility component;

β_n: the utility weight of attribute *n*;

X_{inq}: the score of alternative *i* on attribute *n* for respondent *q*.

Besides calculating the utility of alternatives, the probability that a respondent *q* will choose an alternative *i* can also be calculated. This probability is related to the utility of a department store, because when a department store has the highest utility, we can expect that this department store also has the highest probability to be chosen by respondents.
These probabilities can be calculated using the next formula:

$$P_{iq} = \frac{e^{V_{iq}}}{\sum_j e^{V_{jq}}}$$

P_{iq}: the probability that alternative *i* will be chosen by respondent *q*;

V_{iq}: the structural utility of alternative *i* for respondent *q*;

To determine if the estimation of the probabilities are correct, McFadden´s Rho^2 will be calculated. This is also called the goodness of fit of the MNL model. After all the probabilities are calculated with the previous formula, the log-likelihood LL(β) of all of the respondents can be determined. The higher the log-likelihood, the better the goodness of fit, but also the higher McFadden's Rho^2, the better the goodness of fit. McFadden's Rho^2 can be calculated using the next formula:

$$Rho2 = 1 - \frac{LL(\beta)}{LL(0)}$$

LL(0) is called the 0-model and is used as a benchmark for the LL(β). The more the LL(β) differs from LL(0), the better it is. Rho^2 always lies between 0 and 1, any value higher than 0.2 performs well and represents a good model performance.

3.3 Conclusions

In this research, six departments will be investigated regarding the composition of a department store. These departments are as follows: 1) Fashion, 2) Food, 3) Beauty, 4) Living, 5) Electronics and 6) Active/outdoor. Each department may contain different sub departments and services that cover a certain amount of square meters. Assuming that a department store can only contain four different departments, fifteen different unique department stores can be generated out of these six different departments.

To collect consumers' preferences regarding department stores a survey will be held under a sample of Dutch consumers. First, these consumers will be asked to compose their ideal departments by filling in six imaginary departments with sub departments and services covering an area of 1,250 – 1,750 m^2. Next, they repeatedly have to choose the most preferred department store from a set of alternatives. Finally, consumers will be asked to assign four departments to the four floors of a department store. Multinomial logit models will be used to investigate respondents' preferences regarding the composition and design of a certain department store.

4. Descriptive analysis

In this chapter first a descriptive analysis is conducted of the demographics of the respondents. Thereafter some frequencies regarding consumers involvement in department stores are described. Last, the second part of the survey, where consumers had to fill in their preferences regarding sub-departments and extras, will be analysed. The survey was conducted online amongst 569 consumers in May of 2016. The demanded characteristics of the population were: an equal amount of both males and females, and a spread of different ages varying between 18 and 65 years old. The survey was drafted in the Dutch language (Appendix I), but in appendix II there is also an English version available. A number of 544 respondents completed the whole questionnaire. The answers of the survey have been processed with SPSS. After data preparation and a check for missing values, the descriptive analyses have been conducted.

4.1 Socio-demographics of the respondents

4.1.1 Gender

The requirement for the representation of genders when conducting the survey, was 50/50%. When the distribution of gender is equal it is more well-grounded to identify certain gender specific preferences. Amongst the 544 respondents the ratio of male/female is 47/53% (see figure 4).

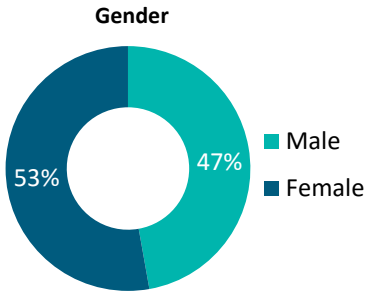

Figure 4: Male-female ratio of the respondents

4.1.2 Age

Another requirement for the respondents group was an equal division of age categories, diversified between 18 and 65 years old. In this variable there were three missing values, leaving 541 respondents classified in five different age categories.

In figure 5 it becomes clear that every age group is nearly equally represented, variating from 20 to 25%. Only the young adults are less represented with 61 respondents (11%).

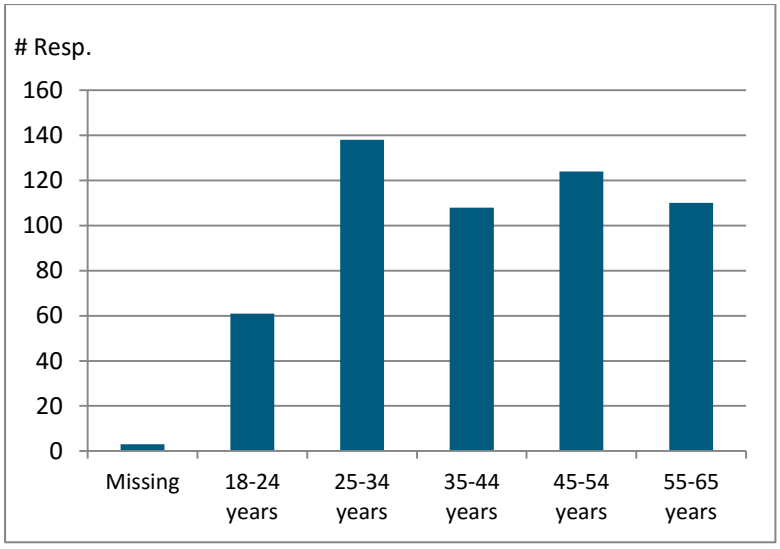

Figure 5: Representation of age categories of respondents

4.1.3 Residence

All of the respondents were asked what the zip code of their residence is. With this information it becomes clear how the respondents are spread throughout the Netherlands. The respondents were first categorized by the twelve Dutch provinces (see figure 6, left) and thereafter divided into four regions (see figure 6, right) because it enhances the chance on significant differences when looking at regions.

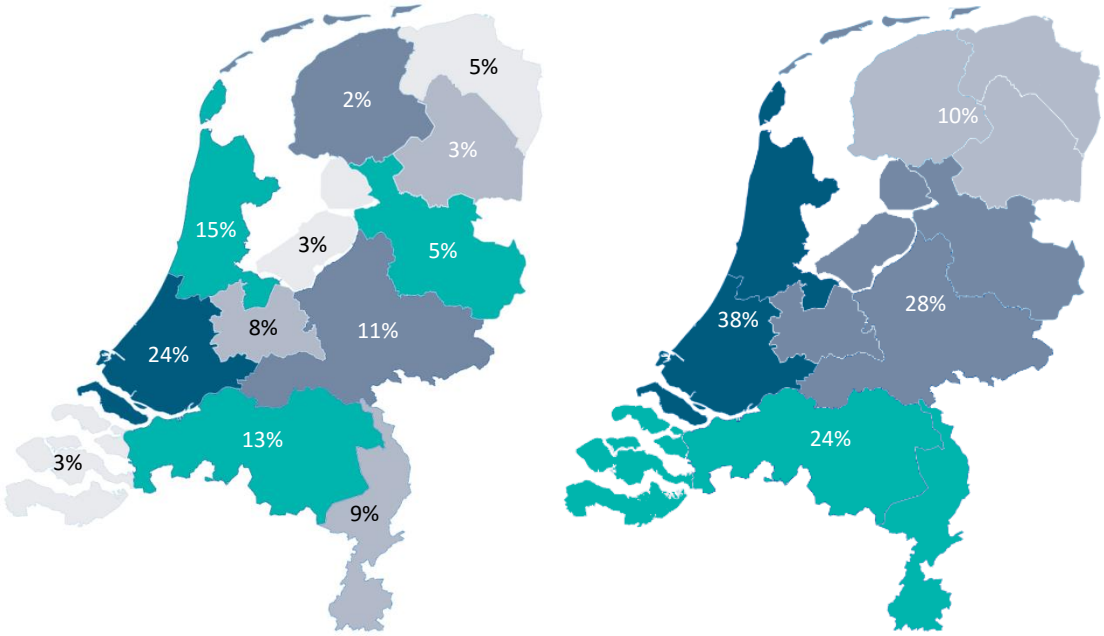

Figure 6: Spread of residence of respondents

The largest group of respondents lives in the Randstad (Western region, 38%), the region with the highest population density in the Netherlands. The least amount of respondents live in the Northern region (10%), which has the lowest population density in the Netherlands. This indicates that there is an equal division of respondents throughout the Netherlands.

4.1.4 Level of education

The largest group of participants (43%) has a high level of education (university of applied sciences or university), followed closely by middle education (42%). A smaller group has a low level of education (15%) and two people filled in other (see figure 7).

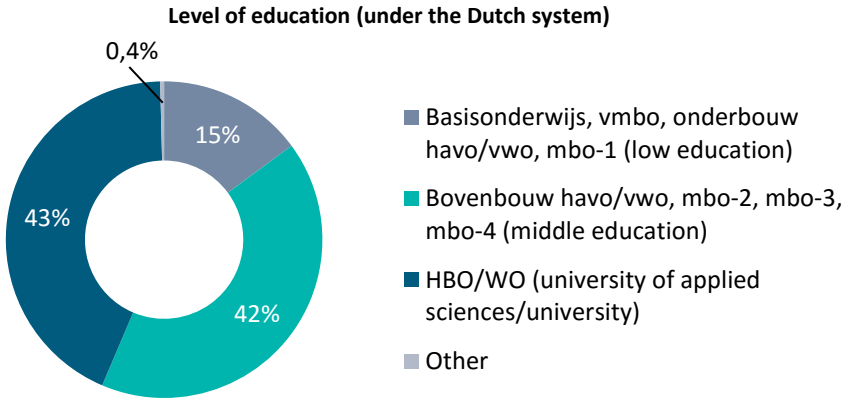

Figure 7: Level of education of the respondents

4.1.5 Income

In the survey respondents were asked to indicate their annual income. Participants could choose from five different categories, or fill in they did not know or they would rather not say their income (even though the survey was conducted anonymously). The largest group (34%) has an average annual income (see figure 8). The other categories are adequately represented. Striking is that although the survey was conducted anonymously, 14% of the respondents doesn´t know or doesn´t want to share their annual income.

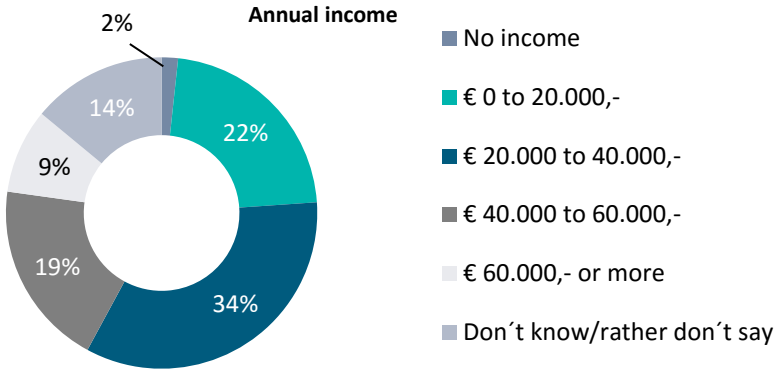

Figure 8: Annual income of the respondents

The hypothesis can be made that people with a higher education, also have a higher income. These two variables are categorical and ordinal. To test of this hypothesis is correct, the correlation between these two variables can be checked using the Spearman's rho. To check whether these variables correlate, respondents who filled in 'other' for education or 'Don't know, rather don't tell' for annual income were left out. The correlation coefficient (0.294) appears to be significant, however, at a rather moderate level.

4.2 Department store visits and preferences

4.2.1 Number of visits

During the survey participants were asked how many times they visited V&D, de Bijenkorf and other department stores comparable to the first two department stores in 2015. This was done to gauge the involvement of respondents in department stores. Figure 9 shows an overview of the consumers' responses. V&D is the most popular department store amongst the respondents. Only 8% didn´t visit the V&D in 2015, and 18% visited this department store over 10 times in one year. De Bijenkorf attracted less of the respondents (23% of the participants did not visit de Bijenkorf in 2015), but this could be caused due to the number of stores in the Netherlands. V&D had 62 stores, de Bijenkorf had 10 stores in 2015. Other (local) department stores are least popular amongst the respondents, 35% did not visit a local department store in 2015. Looking at the overall data from these three questions, only 13 respondents did not visit V&D, de Bijenkorf or another comparable department store in 2015. Therefore it can be concluded that the respondents do have an involvement in Dutch department stores.

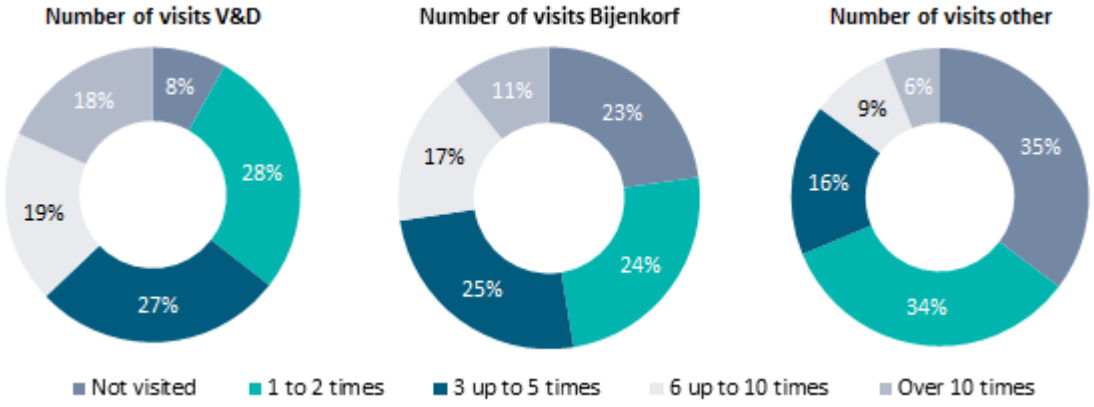

Figure 9: Involvement of respondents with Dutch department stores

4.2.2 Preferences in sub departments

In this section the second part of the survey is discussed. First, the overall preferences of all of the respondents regarding sub department and extras are discussed. Thereafter the differences between certain demographic groups are discussed. Differences per income and differences per region will not be discussed, because there were no significant differences (or only at 2 or 3 sub departments/extras) between the different demographic groups. Because level of education correlates significantly with the income of respondents, level of education will also not be discussed. Therefore, only the different preferences by gender and different preferences by age will be discussed in this study.

Overall preferences

Consumers were asked to compose their ideal departments by choosing different sub departments and extras. As shown in chapter 3, each sub department covered a number of square meters. Consumers could compose six different departments with a directive of 1,500 m^2 and a margin of 250 m^2 under or above this directive. In table 6 is shown how many times the 544 respondents chose the different sub departments.

Table 6: Consumers' preferences regarding sub departments and extras

Amount of selected times					
Fashion	**#**	**Food**	**#**	**Beauty (personal care)**	**#**
Sub departments		*Sub departments*		*Sub departments*	
Baby and child	43%	Bakery	87%	Perfumes	84%
Apparel (ladies & men)	97%	Butchery	58%	Drugstore	79%
Lingerie & underwear	65%	Fish department	42%	Makeup	71%
Shoes	75%	Vegetables and fruit	63%		
Jewellery & watches	36%	Liquor store	41%	*Extras*	
Fashion accessories	61%	Delicatessens	65%	Visagie	46%
		Sweets	45%	Hair dresser	60%
Extras		Patisserie	69%	Beauty/Wellness (spa)	32%
Space personal shopper	15%	Supermarket	28%	Optician	44%
Catwalk (for shows)	9%			Hearing care	19%
Virtual fitting rooms	33%	*Extras*		Pharmacy	50%
Clothing reparation	25%	Restaurant	66%		
Dry cleaning	13%	Bar	41%		
Living	**#**	**Electronics**	**#**	**Active/outdoor**	**#**
Sub departments		*Sub departments*		*Sub departments*	
Furniture	58%	Computer	74%	Sports	92%
Home decoration	87%	Telecom & navigation	65%	Outdoor	83%
Garden	60%	Vision and sound	82%	Traveling	71%
Pets	32%	Photography	48%		
Do-it-yourself	35%	Appliances	81%	*Extras*	
Florist	40%	Electric tools	28%	Travel agency	30%
Books & magazines	37%	Kitchen	66%	Playground	24%
Toys and gifts	37%	Personal care	43%	Test space for sports	31%
		Music, movies, games	40%		
Extras					
Furnishing advice	34%	*Extras*			
Gift wrapping	31%	Cinema	14%		
Photo printing	24%	Tutorials/demonstrations	29%		
Space for workshops	31%	Installation of devices	26%		

The first thing that stands out is that the extras are chosen pretty often by the respondents. Generally the sub departments are chosen more often than the extras, but this can be explained because of the subordination of the extras to the sub departments. However the extras are chosen with an average of 32%. This indicates that consumers want more to their shopping experiences than just buying products. In other words, it can be assumed that experiential value does matter to consumers.

To determine which sub departments and extras are most popular in a particular department, an order of preference can be determined for the sub departments and the extras. This order of preference is shown in table 7. In this table is also shown which percentages and square meters are associated with the departments. When composing a floor of a certain department, the floor should be filled in the order of the ranking list. The square meters can tell at what point a certain floor is full.

Table 7: Order of preference

Order of preference							
#	Fashion	%	m^2	#	Food	%	m^2
	Sub departments				*Sub departments*		
1	Apparel (ladies & men)	97%	800	1	Bakery	87%	200
2	Shoes	75%	300	2	Patisserie	69%	100
3	Lingerie & underwear	65%	200	3	Delicatessens	65%	200
4	Fashion accessories	61%	200	4	Vegetables and fruit	63%	200
5	Baby and child	43%	400	5	Butchery	58%	200
6	Jewellery & watches	36%	200	6	Sweets	45%	100
				7	Fish department	42%	200
	Extras			8	Liquor store	41%	200
1	Virtual fitting rooms	33%	50	9	Supermarket	28%	800
2	Clothing reparation	25%	50				
3	Personal shopper	15%	50		*Extras*		
4	Dry cleaning	13%	100	1	Restaurant	66%	500
5	Catwalk (for shows)	9%	50	2	Bar	41%	300
#	Beauty	%	m^2	#	Living	%	m^2
	Sub departments				*Sub departments*		
1	Perfumes	84%	400	1	Home decoration	87%	800
2	Drugstore	79%	300	2	Garden	60%	200
3	Makeup	71%	300	3	Furniture	58%	800
				4	Florist	40%	50
	Extras			5	Toys and gifts	37,3%	400
1	Hair dresser	60%	100	6	Books & magazines	37,1%	400
2	Pharmacy	50%	300	7	Do-it-yourself	35%	400
3	Visagie	46%	100	8	Pets	32%	100
4	Optician	44%	300				
5	Beauty/Wellness (spa)	32%	800		*Extras*		
6	Hearing care	19%	300	1	Furnishing advice	34%	50
				2	Workshops	31,3%	100
				3	Gift wrapping	30,7%	50
				4	Photo printing	24%	50
#	Electronics	%	m^2	#	Active/outdoor	%	m^2
	Sub departments				*Sub departments*		
1	Vision and sound	82%	300	1	Sports	92%	600
2	Appliances	81%	500	2	Outdoor	83%	600
3	Computer	74%	200	3	Traveling	71%	300
4	Kitchen	66%	200				
5	Telecom and navigation	65%	100		*Extras*		
6	Photography	48%	100	1	Test space for sports	31%	400
7	Personal care	43%	200	2	Travel agency	30%	200
8	Music, movies, games	40%	500	3	Playground	24%	300
9	Electric tools	28%	200				
	Extras						
1	Tutorials/demonstrations	29%	200				
2	Installation of devices	26%	100				
3	Cinema	14%	300				

When looking at the preferences for a Fashion department, the three sub departments that are at the top of the ranking list are apparel, shoes and lingerie & underwear. Regarding the extras the virtual fitting rooms and the clothing reparation are the most popular. It immediately stands out that 97% of the respondents chose apparel, which is the most popular sub department throughout all of the departments. Another thing that stands out is that 'jewellery and watches' only scored 36%, which normally is a sub department with a prominent position in the Dutch department stores.
The most popular sub departments in a Food section are: a bakery, a patisserie and delicatessens. As extras respondents could choose between a restaurant and a bar, from which it has been found that a restaurant is the most popular extra. But still the bar has also been selected by 41% of the respondents. It is striking that consumers are inclined to choose food specialists over a supermarket in a department store. The Beauty department is the only department in this study with more extras than sub departments. All the sub departments scored very high (71% or higher), from which the best scoring sub department is perfumes. It stands out that a drug store (79%) is more popular than makeup (71%). In Dutch department stores makeup normally has a prominent position in the layout of department stores and a drugstore is usually not that common. At the Beauty department a hair dresser is the most preferred extra, closely followed by: a pharmacy, visagie and an optician.
At the Living department, consumers would like to see home decorations the most, followed by garden attributes and furniture. Garden attributes scored 60%, which is striking because in Dutch department stores this is not a common sub department. From the four extras there was not an outstanding favourite, three extras scored around 30%; photo printing was the least popular.
When looking at the Electronics department the three sub departments that scored the highest were: vision and sound, appliances and computer. Electric tools scored the lowest (28%), which makes sense, because it also is not normally seen at Dutch department stores. When looking at the extras of Electronics, a cinema is the least popular and the demonstration and installation of devices both score around 30%. At the Active/outdoor department sports (92%) is the most popular, followed by outdoor (83%). Travelling is less popular (71%), but still in high demand with consumers. When looking at the extras, the testing space for sports is one of the most popular, but also the travel agency, which stands out because this service has a strong online positioning.

Preferences by gender

Under the 544 participants there were 257 males (m) and 287 females (f). For the composition of the departments it is also interesting to check if there are different preferences between males and females. For each department it will be discussed which different preferences there are between males and females. Table 8 shows the average (Av.) of all respondents, and the percentages of both males and females. Chi^2-tests were performed to examine whether there are significant differences between males and females or not. The values for Chi^2 (χ^2) and the significance of these values are displayed in the table. A significance level of $\alpha < 5\%$ is used to determine the significant differences between male or female regarding the sub departments and extras.

Table 8: Difference in preferences by gender

Difference in preferences by gender											
Fashion	**Av.**	**m**	**f**	**χ^2**	**Sig.**	**Food**	**Av.**	**m**	**f**	**χ^2**	**Sig.**
Sub departments						*Sub departments*					
Baby and child	43%	41%	45%	0.906	.341	Bakery	87%	86%	87%	0.062	.803
Apparel (ladies & men)	97%	95%	99%	9.619	.002	Butchery	58%	69%	49%	22.508	.000
Lingerie & underwear	65%	64%	66%	0.248	.619	Fish department	42%	50%	35%	12.468	.000
Shoes	75%	76%	75%	0.125	.724	Vegetables/fruit	63%	63%	62%	0.178	.674
Jewellery & watches	36%	40%	32%	3.443	.064	Liquor store	41%	47%	35%	8.419	.004
Fashion accessories	61%	58%	64%	1.889	.169	Delicatessens	65%	64%	66%	0.101	.751
						Sweets	45%	43%	47%	0.983	.321
Extras						Patisserie	69%	63%	74%	6.431	.011
Space personal shopper	15%	18%	13%	3.460	.063	Supermarket	28%	30%	26%	0.643	.422
Catwalk (for shows)	9%	12%	6%	4.917	.027						
Virtual fitting rooms	33%	39%	28%	8.489	.004	*Extras*					
Clothing reparation	25%	29%	21%	5.434	.020	Restaurant	66%	60%	71%	7.999	.005
Dry cleaning	13%	19%	8%	16.412	.000	Bar	41%	38%	44%	1.864	.172
Beauty (personal care)	**Av.**	**m**	**f**	**χ^2**	**Sig.**	**Living**	**Av.**	**m**	**f**	**χ^2**	**Sig.**
Sub departments						*Sub departments*					
Perfumes	84%	84%	85%	0.190	.663	Furniture	58%	61%	55%	1.772	.183
Drugstore	79%	79%	79%	0.002	.967	Home decoration	87%	84%	90%	4.137	.042
Makeup	71%	61%	80%	22.146	.000	Garden	60%	60%	60%	0.031	.859
						Pets	32%	29%	35%	2.281	.131
Extras						Do-it-yourself	35%	42%	29%	10.233	.001
Visagie	46%	41%	49%	3.704	.054	Florist	40%	34%	46%	7.851	.005
Hair dresser	60%	64%	56%	3.064	.080	Books/magazines	37%	32%	42%	5.699	.017
Beauty/Wellness (spa)	32%	34%	30%	1.337	.248	Toys and gifts	37%	37%	38%	0.114	.735
Optician	44%	47%	41%	2.197	.138						
Hearing care	19%	24%	15%	6.718	.010	*Extras*					
Pharmacy	50%	51%	49%	0.193	.661	Furnishing advice	34%	36%	32%	0.862	.353
						Gift wrapping	31%	29%	32%	0.526	.468
						Photo printing	24%	25%	23%	0.271	.603
						Workshops	31%	29%	33%	0.969	.325
Electronics	**Av.**	**m**	**f**	**χ^2**	**Sig.**	**Active/outdoor**	**Av.**	**m**	**f**	**χ^2**	**Sig.**
Sub departments						*Sub departments*					
Computer	74%	84%	66%	25.543	.001	Sports	92%	92%	92%	0.010	.920
Telecom & navigation	65%	72%	59%	10.237	.001	Outdoor	83%	86%	82%	1.627	.202
Vision and sound	82%	86%	79%	3.921	.048	Traveling	71%	69%	73%	0.838	.360
Photography	48%	44%	52%	2.823	.093						
Appliances	81%	75%	87%	12.830	.000	*Extras*					
Electric tools	28%	37%	21%	16.405	.000	Travel agency	30%	33%	27%	1.966	.161
Kitchen	66%	60%	71%	7.999	.005	Playground	24%	21%	27%	3.187	.074
Personal care	43%	35%	51%	14.575	.000	Test space for sports	31%	32%	30%	0.248	.619
Music, movies, games	40%	42%	39%	0.494	.482						
Extras											
Cinema	14%	17%	11%	4.555	.033						
Tutorials/demos	29%	30%	28%	0.199	.656						
Installation of devices	26%	30%	23%	3.049	.081						

At the Fashion department, there is one significant difference regarding the sub departments, namely: apparel. This sub department is significantly preferred more by females. Men chose more often for the different extras. Four of the five extras where chosen significantly more by men than women, whereby virtual fitting rooms and dry cleaning differed the most from women

At the Food department, men were more likely to choose for a butchery, a fish department and a liquor store. Female respondents chose more often for a patisserie and a restaurant than men. As expected, at the Beauty department makeup is more preferred by women than by men. Striking is that still 61% of the males prefers makeup at the Beauty department and 41% of the males prefers visagie. Normally men are not associated with these categories. When looking at the extras, hearing care is preferred more by men and differs significantly from women. At the Living department, home decorations is preferred more by females. On the other hand the do-it-yourself division is chosen more often by males. Female respondents also prefer a florist and books & magazines more than the male respondents. Regarding the extras of this department there are no significant differences. The Electronics department has the most significant differences. Men chose computer, telecom & navigation, vision & sound and electric tools significantly more often than women. On the other hand female respondents choose appliances, kitchen devices and personal care more often than male respondents. The extras at the Electronic department are slightly more often chosen by men, but the cinema is the only extra that is significantly chosen more by men than women. The Active/outdoor department does not have any significant differences. The playground is the item that comes nearest to a significant difference of <5% and is most preferred by women.

Preferences by age

The respondents are divided into five different age groups: 18-24 years old, 25-34 years old, 35-44 years old, 45-54 years old and 55-65 years old. Three respondents did not fill in their year of birth properly, so these are categorized as missing. For each of the age groups is examined whether they have different preferences compared to the whole group of respondents or not. In this section only the statistically significant differences will be discussed. These significant differences are displayed in table 9.

Table 9: Consumers' difference in preferences by age

Difference in preference by age									
Dept.	**Sub department**	**18-24**	**25-34**	**35-44**	**45-54**	**55-65**	**Avg.**	**χ^2**	**Sig.**
Fashion	Baby and child	41%	44%	56%	35%	42%	43%	11.633	.020
	Lingerie & underwear	67%	58%	60%	75%	67%	65%	9.947	.041
	Jewellery & watches	44%	41%	26%	40%	28%	36%	11.390	.023
Food	Vegetables and fruit	77%	59%	57%	68%	56%	63%	10.451	.033
Beauty	Optician	33%	38%	38%	51%	54%	44%	12.933	.012
	Hearing care	10%	13%	16%	25%	29%	19%	17.262	.002
Electronics	Photography	59%	54%	41%	41%	50%	48%	9.979	.041
	Appliances	67%	79%	84%	84%	85%	81%	10.189	.037
	Kitchen	52%	60%	64%	73%	75%	66%	14.734	.005
	Music, movies, games	61%	49%	37%	32%	30%	40%	23.100	.000
	Cinema	11%	22%	10%	10%	12%	14%	11.075	.026
	Tutorials/demonstrations	25%	20%	31%	33%	36%	29%	10.752	.029
Active	Traveling	70%	64%	66%	74%	81%	71%	10.152	.038
	Playground	13%	29%	36%	18%	19%	24%	18.628	.001
Total		61	138	108	124	110	541		

At the Fashion department there is a significant difference regarding baby and child. As expected the age group of 35-44 years old prefers to have this sub department in a department store, because this is a common age category for having children. The group of age 45-54 prefers this sub department the least of all age groups. Regarding lingerie & underwear there is also a significant difference. The group of age 45-54 prefers this sub department more than average, the group of age 25-34 prefers this sub department less than average. Jewellery & watches is preferred significantly more by age 18-24 and significantly less by age 55-65. The Food department has one remarkable difference, namely vegetables and fruit is preferred significantly more by young consumers (age 18-24). At the Beauty department there are two significant differences regarding the extras. As expected, both the optician as hearing care are preferred more by the older consumers and less by the younger consumers, because old people tend to have more problems with their sight and hearing. The Electronics department is the department with the most differences when looking at age groups. Photography is preferred the most by consumers with an age between 18-24 and the least by consumers with an age between 35-44. Compared to the other age groups, appliances is preferred significantly less by the youngest age group. Kitchen is preferred more by the older consumers and less by the younger consumers. On the other hand: music, movies and games is preferred more by younger respondents than by older respondents. When looking at the extras of the Electronic department, a cinema is significantly more preferred by consumers with the age of 25-34. Tutorials and demonstrations is preferred more by the oldest age group and less by the age group of 25-34 years old. At the Active/outdoor department, the sub department of traveling is preferred significantly more by the oldest age group (and less by the consumers between 25-34). As expected there is also a significant difference regarding the playground. This is preferred more by consumers (in all probability with children) who are between 25 and 44 years old. Remarkable is that there are no significant differences at the Living department.

4.3 Conclusion

The survey had a response of 544 respondents, representing different demographic and socio-economic groups. When consumers were asked how many times they had visited the two largest department store chains in the Netherlands in 2015, V&D (now bankrupt) was the most popular one, followed by de Bijenkorf. Other department stores, comparable to these two chains were mostly not visited (35%) or just 1 or 2 times (34%). Only 13 respondents did not visit a department store at all in the Netherlands in 2015. It was as expected that V&D was the most visited department store in the Netherlands, because V&D had over 60 stores in the Netherlands and because this chain was in the middle price segment. Although V&D was the most popular in the Netherlands, they went bankrupt after all. Suspected is that this has to do with the fact that V&D was not distinguishing enough anymore.

In the second part of the survey the respondents were asked to compose their ideal departments by choosing different sub departments and extras. At the Fashion department it was expected that apparel, shoes and lingerie & underwear were the most favourite sub departments. These are the most important fashion categories everyone wears daily. Striking is that jewellery & watches scored the lowest, because this sub department usually gets a prominent position in Dutch department stores. Also notable, is that virtual fitting rooms is the most preferred service. At this moment this is not a common service yet. At the Food department there were no surprises, because a bakery, a

patisserie, and delicatessens are common sub departments in Dutch department stores. A restaurant was more preferred than a bar, which is something to take into account. At the Beauty department, the best scoring sub department is perfumes which is as expected. Also the other two sub departments scored also 71% or higher, whereby it is striking that a drugstore scores higher than makeup, because a drugstore is not common in Dutch department stores. When looking at the extras, the most popular ones are respectively: a hair dresser, a pharmacy and visagie. Visagie is most common in department stores, so it is striking that the other two extras scored higher. At the Living department it stands out that the garden section scores high among consumers. At the Electronics department there are no real striking results. At the Active/outdoor department it stands out that around 30% of the respondents prefer a sports testing area (which is not common in department stores) and a travel agency (which is still a high percentage, taking all the online travel agencies into account).

Besides these general preferences, there has also been looked at differences in preference by gender, and age. Looking at the preferences by gender, there are a few differences. The most differences sound logic and were as expected. What stands out is that women prefer books & magazines more than men, because it is not a general fact that women are more into reading than men. Regarding men it stands out that they would not only prefer a butchery, but also a fish department. These are not common sub departments for a department store. When looking at extras, females significantly like a restaurant (Food) more than men, which is rather unexpected. One would expect that men would like to eat something at the restaurant in the time that the female consumers are out shopping. Another preference that stand out is that men prefer a catwalk for fashion shows. Most of the times fashion shows are events that are enjoyed by females.

There are also a few significant differences in preference by age. The Living department had no significant differences regarding the different age groups. At the Food department, vegetables & fruit is liked significantly more by the young adults (age 18-24) than others, which is striking because young adults are not automatically associated with a healthy life style. Active/outdoor, and Beauty both had two differences. At the Beauty department, an optician and hearing care were chosen most often by the oldest respondents with an age between 45 and 65. This makes sense because older people are often associated with these services. At the Active/outdoor department, traveling and a playground were most preferred by respondent with an age between 55 and 65 This can be declared by the possibility of this age group is having more money/time to travel (traveling) or having to look after grandchildren (playground). The differences regarding age at the Fashion and Electronics departments are in line with expectations.

What stands out in general is that the extras (services) are chosen relatively often by the consumers. Knowing that selling products is the main business of a department store, consumers often choose for the extras as well. This indicates that having different services at a department store is still in demand of consumers.

5. Data analysis

The data analysis in this chapter will be conducted using discrete choice modelling (see section 3.2). The original dataset was transformed in order to make it suitable for parameter estimation by means of the program NLOGIT 5 (Econometric Software Inc., 2012). First the general preferences of departments and therefore also department stores will be analysed. Second, the differences in preference between male and female will be analysed. Thereafter the differences between the different age groups will be analysed. When it becomes clear what preferences there are regarding departments and department stores the preferences of which department should be on which floor will be analysed. For this subject the differences in gender and age categories will be analysed as well.

5.1 Preferred departments and department stores

In this section the third part of the survey will be analysed. Two department stores were presented to the consumers from which they had to choose which department store they would rather visit. If the respondents did not have a preference, they could choose the option 'neither one of the department stores'. The way this choice was presented in the survey is shown in figure 10 (see also appendix II):

Dept. store 1		**Dept. store 15**	**Your Preference:**
Fashion		Beauty	
Food	*vs.*	Living	◯ Department store 1
Beauty		Electronics	◯ Department store 15
Living		Active/outdoor	◯ Neither one

Figure 10: Example of a choice between two department stores

Each consumer had to make this choice between two department stores seven times in a row. This means that a total of fourteen out of the fifteen possible department stores were presented to each of the 544 consumers during the survey.

5.1.1 General preferences

First the preferences of all of the 544 respondents were analysed. The dataset was transformed using dummy variables representing the department stores. Each department is coded 1 (available) or 0 (not available). A department store contains seven variables with information about which departments a certain department store has. An additional dummy variable is added to measure the effect of the option 'neither one of the department stores' in the survey. For example when a respondent had to choose between department store 1 and department store 15, the choice set is coded as follows (see table 10):

Table 10: Recoding into dummy variables

Dept. store	X_0	X_1	X_2	X_3	X_4	X_5	X_6
1	0	1	1	1	1	0	0
15	0	0	0	1	1	1	1
None	1	0	0	0	0	0	0

X_0 is required for estimating the utility of the 'neither one of the department stores' option. The other X's stand for the different departments: X_1 = Fashion, X_2 = Food, X_3= Beauty, X_4 = Living, X_5 = Electronics, X_6 = Active/outdoor.

The utility of a department store is determined using the formula as stated in chapter 3:

$$U_{iq} = V_{iq} + \varepsilon_{iq}$$
$$= \sum_n \beta_n X_{inq} + \varepsilon_{iq}$$

This formula applies to any respondent *q*, for fifteen different alternatives *i*. For reasons of simplicity, the q-subscript will be left out. The formula for the utility of a certain alternative (department store) can then be rewritten as:

$$V_i = \beta_0 X_{0i} + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i}.$$

NLOGIT 5 (Econometric Software Inc., 2012) is used to estimate the different β's, which represent the part worth utilities of a department store. Every β contributes its share to the (total) utility of a department store. As mentioned before, the value of the X's can be 0 (not available) or 1 (available). To estimate the different β's, one department has to be chosen as the base department where the other departments can be compared with. The part worth utility β of this base department is set to 0. In this study, the Active/outdoor department is set to 0. Table 11 shows what contribution each different department has to a certain department store. The higher the part worth utility β, the higher the contribution to a department store and therefore the more popular a department is.

Because the survey was taken digitally, there is a chance that not all of the 544 respondents filled in this part of the survey seriously. Consumers who filled in the same answer option seven times in a row, were eliminated for this part of the research, because this might influence the validity of the research. There were 45 respondents who met this condition, which means that this part of the analysis (only in section 5.1) will be conducted using the preferences of 499 respondents.

Table 11: Contribution per department amongst 499 respondents

Contribution per department		
Department	β	Sig.
X_0 = None	- 1.758	0.000
X_1 = Fashion	0.636	0.000
X_2 = Food	0.309	0.000
X_3 = Beauty	- 0.202	0.002
X_4 = Living	0.257	0.000
X_5 = Electronics	0.172	0.008
X_6 = Active/outdoor	0.000	N/A

Table 11 displays the contribution β that a department has to the total utility V_i of a department store, compared to the base department X_6 = Active/outdoor (which was set to zero). In this table it becomes clear that all departments have a significant contribution different from the base department. Also X_0, which represents the choice option 'none of both department stores' differs significantly from X_6. The strong negative contribution that X_0 has, shows that this option was far less interesting than choosing one of the two presented department stores at each question. There are five departments that have a higher contribution than the active/outdoor department and there is

one department with a negative contribution to the utility V_i of a department store. When we rank the different departments by part worth utility β, the following order of preference occurs (see table 12).

Table 12: General order of preference regarding departments based on β for 499 respondents

#	Department	β
1	X_1 = Fashion	0.636
2	X_2 = Food	0.309
3	X_4 = Living	0.257
4	X_5 = Electronics	0.172
5	X_6 = Active/outdoor	0.000
6	X_3 = Beauty	- 0.202

The first thing that stands out, is that Fashion is by far the most popular department. This department has the highest difference (0.327) with the following department in the list. The preference for Fashion at the first place is therefore the most distinct preference. Food is the second favourite department, but is closely followed by Living. Electronics is the 4th most preferred department and differs 0.172 from the 5th most preferred department Active/outdoor. Striking is that Beauty contributes less than Active/outdoor and is therefore the least preferred department. This is a unexpected result, because Beauty always has a prominent location in Dutch department stores. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β) is -2,797.3
Log-likelihood of 0-model LL(0) is 3,493 * ln(0.333) = -3,837.5

McFadden's Rho^2 = 1 – LL(β) / LL(0) = 0.271, which represents a good model performance.

Now the contribution or part worth utilities β have been calculated by NLOGIT 5, the total utilities of each department store can be determined. The total utility of each department store can be determined by filling in the formula $V_i = \beta_0 X_{0i} + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i}$. Filling in this formula for example for department store number 1 (containing Fashion, Food, Beauty, Living), gives the following result:

$$V_{i=1} = \beta_0 X_{01} + \beta_1 X_{11} + \beta_2 X_{21} + \beta_3 X_{31} + \beta_4 X_{41} + \beta_5 X_{51} + \beta_6 X_{61}$$
$$= (-1.758 * 0) + (0.636 * 1) + (0.309 * 1) + (-0.202 * 1) + (0.257 * 1) + (0.172 * 0) + (0.000 * 0) = 1.000$$

This formula is used to determine the total utility for every department store. The values of the total utilities are displayed in table 13. The department stores are arranged in order of preference, so it becomes clear which department stores are the most popular according to the total utilities.

Table 13: General order of preference of department store combinations

General order of preference of department store combinations								
#	Comb.	Departments						Total V_i
1	4	Fashion	Food	-	Living	Electronics	-	1.374
2	5	Fashion	Food	-	Living	-	Active/outdoor	1.202
3	6	Fashion	Food	-	-	Electronics	Active/outdoor	1.117
4	10	Fashion	-	-	Living	Electronics	Active/outdoor	1.065
5	1	Fashion	Food	Beauty	Living	-	-	1.000
6	2	Fashion	Food	Beauty	-	Electronics	-	0.915
7	7	Fashion	-	Beauty	Living	Electronics	-	0.863
8	3	Fashion	Food	Beauty	-	-	Active/outdoor	0.743
9	14	-	Food	-	Living	Electronics	Active/outdoor	0.738
10	8	Fashion	-	Beauty	Living	-	Active/outdoor	0.691
11	9	Fashion	-	Beauty	-	Electronics	Active/outdoor	0.606
12	11	-	Food	Beauty	Living	Electronics	-	0.536
13	12	-	Food	Beauty	Living	-	Active/outdoor	0.364
14	13	-	Food	Beauty	-	Electronics	Active/outdoor	0.279
15	15	-	-	Beauty	Living	Electronics	Active/outdoor	0.227

As shown in table 13, department store number 4 is the most preferred department store. Combination 15 is the least favourite department store, closely followed by combination 13. The departments with the highest contribution are Fashion and Food. The department with the lowest contribution is Beauty. In the top 3 are department stores which contain the two highest contributors and lack the lowest contributor. When looking at the bottom four department stores, it becomes clear that the highest contributor (Fashion) is not in the compositions of these department stores, and the lowest contributor (Beauty) is in the composition. Concerning these two departments in the top four it is exactly the other way around. The other departments are in between these extremes.

5.1.2 Preferences by gender

To examine the different preferences regarding gender, extra dummy variables were created to extract the difference in utility that is caused by gender. To determine what the differences in gender are, the dummy variables Z_0 to Z_6 are defined as:

$Z_j = X_j * 1$ for males;
$Z_j = X_j * -1$ for females.

The effects of gender on utility are measured by the parameters for the Z-variables, denoted by α. In general:

$$V_i = \beta_0 X_{0i} + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_5 X_{5i} + \alpha_0 Z_{0i} + \alpha_1 Z_{1i} + \alpha_2 Z_{2i} + \alpha_3 Z_{3i} + \alpha_4 Z_{4i} + \alpha_5 Z_{5i} + \alpha_6 Z_{6i}$$

which can be rewritten for males:

$$V_{i|male} = (\beta_0 + \alpha_0) X_{0i} + (\beta_1 + \alpha_1) X_{1i} + (\beta_2 + \alpha_2) X_{2i} + (\beta_3 + \alpha_3) X_{3i} + (\beta_4 + \alpha_4) X_{4i} + (\beta_5 + \alpha_5) X_{5i} + (\beta_6 + \alpha_6) X_{6i}$$

and for females:

$$V_{i|fem} = (\beta_0 - \alpha_0) X_{0i} + (\beta_1 - \alpha_1) X_{1i} + (\beta_2 - \alpha_2) X_{2i} + (\beta_3 - \alpha_3) X_{3i} + (\beta_4 - \alpha_4) X_{4i} + (\beta_5 - \alpha_5) X_{5i} + (\beta_6 - \alpha_6) X_{6i}$$

In table 14 is shown what the different values for β and α are. These values can be used to calculate the part worth utilities that each department contributes per gender (see last two columns). Again, the values for β and α all differ significant from the base department X_6 = Active/outdoor, that was set to zero in this model.

Table 14: Contribution per department by gender

Contribution per department by gender						
Department	β	Sig.	α	Sig.	Male ($\beta_i + \alpha_i$)	Female ($\beta_i - \alpha_i$)
X_0 = None	- 1.741	0.000	- 0.640	0.001	- 2.381	- 1.101
X_1 = Fashion	0.647	0.000	- 0.455	0.000	0.192	1.102
X_2 = Food	0.317	0.000	- 0.170	0.010	0.147	0.487
X_3 = Beauty	- 0.217	0.001	- 0.423	0.000	- 0.640	0.206
X_4 = Living	0.265	0.000	- 0.252	0.000	0.013	0.517
X_5 = Electronics	0.183	0.006	0.218	0.001	0.401	- 0.035
X_6 = Active/outdoor	0.000	N/A	0.000	N/A	0.000	0.000

It is striking that males are far more less likely to chose for 'None of the above'. When ranking the departments by utility, the following order of preference occurs (see table 15).

Table 15: Order of preference by gender regarding departments

Order of preference by gender regarding departments					
Males	Department	$\beta_i + \alpha_i$	Fem.	Department	$\beta_i - \alpha_i$
1	X_5 = Electronics	0.401	1	X_1 = Fashion	1.102
2	X_1 = Fashion	0.192	2	X_4 = Living	0.517
3	X_2 = Food	0.147	3	X_2 = Food	0.487
4	X_4 = Living	0.013	4	X_3 = Beauty	0.206
5	X_6 = Active/outdoor	0.000	5	X_6 = Active/outdoor	0.000
6	X_3 = Beauty	-0.640	6	X_5 = Electronics	-0.035

In table 15 the different preferences of males and females become clear. Looking at the preferences of the women, it stands out that with a difference of 0.585, Fashion is by far the most preferred department. Living is the second most preferred department, followed closely by the Food department. Striking is that Beauty is the fourth most preferred department, whilst one would expect that this department would score higher amongst females. Active/outdoor is ranked the fifth and Electronics is the least favourite department according to women, which is also as expected.
The most preferred department amongst men is Electronics. However, this first preference is not as extreme as the first preference amongst women. Fashion is the second most preferred department, closely followed by Food. Living is slightly more preferred than Active/outdoor and is in the top 4 of most preferred departments. Beauty is the by far the least favourite department amongst men, which is as expected. The option 'neither one of the department stores' is by far the least favourite option amongst both the genders, but women chose this option more than men.
To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated again by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL (β,α) is -2,722.2
Log-likelihood of 0-model LL(0) is 3,493 * ln(0.333) = -3,837.5

McFadden's $Rho^2 = 1 - LL(\beta) / LL(0) = 0.291$, which represents a good model performance. When this value is compared to the Rho^2 of the general model ($Rho^2 = 0.271$) it can be concluded that the model in this section performs better. This is as expected, because in this model there are more parameters.

Now the part worth utilities for each department have been determined for both males and females, the total utility of each department store can be calculated. Filling in the formula for V_i generates the values for the different department stores and therefore an order of preference for both males (table 16) and females (table 17).

Table 16: Order of preference of department store combination according to males

Order of preference of department store combinations according to males								
#	Comb.	Departments						Total V_i
1	4	Fashion	Food	-	Living	Electronics	-	0.753
2	6	Fashion	Food	-	-	Electronics	Active/outdoor	0.740
3	10	Fashion	-	-	Living	Electronics	Active/outdoor	0.606
4	14	-	Food	-	Living	Electronics	Active/outdoor	0.561
5	5	Fashion	Food	-	Living	-	Active/outdoor	0.352
6	2	Fashion	Food	Beauty	-	Electronics	-	0.100
7	7	Fashion	-	Beauty	Living	Electronics	-	-0.034
8	9	Fashion	-	Beauty	-	Electronics	Active/outdoor	-0.047
9	11	-	Food	Beauty	Living	Electronics	-	-0.079
10	13	-	Food	Beauty	-	Electronics	Active/outdoor	-0.092
11	15	-	-	Beauty	Living	Electronics	Active/outdoor	-0.226
12	1	Fashion	Food	Beauty	Living	-	-	-0.288
13	3	Fashion	Food	Beauty	-	-	Active/outdoor	-0.301
14	8	Fashion	-	Beauty	Living	-	Active/outdoor	-0.435
15	12	-	Food	Beauty	Living	-	Active/outdoor	-0.480

Table 17: Order of preference of department store combination according to females

Order of preference of department store compositions according to females								
#	Comb.	Departments						Total V_i
1	1	Fashion	Food	Beauty	Living	-	-	2.312
2	5	Fashion	Food	-	Living	-	Active/outdoor	2.106
3	4	Fashion	Food	-	Living	Electronics	-	2.071
4	8	Fashion	-	Beauty	Living	-	Active/outdoor	1.825
5	3	Fashion	Food	Beauty	-	-	Active/outdoor	1.795
6	7	Fashion	-	Beauty	Living	Electronics	-	1.790
7	2	Fashion	Food	Beauty	-	Electronics	-	1.760
8	10	Fashion	-	-	Living	Electronics	Active/outdoor	1.584
9	6	Fashion	Food	-	-	Electronics	Active/outdoor	1.554
10	9	Fashion	-	Beauty	-	Electronics	Active/outdoor	1.273
11	12	-	Food	Beauty	Living	-	Active/outdoor	1.210
12	11	-	Food	Beauty	Living	Electronics	-	1.175
13	14	-	Food	-	Living	Electronics	Active/outdoor	0.969
14	15	-	-	Beauty	Living	Electronics	Active/outdoor	0.688
15	13	-	Food	Beauty	-	Electronics	Active/outdoor	0.658

The most preferred department store for males is the same as the overall preferred department store, namely: department store number 4. This combination is closely followed by department store number 6 (just as number 4 containing Fashion, Food and Electronics) and by number 10 (just as number 4 containing Fashion, Living and Electronics). Since Beauty is by far the least preferred department amongst males, the top five department stores according to males does not contain this department. Department store number 1 is most preferred by females, containing Fashion, Food, Beauty and Living. This department store is closely followed by department store number 5 and number 4, containing the highest scoring departments: Fashion, Food and Living. The four least preferred department stores amongst women all contain the Electronics department, the least preferred department by females. It is notable that women have more distinct preferences than men.

5.1.3 Preferences by age

Just like examining the difference in gender, to extract the difference in utility that is caused by age, extra dummy variables had to be created. To determine what the differences in age are, the dummy variables W_0 to W_6 are defined as:

$W_j = X_j * 1$ for age group A: 18-34 years old;
$W_j = X_j * 0$ for age group B: 35-54 years old;
$W_j = X_j * -1$ for age group C: 55-65 years old.

The effects of age on utility are measured by the parameters for the W-variables, denoted by γ. In general:

$$V_i = \beta_0 X_{0i} + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_5 X_{5i} + \gamma_0 W_{0i} + \gamma_1 W_{1i} + \gamma_2 W_{2i} + \gamma_3 W_{3i} + \gamma_4 W_{4i} + \gamma_5 W_{5i} + \gamma_6 W_{6i}$$

which can be rewritten for age group A:

$$V_{i|A} = (\beta_0 + \gamma_0) X_{0i} + (\beta_1 + \gamma_1) X_{1i} + (\beta_2 + \gamma_2) X_{2i} + (\beta_3 + \gamma_3) X_{3i} + (\beta_4 + \gamma_4) X_{4i} + (\beta_5 + \gamma_5) X_{5i} + (\beta_6 + \gamma_6) X_{6i}$$

and for age group B:

$$V_{i|B} = (\beta_0 + 0) X_{0i} + (\beta_1 + 0) X_{1i} + (\beta_2 + 0) X_{2i} + (\beta_3 + 0) X_{3i} + (\beta_4 + 0) X_{4i} + (\beta_5 + 0) X_{5i} + (\beta_6 + 0) X_{6i}$$

and for age group C:

$$V_{i|C} = (\beta_0 - \gamma_0) X_{0i} + (\beta_1 - \gamma_1) X_{1i} + (\beta_2 - \gamma_2) X_{2i} + (\beta_3 - \gamma_3) X_{3i} + (\beta_4 - \gamma_4) X_{4i} + (\beta_5 - \gamma_5) X_{5i} + (\beta_6 - \gamma_6) X_{6i}$$

In table 18 is shown what the different values for β and γ are. These values can be used to calculate the part worth utilities that each department contributes per age group (see last three columns). This models contains the data of 496 respondents, because regarding age there were three respondents with missing values. Again, X_6 = Active/outdoor was chosen as the base department, which was set to zero in this model. However, it occurs that only the preference for the Beauty department differs significantly between age groups.

Table 18: Contribution per department by age group

Contribution per department by age group							
Values and significance for β and γ					Group A	Group B	Group C
Departments	β	Sig.	γ	Sig.	β + γ	β + 0	β - γ
X_0 = None	-1.831	0.000	0.239	0.357	-1.831	-1.831	-1.831
X_1 = Fashion	0.640	0.000	- 0.012	0.889	0.640	0.640	0.640
X_2 = Food	0.310	0.000	- 0.038	0.670	0.310	0.310	0.310
X_3 = Beauty	- 0.240	0.000	0.190	0.030	-0.050	- 0.240	- 0.430
X_4 = Living	0.258	0.000	- 0.036	0.684	0.258	0.258	0.258
X_5 = Electronics	0.152	0.024	0.096	0.274	0.152	0.152	0.152
X_6 = Active/outdoor	0.000	N/A	0.000	N/A	0.000	0.000	0.000

When only looking at the contribution β for each department, the values are almost the same as the values in the general model (amongst 499 respondents). Also, the order of preference remains the same. The only department that is influenced by the preferences per age group, is Beauty. The youngest age group is the most open to this department, and the oldest age group is the least open for this department. However, the difference in contribution between the age groups is not enough to change the order of preference of the department amongst the different age groups. Fashion is still by far the most popular, followed by Food and Living. Electronics is still listed as the fourth most preferred department, followed by Active/outdoor. Regardless the age of the respondents, Beauty still remains the least favourite department. However when looking at age group A (18-34 years old) the difference between Active/outdoor and Beauty is very small. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β,γ) is -2,768.8
Log-likelihood of 0-model LL(0) is 3,472 * ln(0.333) = -3,814.4

McFadden's Rho^2 = 1 – LL(β) / LL(0) = 0.274, which represents a good model performance.

Based on this value it can be concluded that this model performs slightly better than the general model, but performs less good than the model of the previous section. This indicates that gender has more influence on department store composition than age.

5.1.4 Preference for gender and age combined

Because dummy variables were produced for both gender and age, a model can be estimated using all these variables. When estimating this model in NLOGIT 5, the following values occur (table 19):

Table 19: Contribution per department by age group

Contribution per department for gender and age combined						
Department	β	Sig.	α	Sig.	γ	Sig.
X_0 = None	- 1.815	0.000	- 0.671	0.001	0.221	0.401
X_1 = Fashion	0.652	0.000	- 0.455	0.000	- 0.251	0.785
X_2 = Food	0.318	0.000	- 0.181	0.007	- 0.049	0.585
X_3 = Beauty	- 0.259	0.000	- 0.429	0.000	0.194	0.031
X_4 = Living	0.268	0.000	- 0.259	0.000	- 0.063	0.488
X_5 = Electronics	0.165	0.016	0.220	0.001	0.106	0.238
X_6 = Active/outdoor	0.000	N/A	0.000	N/A	0.000	N/A

When looking at the contributions to the utility of a department store regarding gender, all departments have a significant difference in contribution compared to the base department X_6 = Active/outdoor, which was set to zero. The values of the contribution are a bit different from the values without the age effects (section 5.1.2), but the order of preference remains the same. Looking at the values of the contribution γ there is again only one department that differs significantly over age categories, namely Beauty. When applying these effects to the Beauty department, the following values occur (see table 20):

Table 20: Contribution of the Beauty department regarding both gender and age

Contribution for the Beauty department regarding both gender and age								
Gender	Age	β		α		γ		Total
Male	Young (A)	- 0.259	+	- 0.429	+	0.194	=	- 0.494
Female	Young (A)	- 0.259	–	- 0.429	+	0.194	=	0.364
Male	Middle (B)	- 0.259	+	- 0.429	+	0.000	=	- 0.688
Female	Middle (B)	- 0.259	–	- 0.429	+	0.000	=	0.170
Male	Old (C)	- 0.259	+	- 0.429	–	0.194	=	- 0.882
Female	Old (C)	- 0.259	–	- 0.429	–	0.194	=	- 0.024

Looking at table 20, it can be concluded that the Beauty department is the most preferred by young females. After the young females, middle aged females are most likely to choose the Beauty department, followed by old women. After old women, Beauty is most preferred by young men, then followed by middle aged men. As expected the Beauty department is least preferred by old men. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β, α, γ) is -2,693.4
Log-likelihood of 0-model LL(0) is 3,472 * ln(0.333) = -3,814.4

McFadden's Rho^2 = 1 – LL(β) / LL(0) = 0.294, which represents a good model performance.

This model has the best performance compared to all of the previous models in this section. This is as expected, because this model contains the most parameters.

5.2 Preferences of floor composition

In this section, the fourth part of the survey will be analysed. For this part the data of 541 respondents were analysed. The 45 respondents that were excluded in the previous section are now again included in this section. The three respondents that now are eliminated are the three respondents who did not fill in their age correctly. Every respondent had to compose three different department stores. A department store has four different departments which can be divided over four different floors: the ground floor, first floor, second floor and third floor. A department store can be composed in 24 different ways, leaving 24 compositions per department store to choose from for the respondents during the survey. Every of this 24 'choice options' consist of three different choice sets, respectively with four, three and two options. The main idea of a choice option is as follows: a department store contains four different departments which have to be divided over four different floors. For the ground floor there are four departments to be divided at this floor. This is the first choice set, containing four options (the four departments). After one of the four possible departments is placed on the ground floor, the consumer has to assign a department to the first floor. At the first floor there are three departments left to be divided. This is the second choice set (containing three options). When one of the three departments is placed on this floor, the consumer has to fill in the second floor. At this floor there are two possible departments left to be chosen. This is the third choice set, containing two options. When a consumer places one of the two departments on the second floor, the left over department automatically gets placed onto the third floor.
In this section, first the general preferences will be discussed, later the preferences by gender and then the preferences by age.

5.2.1 General preferences

The formulas for this part of the survey work the same as the formulas in the previous part of the survey. The difference is that instead of 7 variables (X_0 to X_6), the formula now has 24 variables, namely: X_{1A}, X_{1B}, X_{1C}, (…), X_{4D}, X_{4E}, X_{4F}. The explanation of these variables is as follows: A = Fashion, B = Food, C = Beauty, D = Living, E = Electronics, F = Active/outdoor. Number 1 to 4 stand for the floors of a department store: 1 = ground floor, 2 = first floor, 3 = second floor, 4 = third floor. When combining the numbers and characters, the following explanation applies:

X_{1A} = Fashion at the ground floor
X_{1B} = Food at the ground floor
X_{1C} = Beauty at the ground floor
:
X_{id} = Department *d* at floor *i*
:
X_{4D} = Living at the 3rd floor
X_{4E} = Electronics at the 3rd floor
X_{4F} = Active/outdoor at the 3rd floor

The choice set of this model is more elaborate than the choice set that was used in part three of the survey. For example: a respondent had to make a floor composition for department store number one and chose the following composition (see table 21):

Table 21: Example of making a floor composition for department store one

Dept. Store 1
A = Fashion
B = Food
C = Beauty
D = Living

Led to:

Floor plan	
Floor	**Dept.**
3	Living
2	Beauty
1	Food
GF	Fashion

The estimation data for this example is coded according to table 22. When this floor composition was chosen for department store number 1, the choice set was coded as shown in table 22.

Table 22: Recoding into dummy variables

Dept.	Choice	X_{1A}	X_{1B}	X_{1C}	X_{1D}	X_{1E}	X_{1F}	X_{2A}	X_{2B}	X_{2C}	X_{2D}	X_{2E}	X_{2F}	X_{3A}	X_{3B}	X_{3C}	X_{3D}	X_{3E}	X_{3F}
A	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
C	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

It is assumed that the respondent starts to choose a department for the ground floor. For this floor the respondent can still choose all of the four different departments (A,B,C,D). Presume the

respondent chooses Fashion (A) at the ground floor, there are three departments left that can be chosen at the first floor. After choosing Food (B) at the first floor, Beauty (C) and Living (D) are left to be chosen at the second floor. In this example the respondent chooses for the Beauty (C) department at the fourth floor, so Living gets automatically placed at the third floor. In table 22 the third floor (X4A to X4F) therefore is not displayed, as it is the left over floor.

In this part of the survey there is no option 'none of the compositions'. When determining the contribution β for each floor, this time there are two factors that have to be set to zero. First, one of the departments has to be set to zero, which in this part of the research is again the Active/outdoor department. And second, one of the floors has to be set to zero as well, which is the 3rd floor. When this model is estimated in NLOGIT 5, the following values occur (see table 23):

Table 23: General contribution β of departments per floor

General contribution β of departments per floor								
Department	Gr. Floor	Sig.	1st floor	Sig.	2nd floor	Sig.	3rd floor	Sig.
Fashion	0.905	0.000	1.598	0.000	0.773	0.000	0.000	N/A
Food	1.496	0.000	0.520	0.000	- 0.346	0.009	0.000	N/A
Beauty	0.109	0.309	0.808	0.000	0.606	0.000	0.000	N/A
Living	- 0.102	0.368	0.663	0.000	0.807	0.000	0.000	N/A
Electronics	- 0.526	0.000	0.608	0.000	0.736	0.000	0.000	N/A
Active/outdoor	0.000	N/A	0.000	N/A	0.000	N/A	0.000	N/A

The preferences regarding floor composition can be approached looking from the floors' perspective. When looking at the ground floor there are three departments that have a significant different contribution compared to the base department Active/outdoor. Food differs the most from the base department with a β of 1.496 and is by far the most popular department for the ground floor. Fashion is the second most preferred department for the ground floor. Beauty and Living do not have a significant different contribution compared to Active/outdoor, so these three departments are the third most preferred departments for the ground floor. Electronics is by far the least preferred department to put on the ground floor. If not allocated to the ground floor, Fashion is the most preferred department at the 1st floor of a department store with a contribution β of 1.598. This is a very distinct preference, because the second most preferred department for the 1st floor is Beauty, and has a contribution β of 0.808. The third most preferred department for the 1st floor is the Living department. The Electronics and Food departments are preferred respectively as fourth and fifth department at the 1st floor. Active/outdoor is the least favourite department to be chosen at the 1st floor. The difference in contributions for the 2nd floor are less distinct than the previous two floors. Living is the most preferred department at the 2nd floor (if it was not allocated to the ground floor or first floor), followed closely by Fashion and by Electronics. Beauty is the fourth most preferred department on the 2nd floor. The second least favourite department on the 2nd floor is Active/outdoor, followed by the least favourite department, namely Food. Because the 3rd floor is defined as the base floor, no order of preference can be produced for this floor, however, this has implicitly been taken into consideration when estimating the parameters for the other floors.

Now that the part worth utilities are estimated, the probability that a certain composition of a certain department store will be chosen by consumers can be calculated. Each of the fifteen different department stores can be composed in 24 different ways. This results in 15 * 24 = 360 probabilities. For each department store, it is assumed that the composition with the highest

probability is the most favourite composition for that department store according to the consumers. The probabilities are calculated using the formula stated in section 3.2 (omitting subscript *q*):

$$P_i = \frac{e^{V_i}}{\sum_j e^{V_j}}$$

This formula is used a few times to calculate the probability a certain floor composition will be chosen. It is assumed that a consumer first places a department on the ground floor, then respectively at the 1st floor, 2nd floor and 3rd floor. When filling in the ground floor the consumer has all of the four departments left to choose from. When filling in the 1st floor there are three departments left and when filling in the 2nd floor there are two departments left. At the 3rd floor there is one department left, so the left over department gets automatically placed on the 3rd floor. When following this principle, all of the probabilities of a floor composition can be calculated. For example: the probability that department store number 1 (containing: Fashion, Food, Beauty, Living) is composed as in the example of table 21, is calculated as follows:

$$\mathrm{P_{A|GF}} = \frac{e^{V_{A|GF}}}{e^{V_{A|GF}} + e^{V_{B|GF}} + e^{V_{C|GF}} + e^{V_{D|GF}}} = \frac{e^{0.905}}{e^{0.905} + e^{1.496} + e^{0.000} + e^{0.000}} = 0.2766$$

$$\mathrm{P_{B|1st}} = \frac{e^{V_{B|1st}}}{e^{V_{B|1st}} + e^{V_{C|1st}} + e^{V_{D|1st}}} = \frac{e^{0.520}}{e^{0.520} + e^{0.808} + e^{0.663}} = 0.2868$$

$$\mathrm{P_{C|2nd}} = \frac{e^{V_{C|2nd}}}{e^{V_{C|2nd}} + e^{V_{D|2nd}}} = \frac{e^{0.606}}{e^{0.606} + e^{0.807}} = 0.4500$$

The probability that a certain department gets placed on the 3rd floor is always 1.000, because after filling the first three floors, there are no other options left. Therefore this probability does not have to be calculated. The total probability that the composition of the example in table 21 is chosen for department store number 1 is: $0.2766 * 0.2868 * 0.4500 = 0.0357$. For every department store the probabilities of 24 floor compositions were calculated and can be found in appendix IV. In table 24 the three most preferred compositions (with the highest probabilities) per department store are displayed.

Table 24: Most preferred compositions of 15 different department stores

Most preferred compositions of 15 different department stores						
Dept. Store	#	Ground Floor	1st Floor	2nd Floor	3rd Floor	P_i
1	**1**	**Food**	**Fashion**	**Living**	**Beauty**	**.1488**
	2	Food	Fashion	Beauty	Living	.1217
	3	Fashion	Beauty	Living	Food	.0804
2	**1**	**Food**	**Fashion**	**Electronics**	**Beauty**	**.1527**
	2	Food	Fashion	Beauty	Electronics	.1341
	3	Fashion	Beauty	Electronics	Food	.0843
3	**1**	**Food**	**Fashion**	**Beauty**	**Active/outdoor**	**.1952**
	2	Food	Fashion	Active/outdoor	Beauty	.1065
	3	Food	Beauty	Fashion	Active/outdoor	.0937
4	**1**	**Food**	**Fashion**	**Living**	**Electronics**	**.1536**
	2	Food	Fashion	Electronics	Living	.1431
	3	Fashion	Living	Electronics	Food	.0770
5	**1**	**Food**	**Fashion**	**Living**	**Active/outdoor**	**.2166**
	2	Food	Fashion	Active/outdoor	Living	.0966
	3	Food	Living	Fashion	Active/outdoor	.0842
6	**1**	**Food**	**Fashion**	**Electronics**	**Active/outdoor**	**.2249**
	2	Food	Fashion	Active/outdoor	Electronics	.1077
	3	Food	Electronics	Fashion	Active/outdoor	.0846
7	**1**	**Fashion**	**Beauty**	**Living**	**Electronics**	**.0942**
	2	Fashion	Beauty	Electronics	Living	.0877
	3	Fashion	Living	Electronics	Beauty	.0838
8	**1**	**Fashion**	**Beauty**	**Living**	**Active/outdoor**	**.1352**
	2	Fashion	Living	Beauty	Active/outdoor	.1095
	3	Beauty	Fashion	Living	Active/outdoor	.0792
9	**1**	**Fashion**	**Beauty**	**Electronics**	**Active/outdoor**	**.1458**
	2	Fashion	Electronics	Beauty	Active/outdoor	.1142
	3	Beauty	Fashion	Electronics	Active/outdoor	.0848
10	**1**	**Fashion**	**Living**	**Electronics**	**Active/outdoor**	**.1342**
	2	Fashion	Electronics	Living	Active/outdoor	.1298
	3	Living	Fashion	Electronics	Active/outdoor	.0848
11	**1**	**Food**	**Beauty**	**Living**	**Electronics**	**.1221**
	2	Food	Beauty	Electronics	Living	.1137
	3	Food	Living	Electronics	Beauty	.1086
12	**1**	**Food**	**Beauty**	**Living**	**Active/outdoor**	**.1789**
	2	Food	Living	Beauty	Active/outdoor	.1449
	3	Food	Beauty	Active/outdoor	Living	.0798
13	**1**	**Food**	**Beauty**	**Electronics**	**Active/outdoor**	**.1890**
	2	Food	Electronics	Beauty	Active/outdoor	.1480
	3	Food	Beauty	Active/outdoor	Electronics	.0905
14	**1**	**Food**	**Living**	**Electronics**	**Active/outdoor**	**.1739**
	2	Food	Electronics	Living	Active/outdoor	.1682
	3	Food	Living	Active/outdoor	Electronics	.0833
15	**1**	**Living**	**Beauty**	**Electronics**	**Active/outdoor**	**.0832**
	2	Beauty	Living	Electronics	Active/outdoor	.0765
	3	Beauty	Electronics	Living	Active/outdoor	.0740

Now this overview has been produced, it can easily be extracted which department is the most favourite at each floor. At the ground floor, Food is the most popular department, followed by Fashion. At the 1st floor, Beauty is the most favourite department, closely followed by Fashion. Electronics, and Living are the most preferred departments at the 2nd floor and Active/outdoor is the most preferred department at the 3rd floor. The best allocation of departments to floors is to department store 6 (consisting of Fashion, Food, Electronics, and Active/outdoor), which has the highest probability to be chosen of all probabilities. The most preferred allocation to floors of department store 15 (Beauty, Living, Electronics, and Active/outdoor) is the lowest compared to the other preferences in table 24. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β) is -4,613.3

The log-likelihood of the 0-model LL(0) is calculated differently than in the previous sections. This section contains three choice sets of respectively 4, 3 and 2 choices. Therefore LL(0) is calculated as follows: 1,623 * (ln(0.25) + ln(0.333) + ln(0.5)) = -5,158.0

McFadden's $Rho^2 = 1 - LL(\beta) / LL(0) = 0.106$, which does not represent a good model performance.

5.2.2 Preferences by gender

For the distinction in gender, the same method is used as in section 5.1.2. To examine the different preferences by gender regarding floor composition, extra dummy variables had to be created to extract the difference in utility that is caused by gender. To determine the differences in gender for the floor compositions, again the dummy variables Z_0 to Z_6 are defined as:

$Z_j = X_j * 1$ for males;
$Z_j = X_j * -1$ for females.

The effects of gender on utility are measured by the parameters for the Z-variables, denoted by α. In general:

$$V_i = \beta_{1A}X_{1Ai}+\beta_{1B}X_{1Bi}+\beta_{1C}X_{1Ci}+(\ldots)+\beta_{4D}X_{4Di}+\beta_{4E}X_{4Ei}+\beta_{4F}X_{4Fi}+\alpha_{1A}Z_{1Ai}+\alpha_{1B}Z_{1Bi}+\alpha_{1C}Z_{1Ci} +(\ldots)+\alpha_{4D}Z_{4Di}+\alpha_{4E}Z_{4Ei}+\alpha_{4F}Z_{4Fi}$$

which can be rewritten for males:

$$V_{i|male} = (\beta_{1A}+\alpha_{1A})X_{1Ai}+(\beta_{1B}+\alpha_{1B})X_{1Bi}+(\beta_{1C}+\alpha_{1C})X_{1Ci}+(\ldots)+(\beta_{4D}+\alpha_{4D})X_{4Di}+(\beta_{4E}+\alpha_{4E})X_{4Ei} +(\beta_{4F}+\alpha_{4F})X_{4Fi}$$

and for females:

$$V_{i|fem} = (\beta_{1A}-\alpha_{1A})X_{1Ai}+(\beta_{1B}-\alpha_{1B})X_{1Bi}+(\beta_{1C}-\alpha_{1C})X_{1Ci}+(\ldots)+(\beta_{4D}-\alpha_{4D})X_{4Di}+(\beta_{4E}-\alpha_{4E})X_{4Ei} +(\beta_{4F}-\alpha_{4F})X_{4Fi}$$

From this formula it can be extracted how to calculate the part worth utilities for both males and females. When calculating the part worth utility of for example the Fashion department at the ground floor, the values for β and α in table 25 are used. For males this would be: $V_{1A} = \beta_{1A} + \alpha_{1A} = 0.906 – 0.260 = 0.646$. For females this would be: $V_{1A} = \beta_{1A} – \alpha_{1A} = 0.906 + 0.260 = 1.166$.

In table 25 is shown what the different values for β and α are. These values are used to calculate the part worth utilities that each department contributes per gender (see table 26). When looking at the values for α, not all departments have a significant different contribution across both genders.

Table 25: Contribution β and α per department per floor by gender

Contribution β per department per floor						
Department	Gr. Floor	Sig.	1st floor	Sig.	2nd floor	Sig.
Fashion	0.906	0.000	1.591	0.000	0.788	0.000
Food	1.503	0.000	0.506	0.000	- 0.340	0.011
Beauty	0.080	0.466	0.788	0.000	0.605	0.000
Living	- 0.096	0.397	0.666	0.000	0.827	0.000
Electronics	- 0.583	0.000	0.617	0.000	0.765	0.000
Active/outdoor	0.000	N/A	0.000	N/A	0.000	N/A
Contribution α per department per floor for difference in gender						
Department	Gr. Floor	Sig.	1st floor	Sig.	2nd floor	Sig.
Fashion	- 0.260	0.007	- 0.371	0.000	- 0.361	0.012
Food	- 0.259	0.006	0.023	0.855	0.087	0.511
Beauty	- 0.410	0.000	- 0.361	0.000	- 0.215	0.049
Living	- 0.186	0.100	- 0.108	0.296	0.046	0.666
Electronics	0.264	0.044	- 0.003	0.974	0.086	0.384
Active/outdoor	0.000	N/A	0.000	N/A	0.000	N/A

The β-parameters listed in table 25 are very similar to those listed in table 23, which is to be expected. For Fashion and Beauty, the differences between males and females are significant for all floors. Regarding Food and Electronics, this is only true for the ground floor and for Living, there are no gender differences at all. In table 26 the different contributions are stated per gender. As the contributions for Beauty and Living to the ground floor are not significantly different from the contribution of the base department, it is assumed that the contribution of these departments to the ground floor is the same as the contribution of the base department, namely: 0.000.

Table 26: Contribution for male and female per department per floor

Contribution for males per department per floor			
Department	Gr. Floor	1st floor	2nd floor
Fashion	0.646	1.220	0.427
Food	1.244	0.506	- 0.340
Beauty	- 0.410	0.427	0.390
Living	0.000	0.666	0.827
Electronics	- 0.319	0.617	0.765
Active/outdoor	0.000	0.000	0.000
Contribution for females per department per floor			
Department	Gr. Floor	1st floor	2nd floor
Fashion	1.166	1.962	1.149
Food	1.762	0.506	- 0.340
Beauty	0.410	1.149	0.820
Living	0.000	0.666	0.827
Electronics	- 0.847	0.617	0.765
Active/outdoor	0.000	0.000	0.000

Looking at table 26, there are some differences regarding order of preference. At the ground floor, both males and females prefer Food the most, followed by Fashion. Females think of Beauty as the third most preferred department on the ground floor, while males think this is the least preferred department at this floor. Looking at the first floor Fashion is the most favourite and Active/outdoor is the least favourite department according to both genders if not assigned to the Ground Floor. Fashion is respectively followed by Living and Electronics for males and by Beauty and Living by females. If not assigned to Ground Floor or first floor, the top three most preferred departments by males on the second floor is: Living, Electronics, Fashion. For females, this is: Fashion, Living, and Beauty. Active/outdoor and Food are for both genders the least favourite departments for this floor. Now the part worth utilities are calculated for males, and females, it can be examined how the differences affect the most preferred allocations of departments to floors. Again, the probabilities of each floor composition have been calculated, using the same method as in the previous section. Table 27 provides an overview of the most preferred floor composition per department store in general (G), by males (M) and by females (F).

In table 27, it can easily be extracted at what floor which department is most preferred by both the genders. Males and females both prefer Food at the ground floor the most, followed by Fashion. At the first floor, Fashion and Living are the most preferred departments according to males and Fashion and Beauty according to females. At the second floor, the most preferred departments according to males are Electronics and Beauty. Electronics, and Living are most preferred at the second floor according to females. As same as in general, Active/outdoor is the most preferred department at the third floor according to both genders. At the first and second floor, the preferences of males differ from the general preferences. In total, men have different preferences regarding the composition of six department stores compared to the general preferences. For females there are only two differences. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β, α) is -4,570.5

The log-likelihood of the 0-model LL(0) is 1,623 * (ln(0.25) + ln(0.333) + ln(0.5)) = -5,158.0

McFadden's $Rho^2 = 1 – LL(\beta) / LL(0) = 0.114$, which still does not represents a good model performance. As expected this model performs better than the model in section 5.2.1, because there are more parameters in this model.

Table 27: Most preferred compositions of 15 different department stores by gender

Most preferred compositions of 15 different department stores by gender						
Dept. Store	Gender	Ground Floor	1st Floor	2nd Floor	3rd Floor	P_i
1	**G**	**Food**	**Fashion**	**Living**	**Beauty**	**.1488**
	M	Food	Fashion	Living	Beauty	.1477
	F	Food	Fashion	Living	Beauty	.1475
2	**G**	**Food**	**Fashion**	**Electronics**	**Beauty**	**.1527**
	M	Food	Fashion	Electronics	Beauty	.1519
	F	Food	Fashion	Beauty	Electronics	.1601
3	**G**	**Food**	**Fashion**	**Beauty**	**Active/outdoor**	**.1952**
	M	Food	Fashion	Beauty	Active/outdoor	.1681
	F	Food	Fashion	Beauty	Active/outdoor	.2212
4	**G**	**Food**	**Fashion**	**Living**	**Electronics**	**.1536**
	M	Food	Fashion	Living	Electronics	.1186
	F	Food	Fashion	Living	Electronics	.1871
5	**G**	**Food**	**Fashion**	**Living**	**Active/outdoor**	**.2166**
	M	Food	Fashion	Living	Active/outdoor	.1750
	F	Food	Fashion	Living	Active/outdoor	.2597
6	**G**	**Food**	**Fashion**	**Electronics**	**Active/outdoor**	**.2249**
	M	Food	Fashion	Electronics	Active/outdoor	.1809
	F	Food	Fashion	Electronics	Active/outdoor	.2711
7	**G**	**Fashion**	**Beauty**	**Living**	**Electronics**	**.0942**
	M	Fashion	Living	Electronics	Beauty	.0960
	F	Fashion	Beauty	Living	Electronics	.1221
8	**G**	**Fashion**	**Beauty**	**Living**	**Active/outdoor**	**.1352**
	M	Fashion	Living	Beauty	Active/outdoor	.1081
	F	Fashion	Beauty	Living	Active/outdoor	.1719
9	**G**	**Fashion**	**Beauty**	**Electronics**	**Active/outdoor**	**.1458**
	M	Fashion	Electronics	Beauty	Active/outdoor	.1118
	F	Fashion	Beauty	Electronics	Active/outdoor	.1872
10	**G**	**Fashion**	**Living**	**Electronics**	**Active/outdoor**	**.1342**
	M	Fashion	Living	Electronics	Active/outdoor	.1139
	F	Fashion	Living	Electronics	Active/outdoor	.1575
11	**G**	**Food**	**Beauty**	**Living**	**Electronics**	**.1221**
	M	Food	Living	Electronics	Beauty	.1281
	F	Food	Beauty	Living	Electronics	.1555
12	**G**	**Food**	**Beauty**	**Living**	**Active/outdoor**	**.1789**
	M	Food	Living	Beauty	Active/outdoor	.1466
	F	Food	Beauty	Living	Active/outdoor	.2245
13	**G**	**Food**	**Beauty**	**Electronics**	**Active/outdoor**	**.1890**
	M	Food	Electronics	Beauty	Active/outdoor	.1492
	F	Food	Beauty	Electronics	Active/outdoor	.2383
14	**G**	**Food**	**Living**	**Electronics**	**Active/outdoor**	**.1739**
	M	Food	Living	Electronics	Active/outdoor	.1550
	F	Food	Living	Electronics	Active/outdoor	.1953
15	**G**	**Living**	**Beauty**	**Electronics**	**Active/outdoor**	**.0832**
	M	Living	Electronics	Beauty	Active/outdoor	.0743
	F	Beauty	Living	Electronics	Active/outdoor	.1060

5.2.3 Preferences by age

When examining the preferences in floor composition, it is also interesting to look if there are any different preferences for the floor composition regarding age. To determine what the differences in age are, again the dummy variables W_0 to W_6 are defined as:

$W_j = X_j * 1$ for age group A: 18-34 years old;
$W_j = X_j * 0$ for age group B: 35-54 years old;
$W_j = X_j * -1$ for age group C: 55-65 years old.

The effects of age on utility are measured by the parameters for the W-variables, denoted by γ. In general:

$$V_i = \beta_{1A}X_{1A/i} + \beta_{1B}X_{1B/i} + \beta_{1C}X_{1C/i} + (\ldots) + \beta_{4D}X_{4D/i} + \beta_{4E}X_{4E/i} + \beta_{4F}X_{4F/i} + \gamma_{1A}Z_{1A/i} + \gamma_{1B}Z_{1B/i} + \gamma_{1C}Z_{1C/i} + (\ldots) + \gamma_{4D}Z_{4D/i} + \gamma_{4E}Z_{4E/i} + \gamma_{4F}Z_{4F/i}$$

which can be rewritten for age group A:

$$V_{i/A} = (\beta_{1A} + \gamma_{1A})X_{1A/i} + (\beta_{1B} + \gamma_{1B})X_{1B/i} + (\beta_{1C} + \gamma_{1C})X_{1C/i} + (\ldots) + (\beta_{4D} + \gamma_{4D})X_{4D/i} + (\beta_{4E} + \gamma_{4E})X_{4E/i} + (\beta_{4F} + \gamma_{4F})X_{4F/i}$$

and for age group B:

$$V_{i/B} = (\beta_{1A} + 0)X_{1A/i} + (\beta_{1B} + 0)X_{1B/i} + (\beta_{1C} + 0)X_{1C/i} + (\ldots) + (\beta_{4D} + 0)X_{4D/i} + (\beta_{4E} + 0)X_{4E/i} + (\beta_{4F} + 0)X_{4F/i}$$

and for age group C:

$$V_{i/C} = (\beta_{1A} - \gamma_{1A})X_{1A/i} + (\beta_{1B} - \gamma_{1B})X_{1B/i} + (\beta_{1C} - \gamma_{1C})X_{1C/i} + (\ldots) + (\beta_{4D} - \gamma_{4D})X_{4D/i} + (\beta_{4E} - \gamma_{4E})X_{4E/i} + (\beta_{4F} - \gamma_{4F})X_{4F/i}$$

From this formula, it can be extracted how to calculate the part worth utilities for the different age groups. When calculating the part worth utility of for example the Food department at the ground floor, the values for β and γ in table 27 are used. For Group A this would be: $V_{1A} = \beta_{1A} + \gamma_{1A} = 1.556 – 0.408 = 1.148$. For Group B this would be: $V_{1A} = \beta_{1A} + 0 = 1.556 + 0 = 1.556$. For Group C this would be: $V_{1A} = \beta_{1A} – \gamma_{1A} = 1.556 + 0.408 = 1.964$.

In table 27, the different values for β and γ are shown. These values are used to calculate the part worth utilities that each department contributes per age group (see table 28). Active/outdoor is the department that is set to zero again

Table 27: Contribution β and γ per department per floor by age groups

Contribution β per department per floor						
Department	Gr. Floor	Sig.	1st floor	Sig.	2nd floor	Sig.
Fashion	0.906	0.000	1.644	0.000	0.783	0.000
Food	1.564	0.000	0.667	0.000	- 0.325	0.024
Beauty	0.096	0.397	0.834	0.000	0.623	0.000
Living	- 0.079	0.502	0.750	0.000	0.856	0.000
Electronics	- 0.550	0.000	0.646	0.000	0.733	0.000
Active/outdoor	0.000	N/A	0.000	N/A	0.000	N/A
Contribution γ per department per floor						
Department	Gr. Floor	Sig.	1st floor	Sig.	2nd floor	Sig.
Fashion	- 0.005	0.972	- 0.195	0.188	- 0.074	0.692
Food	- 0.408	0.002	- 0.670	0.000	- 0.132	0.492
Beauty	0.050	0.738	- 0.075	0.596	- 0.137	0.347
Living	- 0.136	0.380	- 0.495	0.000	- 0.243	0.082
Electronics	0.085	0.628	- 0.162	0.252	- 0.012	0.930
Active/outdoor	- 0.000	N/A	- 0.000	N/A	- 0.000	N/A

At the ground floor, the Food department is the only department with significant different preferences across age groups. At the first floor there are two departments with a significant differences, namely: Food and Living. At the second floor there are no significant differences at all. In table 28, the different contributions are calculated for each age group. In the general model the contributions for Beauty and Living at the ground floor were not significantly different from the base department. Therefore it is assumed that the contribution of this floor is the same as the contribution of the base department, namely: 0.000.

Table 28: Contribution for the age groups per department per floor

Contribution for Group A per department per floor			
Department	Gr. Floor	1st floor	2nd floor
Fashion	0.906	1.644	0.783
Food	**1.155**	**- 0.004**	- 0.325
Beauty	0.000	0.834	0.623
Living	0.000	**0.255**	0.856
Electronics	- 0.550	0.646	0.733
Active/outdoor	0.000	0.000	0.000
Contribution for Group B per department per floor			
Department	Gr. Floor	1st floor	2nd floor
Fashion	0.906	1.644	0.783
Food	**1.564**	**0.667**	- 0.325
Beauty	0.000	0.834	0.623
Living	0.000	**0.750**	0.856
Electronics	- 0.550	0.646	0.733
Active/outdoor	0.000	0.000	0.000
Contribution for Group C per department per floor			
Department	Gr. Floor	1st floor	2nd floor
Fashion	0.906	1.644	0.783
Food	**1.972**	**1.337**	- 0.325
Beauty	0.000	0.834	0.623
Living	0.000	**1.246**	0.856
Electronics	- 0.550	0.646	0.733
Active/outdoor	0.000	0.000	0.000

Looking at table 28, it can be concluded that only on the first floor the order of preference differs per age group. For group A, when not selected at the ground floor, the top three departments at this floor are: Fashion, Beauty and Electronics. For group B this is: Fashion, Beauty and Living and for age group C respectively Fashion, Food and Living are the top 3 preferred departments at this floor. Now the part worth utilities have been calculated for every age group, it can be examined how these differences affect the most preferred allocation of departments to floors. Again, the probabilities for each floor composition have been calculated, using the same method as in the previous sections. Table 29 presents an overview of the most preferred floor composition per department store in general (G) and the different age groups.

There are less differences between the age groups than differences between gender. Age group A has different preferences at three department stores regarding most preferred floor compositions compared to the general preferences. Age group B has the same preferences as in general, because γ has no effect on the part worth utilities of this age group. Age group C has five different preferences compared to the general group. At the ground floor, Food is preferred the most unanimously by all of the age groups, and Fashion is preferred the second most at this floor. At the first floor, Fashion and Beauty are most preferred by age group A. Living is the most preferred at the first floor by age group C, but is closely followed by Fashion. This is different from the general group and other age groups, but is also expected according to the significant differences in table 28. In age group A, Living was placed at the second floor every time. For age group C, the Electronics department is most favourite at the second floor. All of the three age groups think the third floor is the best position to place Active/outdoor. For age group C the third floor is sometimes the most preferred location for the Beauty department. However, this preference is less distinct than other preferences according to the age groups. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β, γ) is -4,584.9

The log-likelihood of the 0-model LL(0) is 1,623 * (ln(0.25) + ln(0.333) + ln(0.5)) = -5,158.0

McFadden's $Rho^2 = 1 – LL(\beta) / LL(0) = 0.111$, which does not represent a good model performance. As expected, this model performs better than the model in section 5.2.1, because there are more parameters, but it performs worse than the model in section 5.2.2. This indicates that gender has more influence on floor composition than age.

Table 29: Most preferred compositions of 15 different department stores by age compared to general

Most preferred compositions of 15 different department stores by age						
Dept. Store	Age	Ground Floor	1st Floor	2nd Floor	3rd Floor	P_i
1	**General**	**Food**	**Fashion**	**Living**	**Beauty**	**.1488**
	18-34	Food	Fashion	Living	Beauty	.1367
	35-54	Food	Fashion	Living	Beauty	.1553
	55-65	Food	Fashion	Living	Beauty	.1624
2	**General**	**Food**	**Fashion**	**Electronics**	**Beauty**	**.1527**
	18-34	Food	Fashion	Electronics	Beauty	.1278
	35-54	Food	Fashion	Electronics	Beauty	.1573
	55-65	Food	Fashion	Electronics	Beauty	.1859
3	**General**	**Food**	**Fashion**	**Beauty**	**Active/outdoor**	**.1952**
	18-34	Food	Fashion	Beauty	Active/outdoor	.1649
	35-54	Food	Fashion	Beauty	Active/outdoor	.2051
	55-65	Food	Fashion	Beauty	Active/outdoor	.2448
4	**General**	**Food**	**Fashion**	**Living**	**Electronics**	**.1536**
	18-34	Food	Fashion	Living	Electronics	.1441
	35-54	Food	Fashion	Living	Electronics	.1614
	55-65	Food	Fashion	Living	Electronics	.1663
5	**General**	**Food**	**Fashion**	**Living**	**Active/outdoor**	**.2166**
	18-34	Food	Fashion	Living	Active/outdoor	.2019
	35-54	Food	Fashion	Living	Active/outdoor	.2260
	55-65	Food	Fashion	Living	Active/outdoor	.2318
6	**General**	**Food**	**Fashion**	**Electronics**	**Active/outdoor**	**.2249**
	18-34	Food	Fashion	Electronics	Active/outdoor	.1900
	35-54	Food	Fashion	Electronics	Active/outdoor	.2339
	55-65	Food	Fashion	Electronics	Active/outdoor	.2765
7	**General**	**Fashion**	**Beauty**	**Living**	**Electronics**	**.0942**
	18-34	Fashion	Beauty	Living	Electronics	.1088
	35-54	Fashion	Beauty	Living	Electronics	.0946
	55-65	Fashion	Living	Electronics	Beauty	.1168
8	**General**	**Fashion**	**Beauty**	**Living**	**Active/outdoor**	**.1352**
	18-34	Fashion	Beauty	Living	Active/outdoor	.1591
	35-54	Fashion	Beauty	Living	Active/outdoor	.1348
	55-65	Fashion	Living	Beauty	Active/outdoor	.1509
9	**General**	**Fashion**	**Beauty**	**Electronics**	**Active/outdoor**	**.1458**
	18-34	Fashion	Beauty	Electronics	Active/outdoor	.1462
	35-54	Fashion	Beauty	Electronics	Active/outdoor	.1462
	55-65	Fashion	Beauty	Electronics	Active/outdoor	.1462
10	**General**	**Fashion**	**Living**	**Electronics**	**Active/outdoor**	**.1342**
	18-34	Fashion	Electronics	Living	Active/outdoor	.1563
	35-54	Fashion	Living	Electronics	Active/outdoor	.1394
	55-65	Fashion	Living	Electronics	Active/outdoor	.1802
11	**General**	**Food**	**Beauty**	**Living**	**Electronics**	**.1221**
	18-34	Food	Beauty	Living	Electronics	.1226
	35-54	Food	Beauty	Living	Electronics	.1254
	55-65	Food	Living	Electronics	Beauty	.1755
12	**General**	**Food**	**Beauty**	**Living**	**Active/outdoor**	**.1789**
	18-34	Food	Beauty	Living	Active/outdoor	.1809
	35-54	Food	Beauty	Living	Active/outdoor	.1831
	55-65	Food	Living	Beauty	Active/outdoor	.2355
13	**General**	**Food**	**Beauty**	**Electronics**	**Active/outdoor**	**.1890**
	18-34	Food	Beauty	Electronics	Active/outdoor	.1648
	35-54	Food	Beauty	Electronics	Active/outdoor	.1939
	55-65	Food	Beauty	Electronics	Active/outdoor	.2197
14	**General**	**Food**	**Living**	**Electronics**	**Active/outdoor**	**.1739**
	18-34	Food	Electronics	Living	Active/outdoor	.1760
	35-54	Food	Living	Electronics	Active/outdoor	.1849
	55-65	Food	Living	Electronics	Active/outdoor	.2707
15	**General**	**Living**	**Beauty**	**Electronics**	**Active/outdoor**	**.0832**
	18-34	Beauty	Electronics	Living	Active/outdoor	.0892
	35-54	Living	Beauty	Electronics	Active/outdoor	.0834
	55-65	Beauty	Living	Electronics	Active/outdoor	.1028

5.2.4 Preference for gender and age combined

Taking both gender and age into account, it can be concluded that gender has more influence on the floor composition than age. The contribution of the Food department at the ground floor is the only value that significantly differs for both gender and age, so an extra distinction can be made for this variable on top of the differences that are already discussed in this section. In table 30, the total contribution for each gender and age group is calculated. The other (insignificant) values can be found in appendix III.

Table 30: Contribution of the Food department at the ground floor regarding both gender and age

Contribution for the Food department regarding both gender and age								
Gender	Age	β		α		γ		Total
Male	Young (A)	1.570	+	- 0.264	+	- 0.411	=	0.895
Female	Young (A)	1.570	–	- 0.264	+	- 0.411	=	1.423
Male	Middle (B)	1.570	+	- 0.264	+	0.000	=	1.306
Female	Middle (B)	1.570	–	- 0.264	+	0.000	=	1.834
Male	Old (C)	1.570	+	- 0.264	–	- 0.411	=	1.717
Female	Old (C)	1.570	–	- 0.264	–	- 0.411	=	2.245

Having a Food department at the ground floor is by far the most popular amongst old females. After old females, middle aged females prefers to have Food at the ground floor the most. The middle aged females are closely followed by old males. Having a Food department at the ground floor is least preferred by young males. To check whether this model is able to re-predict the observed choices, McFadden's Rho^2 is calculated by using the LL(β) and LL(0) of the model:

Log-likelihood of the estimated model LL(β, α, γ) is -4,542.0

The log-likelihood of the 0-model LL(0) is 1,623 * (ln(0.25) + ln(0.333) + ln(0.5)) = -5,158.0

McFadden's $Rho^2 = 1 – LL(\beta) / LL(0) = 0.119$, which does not represent a good model performance. As expected, this model performs better than the model in the previous sections, because there are more parameters in this model.

5.3 Conclusions

In this chapter data were analysed using discrete choice modelling. The program NLOGIT 5 was used for parameter estimation and the original dataset was recoded to make it suitable for model estimation. First, the general preferences regarding the six different departments were predicted. Dummy variables were created to measure the effect of every department on the utility. In this model Active/outdoor was chosen as the base department where all the other departments could be compared with. After doing this a general order of preference occurs regarding the six different departments. Amongst 499 respondents the following consecution applies: 1) Fashion, 2) Food, 3) Living, 4) Electronics, 5) Active/outdoor and 6) Beauty. This is a surprising result, because Beauty is a very prominent department in the well-known Dutch department stores. After determining the contribution β of each department to the total utility of a department store, the utilities of each department store were calculated. The top 3 of the most preferred department stores is: 1) Fashion, Food, Living and Electronics, 2) Fashion, Food, Living and Active/outdoor, and 3) Fashion, Food, Electronics and Active/outdoor. The least favourite department store contains Beauty, Living,

Electronics and Active/outdoor. As expected, the top 3 always contains Fashion. Food is also always in the top 3, which is also logical, because consumers are used to having a Food department in a department store. Living is also a common department in Dutch department stores and therefore also an expected result. Electronics is not always represented in a prominent way, so this result is a bit surprising. Another fact that is surprising is that Beauty is not in the top 3 at all.

After knowing the general preferences, it was examined if there were any different preferences regarding gender and regarding age. Extra dummy variables were created for gender and also for age. Regarding gender all the differences between males and females were significant. For males this led to the following order of preference: 1) Electronics, 2) Fashion,
3) Food, 4) Living, 5) Active/outdoor and 6) Beauty. A result that stands out, is that the most favourite department of males is the Electronics department, on the other hand it is not surprising, because men are frequently associated with an affection for gadgets and technique. Another result that is not surprising, is that Beauty is the least favourite department according to men. The order of preference that occurs for women is as follows: 1) Fashion, 2) Living, 3) Food, 4) Beauty, 5) Active/outdoor and 6) Electronics. As expected, Fashion is the most favourite department of women. Striking is that the Beauty department is the fourth most favourite department for females, which can mean that department store chains should not give Beauty such a prominent location in their stores. When calculating the utilities per department store for both males and females, both genders have a different top 3 listing. The males' most preferred department store is the same as the general most preferred department store. For women the most favourite department store contains: Fashion, Food, Beauty and Living. Since Beauty is a more preferred department by females than Electronics this is an expected result.

Examining the different preferences regarding age groups, resulted in only one significant difference. This difference concerns the preference regarding the Beauty department. In general, young consumers are more open to this department than old consumers. When also gender is taken into account regarding this department, the following differences occur: young females are most likely to choose a department store with a Beauty department in it, which is an expected result because young women are more often associated with a predilection for beauty. Another expected result is that old men are the least open to a department store with a Beauty department in it.

The last part that was analysed, was the preferences regarding floor compositions of consumers. Again, dummy variables were used to measure the effect of the location of a department on the utility of a department store. In general, the following conclusions can be drawn: at the ground floor, Food is the most preferred department, followed by Fashion. Beauty and Fashion are the most preferred departments at the 1st floor and Living and Electronics are the most preferred department at the 2nd floor. At the 3rd floor, Active/outdoor is the most preferred department. It stands out that consumers prefer Food at the ground floor, because normally a restaurant is placed at the top floor in Dutch department stores. However, most of the times a department store contains both a Food section at the ground floor and only the restaurant is at the top floor. It also stands out that Beauty is placed on the 1st floor by consumers, while normally in the Netherlands this department has a prominent position at the ground floor.

For the floor composition it was also examined if there were any differences in preferences regarding age and gender. When it comes to gender, the females have the same preferences as the total group of respondents. The preferences of males differ at some points from the general point of view. The most important difference seems to be that females attach more utility to having Beauty on the first floor. Looking at the preferences regarding age groups, there are a few differences. The middle age group is assumed to have the same preferences as in general. Older respondents differ from the younger respondents in the sense that they attach more utility to having Living at ground floor or first floor level. Since the performance of the model increases more when taking gender into consideration compared to age, it can be concluded that gender has the highest influence on department store composition.

6. Conclusions and recommendations

In this chapter, the conclusions that can be made based on the literature research and several data analyses are described. The goal of this research is to find out what the consumers' preferences are regarding department stores. The first part of this research was a literature review on department stores and experiential value. The second part of this research was a data analysis on consumers' preferences regarding department store composition.

First, the sub questions will be answered, followed by the answer to the main question:

'Which characteristics should a department store have in order to add (experiential) value to shopping environments in the Netherlands for Dutch consumers?'

These questions will be answered by using the outcomes of the literature review and the outcomes of the data analyses. After answering the questions recommendations will be made for further research and some managerial implications will be elaborated.

6.1 Conclusions

In order to be able to answer this question, the four sub research questions are to be answered:

1. **How can department stores be defined?**

In this research two different definitions were used to define a department store. Both definitions contain different key elements that are usually attributed to department stores. The first, more general definition is as follows:

> *'A department store is a large retail establishment with an extensive assortment in variety and range of goods, organized into separate departments. All departments are housed under the same roof to facilitate buying, customer service, merchandising, and control.' (BD, 2015).*

Key elements in this definition, are that a department store is large, has an extensive assortment, has different, separate departments and that all of the departments are housed under the same roof. What is missing is what kind or how many departments a department stores has to have, so the next definition gives an indication of what product categories department stores usually contain:

> *'A department store is a retail establishment which specializes in selling a wide range of products without a predominant merchandise line. Department stores generally sell a wide variety of products, including apparel, furniture, appliances, electronics, and additional select lines of products such as paint, hardware, and so on arranged departments.' (Johnson, & Kim, 2009).*

What can be learned from this definition is that department stores usually have four departments (or more) and it describes which four most important product lines that all department stores should have in their assortment according to Johnson & Kim (2009). Depending on the size of a department store, additional product lines can be included into the assortment of the store.

The three types of department stores that can be distinguished are: high end, mid-range and discount department stores. The discount department stores are not included in this study.

2. What are the characteristics of department stores?

Traditional department stores have different types of departments and specialities under the roof of one giant retail establishment. The key assets of department stores are to provide a high level of service, a high quality of products and providing a premium shopping experience to consumers. Customers are attracted by department stores because of the in-store shopping value that is provided by the department stores, this evokes hedonic shopping (Bressers, 2011)..
Because department stores sell a wide variety of products, usually at a good location, they are celebrated for their one-stop shopping environment which adds something to the retail environment. Therefore department stores are usually threated as anchor store, making them also attractive tenants to real estate investors (Finn and Louviere, 1996).

Nowadays department stores sometimes deviate from their unique selling points, causing them to start losing their added value to the shopping environments. In the meantime, other retailers started improving shopping experience in their stores, causing blurring of distinctions in the original retail landscape. For this reason department stores are not functioning as well as they used to do, so department stores have to start distinguish themselves again from other retailers. Department stores have to keep up with current trends and have to facilitate consumers again in a distinctive shopping experience leading to a great experiential value (Bressers, 2011).

3. How can experiential value of a retail environment be defined? And what role does it play in department stores?

One of the most important characteristics of department stores, is that they provide experiential value for consumers. In this research, the following definition for experiential value is used:

> '*Experiential value is a perceived preference for product attributes or service performances arising from interaction within a consumption setting that facilitates or blocks achievement of customer goals or purpose.*' (Mathwick et al, 2002).

When looking at a retailer, there are two main components that contribute to the shopping experience of a consumer: the experiential value of the shopping area and the experiential value of the store. Important attributes of the shopping area that contribute to the shopping experience are: accessibility, parking spots and routing. In addition, the right mix of functions (retail, leisure, public) and the mix of retailers are also important. The factor that is most important to consumers concerning experiential value, is the ambiance (safety, enjoyment of stay etc.) of the shopping environment experience (Teller & Elms, 2010). Besides where a department store is located in a shopping area with the right characteristics, the building wherein the department store is located is also very important. The buildings usually have to be large and impressive with a luxurious appearance, which is inviting to consumers. Besides these factors regarding shopping environment, the experiential value of the department store itself also contributes to the shopping experience of consumers (DiNardo, 2012).

There are two different kinds of value regarding the experiential value of a (department) store, namely: intrinsic and extrinsic value. Both these values can also be divided into an active value and a reactive value. A combination of these values will lead to playfulness, aesthetics, consumer return on investment and service excellence. Stores have to find the right balance of these four qualities to

create in-store shopping value. In-store shopping experience also has two distinguishing factors, namely: retail factors and consumer factors. Retailer factors are the factors that can be provided by the department store, such as: personnel, price, lay out, atmospherics, inspiration, innovations, opportunity to try out products, services, stimulation of senses, recreation and special activities such as events. Finding the right balance by implementing these assets, the optimal experiential value will be created (Mathwick et al, 2001; Bäckström & Johansson, 2006).

A current trend that also applies to department store is online retailing. A physical shopping experience is not complete anymore without a decent online shopping environment. Because consumers are constantly seeking for innovation and new concepts, the integration of different channels is very important in order to become a multichannel or omnichannel retailer and to provide in the ultimate shopping experience for consumers (CBW-Mitex, 2010).

4. What composition should a department store have in order to be attractive to consumers?

To determine what composition a department store should have in order to be attractive to consumers, a descriptive analysis was conducted and discrete choice modelling was used. The sample contained 544 respondents, whereby gender, age, income and place of residence were spread proportionally. First, conclusions can be drawn regarding what the most preferred composition in general is according to the respondents. Second, a distinction between the two different genders can be made and last the difference in preference regarding department store composition according to different age groups can be described.

In this research, six possible departments that a department store can contain were selected: Fashion, Food, Beauty, Living, Electronics and Active/outdoor. These departments can be ranked by preference according to consumers, using a multinomial logit model: 1) Fashion, 2) Food, 3) Living, 4) Electronics, 5) Active/outdoor and 6) Beauty. It is not surprising that Fashion is the most preferred department according to the respondents. It is notable that Food is also a very important department. Striking is that Beauty is the least favourite department, while at Dutch department stores chains this department always has a prominent location in the stores.

It is assumed that a department store can contain four different departments divided over four different floors. This resulted in that the most attractive department store to consumers should contain the departments of: Fashion, Food, Living and Electronics. It stands out that the Beauty is not a department that is part of the most preferred department store.
For the entire fifteen possible department stores it was also examined which department is most preferred at a certain floor of the department store. Again, by using discrete choice models, the following results were obtained: Food at the ground floor, Fashion at the 1st floor, Living at the 2nd floor and Electronics at the 3rd floor.

In addition to investigating the most appreciated department store in terms of available departments and allocation of departments to floors, it has been determined which sub departments and extras (services) should be in each department. The preferences of the sub departments and extras were analysed by descriptive analysis and will be elaborated for the most popular department store. The Food department should at least contain: a bakery, a patisserie, delicatessens and a restaurant. A bar is optional but is also preferred by many consumers. The Fashion department should consist of: apparel, shoes, lingerie & underwear, virtual fitting rooms

and a section for clothing reparation. Home accessories, garden attributes, furniture and furnishing advice are elements that should be available at the Living department. For the Electronics department, vision and sound, appliances and computers are the most favourite sub departments, demonstration and installation of devices both are the most popular extras.

Besides these general preferences, there has also been looked at differences in preference by gender. According to the MNL-model, the order of departments from most preferred to least preferred for males is: 1) Electronics, 2) Fashion, 3) Food, 4) Living, 5) Active/outdoor and 6) Beauty. It stand out that the Electronics department has risen from the fourth place to the first place. Men are generally associated with a predilection for electronics, so this result is not unexpected. For females, the order is: 1) Fashion, 2) Living, 3) Food, 4) Beauty, 5) Active/outdoor and 6) Electronics. It stand out that the most preferred department by men, is the least preferred department by women. As expected, Fashion is the most favourite department and also Beauty is more favourite amongst women compared to men. The most favourite department store for men is the same as the general preferred department store. The most preferred department store for women is almost the same as the general preferred one, except Electronics is replaced by Beauty. A MNL-model also has been estimated to examine whether there were significant differences in preferences regarding the allocation of departments to floors. Although significant differences have been detected, the effects on the optimal allocation of departments to floors are limited. Ultimately, the optimal department store for males has Food at the ground floor, Fashion at the 1st floor, Living at the 2nd floor, and Electronics at the 3rd floor. For females, the Electronics department at the top floor should be replaced by the Beauty department.

Filling in these departments with sub departments and extras, the things that stand out are that women prefer books & magazines and a restaurant more than men, which are items that are not usually gender related. Male prefer a butchery and a fish section, which are not common product categories in department stores. Another thing that stands out is that men significantly prefer a catwalk more than women, while usually fashion shows are associated with females.

There are also some differences in preference regarding different age groups. Earlier in this research there were five different age categories composed: 1) 18-24 years old, 2) 25-34 years old, 3) 35-44 years old, 4) 45-54 years old and 5) 55-65 years old. For the MNL-model these age categories were combined into three different age groups: age group A (18-34 years old), age group B (35-54 years old) and age group C (55-65 years old). After estimating a MNL-model for the differences in age there were some differences according to the most preferred department store.

All of the findings and conclusions that are elaborated above lead to the general answer to the main research question:

'Which characteristics should a department store have in order to add (experiential) value to shopping environments in the Netherlands for Dutch consumers?'

A department store needs the right mix of departments to create a good shopping experience. However, many other factors are important, such as: personnel, price, lay out, atmospherics, inspiration, innovations, opportunity to try out products, services, stimulation of senses, recreation and special activities such as events. Department store should take all of these factors into account. Department stores should make room for particular services in order to improve experience. In

general, a department store should at least contain the departments of Fashion, Food, Living and Electronics. If a department store focuses more on females, the Electronics department should be replaced by a Beauty department.

6.2 Recommendations for further research

During the literature review it became clear that department stores are usually associated with experiential value. In the survey of this research experiential value was measured by the extras consumers could choose from when composing the different departments. However, to get a better insight in the preferences regarding services and facilities in department stores, further research is necessary.

A current trend is the integration of online and offline retailing via multiple channels. This research is almost only about offline retailing. It would be interesting to learn how the experiential value can be expanded by integrating online retailing into department stores and in what way this integration should take place.

To determine the preferred composition of a department store, it was assumed that a department store has four floors and that every floor only can contain one department. In reality, multiple departments can be allocated to one floor and not every department store building contains four floors of approximately 1.500 m^2, which was assumed in this research. The square meters that were assigned to a sub department or extra service also can differ from the assumed values. It would be interesting to have a typical department store redesigned by consumers (see e.g. Borgers et al, 2010) for an example in a neighbourhood shopping centre context.

An interesting follow-up study would be to investigate whether a department store that contains the preferred departments according to this research would function as an anchor store in large shopping districts. Would this 'ideal' department store attract more consumers to the shopping district. And would this department store evoke more expenditure?

In this study was chosen that the different kinds of demographics aspects should be equally divided throughout the respondents. It is possible that a 50/50% representation of males and females is not a good representation of the Dutch consumer that visits department stores. It can be that women go shopping more often than men. Therefore, a follow-up study can be done for the exact right mix of department store consumers.

6.3 Managerial implications

Department store managers can use the results of this study in setting up their department store. They now know about the preferences regarding departments and the composition of these departments in terms of sub departments and extras. For instance: the Beauty department is not the best department to be given a prominent position at the ground floor. Also: the Food department is most preferred at the ground floor instead of the top floor. When the target group for a certain department store is females, than the management should consider implementing a Beauty department into the department store instead of an Electronics department. When managers are considering offering additional services in order to enhance the shopping experience, the results from this study can be used to choose which services to implement. The most popular

services to implement at the different departments are: virtual fitting rooms, a restaurant, a hair dresser, furnishing advice, tutorials and demonstrations of devices and a test space for sports.

Owners of real estate or investors do not determine the composition of a department store; they offer a physical retail space that may be used to accommodate a department store. However, in order to keep business going, real estate owners should stimulate tenants to take the result of this study into consideration. In addition when a real estate owner/investor has a large retail property where no department store formula is interested in, they could think of renting out the retail unit in smaller parts according to the shop-in-shop principle. The results of this study can help real estate owners to compose the shops in the shop in the right way according to the department store composition that has been investigated in this research.

However, a side note has to be made that this research focuses on the consumers´ preferences of department stores. This means that this study did not examine what is best for the business side of department stores. For example: Beauty and jewellery are normally at the ground floor of a department store because the highest margins are to be earned at these sections. Also: a Food department is usually at the top floor because then consumers have to pass by all of the other floors to get to the restaurant. It is possible that what is most preferred by consumers, is not always the best for the business side.

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Appendices

Appendix I: Survey in Dutch

Appendix II: Survey in English

Appendix III: Output of NLOGIT

Appendix IV: Probabilities of dept. store floor compositions

Appendix I: Survey in Dutch

Een nieuw warenhuis in Nederland

In de afgelopen maanden is een aantal bekende winkelketens failliet gegaan. De grootste keten die failliet ging, is het warenhuis V&D. Hierdoor ontstaat er ruimte voor een nieuw warenhuis in Nederland.
De Technische Universiteit Eindhoven doet in samenwerking met Syntrus Achmea Real Estate & Finance onderzoek naar de wensen van consumenten betreffende een nieuw warenhuis in Nederland. Deze enquête gaat over het aanbod en indeling van zo´n nieuw warenhuis.
Het invullen van deze enquête duurt ongeveer 10 minuten.

Hartelijk dank voor uw medewerking.

Deel I: Persoonlijke gegevens

Vraag 1: Wat is uw geboortejaar?

Vraag 2: Wat is uw geslacht?

☐ Man ☐ Vrouw

Vraag 3: Wat is de postcode van uw woonplaats?

Vraag 4: Wat is uw hoogst genoten opleidingsniveau?

- ☐ Basisonderwijs, vmbo, onderbouw havo/vwo, mbo-1
- ☐ Bovenbouw havo/vwo, mbo-2, mbo-3, mbo-4
- ☐ HBO/WO (universiteit)
- ☐ Anders

Vraag 5: Wat is uw huidige jaarinkomen?

- ☐ Geen inkomen
- ☐ Tot 20.000 euro
- ☐ 20.000 tot 40.000 euro
- ☐ 40.000 tot 60.000 euro
- ☐ 60.000 euro of meer
- ☐ Weet niet / vertel ik liever niet

Vraag 6: Hoe vaak bezocht u het afgelopen jaar de V&D?

- ☐ Geen keer
- ☐ 1 á 2 keer
- ☐ 3 t/m 5 keer
- ☐ 6 t/m 10 keer
- ☐ Meer dan 10 keer

Vraag 7: Hoe vaak bezocht u het afgelopen jaar de Bijenkorf?

- ☐ Geen keer
- ☐ 1 á 2 keer
- ☐ 3 t/m 5 keer
- ☐ 6 t/m 10 keer
- ☐ Meer dan 10 keer

Vraag 8: Hoe vaak bezocht u het afgelopen jaar een ander (lokaal) warenhuis dat vergelijkbaar is met de Bijenkorf of V&D?

- ☐ Geen keer
- ☐ 1 á 2 keer
- ☐ 3 t/m 5 keer
- ☐ 6 t/m 10 keer
- ☐ Meer dan 10 keer

Deel II: Afdelingen en onderafdelingen

Afdelingen

Voor een toekomstig warenhuis zijn zes afdelingen geselecteerd:

1) Mode,
2) Vers & Horeca,
3) Beauty,
4) Wonen,
5) Elektronica en
6) Actief/outdoor.

Elk van deze afdelingen heeft een aantal onderafdelingen die onderdeel kunnen gaan uitmaken van het toekomstige warenhuis; zo zijn er voor Mode bijvoorbeeld de onderafdelingen: kleding, schoenen en accessoires.
Ook kunnen er bepaalde extra's worden aangeboden op de verschillende afdelingen. Mode heeft als extra's bijvoorbeeld een personal shopper (persoonlijke assistent(e)), een catwalk of een stomerij.
We vragen u nu om voor elke afdeling uw ideale samenstelling te maken.

Vraag 9:

Stel: u mag een modeafdeling van ongeveer 1.500 m^2 indelen. Welke onderdelen uit de onderstaande lijst zou u momenteel kiezen? U hoeft niet precies op 1.500 m^2 uit te komen, ergens tussen 1.250 en 1.750 m^2 is goed.

Nr.	Keuzemogelijkheden	Opp.	In samenstelling (ja/nee)
1	Baby en kind	400 m^2	
2	Dames- en herenkleding	800 m^2	
3	Lingerie en ondergoed	200 m^2	
4	Schoenen	300 m^2	
5	Sierraden en horloges	200 m^2	
6	Mode accessoires (tassen, riemen e.d.)	200 m^2	
7	Ruimte voor een Personal shopper	50 m^2	
8	Catwalk (t.b.v. modeshows)	50 m^2	
9	Virtuele paskamers (projectieschermen)	50 m^2	
10	Kledingreparatie	50 m^2	
11	Stomerij	100 m^2	
	Totaal		

Vraag 10:

Stel: u mag een vers- en horeca-afdeling van ongeveer 1.500 m^2 indelen. Welke onderdelen uit de onderstaande lijst zou u momenteel kiezen? U hoeft niet precies op 1.500 m^2 uit te komen, ergens tussen 1.250 en 1.750 m^2 is goed.

Nr.	Keuzemogelijkheden	Opp.	In samenstelling (ja/nee)
1	Bakkerij	200 m^2	
2	Slagerij	200 m^2	
3	Visafdeling	200 m^2	
4	Groente/fruit	200 m^2	
5	Slijterij	200 m^2	
6	Delicatessen (worstjes, kaas, e.d.)	200 m^2	
7	Snoepafdeling	100 m^2	
8	Patisserie (taart, gebakjes)	100 m^2	
9	Supermarkt	800 m^2	
10	Restaurant	500 m^2	
11	Café	300 m^2	
	Totaal		

Vraag 11:

Stel: u mag een beautyafdeling van ongeveer 1.500 m^2 indelen. Welke onderdelen uit de onderstaande lijst zou u momenteel kiezen? U hoeft niet precies op 1.500 m^2 uit te komen, ergens tussen 1.250 en 1.750 m^2 is goed.

Nr.	Keuzemogelijkheden	Opp.	In samenstelling (ja/nee)
1	Parfumerie	400 m^2	
2	Drogisterij	300 m^2	
3	Make-up	300 m^2	
4	Visagist(e)	100 m^2	
5	Kapper/barbier	100 m^2	
6	Beauty & Wellness (Spa)	800 m^2	
7	Opticien	300 m^2	
8	Audicien (gehoortoestellen e.d.)	300 m^2	
9	Apotheek	300 m^2	
	Totaal		

Vraag 12:

Stel: u mag een woonafdeling van ongeveer 1.500 m^2 indelen. Welke onderdelen uit de onderstaande lijst zou u momenteel kiezen? U hoeft niet precies op 1.500 m^2 uit te komen, ergens tussen 1.250 en 1.750 m^2 is goed.

Nr.	Keuzemogelijkheden	Opp.	In samenstelling (ja/nee)
1	Meubels	800 m^2	
2	Woonaccessoires	400 m^2	
3	Tuinattributen	200 m^2	
4	Dierenafdeling	100 m^2	
5	Doe-het-zelfafdeling	400 m^2	
6	Bloemist	50 m^2	
7	Boeken & tijdschriften	400 m^2	
8	Speelgoed en cadeaus	400 m^2	
9	Inrichtingsadvies woning	50 m^2	
10	Cadeau-inpakservice	50 m^2	
11	Fotoprintservice (album, kunst etc.)	50 m^2	
12	Ruimte voor workshops (hobby´s)	100 m^2	
	Totaal		

Vraag 13:

Stel: u mag een elektronica-afdeling van ongeveer 1.500 m^2 indelen. Welke onderdelen uit de onderstaande lijst zou u momenteel kiezen? U hoeft niet precies op 1.500 m^2 uit te komen, ergens tussen 1.250 en 1.750 m^2 is goed.

Nr.	Keuzemogelijkheden	Opp.	In samenstelling (ja/nee)
1	Computers	200 m^2	
2	Telecom en navigatie	100 m^2	
3	Beeld en geluid	300 m^2	
4	Fotografie	100 m^2	
5	Huishoudelijke apparaten	500 m^2	
6	Elektrisch gereedschap	200 m^2	
7	Keukenapparaten	200 m^2	
8	Persoonlijke verzorging	200 m^2	
9	Muziek, films en games	500 m^2	
10	Bioscoopzaal	300 m^2	
11	Demonstraties en uitleg apparaten	200 m^2	
12	Installatie van apparaten	100 m^2	
	Totaal		

Vraag 14:

Stel: u mag een actief/outdoor afdeling van ongeveer 1.500 m^2 indelen. Welke onderdelen uit de onderstaande lijst zou u momenteel kiezen? U hoeft niet precies op 1.500 m^2 uit te komen, ergens tussen 1.250 en 1.750 m^2 is goed.

Nr.	Keuzemogelijkheden	Opp.	In samenstelling (ja/nee)
1	Sportartikelen	600 m^2	
2	Outdoor artikelen	600 m^2	
3	Reisartikelen (koffers e.d.)	300 m^2	
4	Reisbureau	200 m^2	
5	Speelparadijs	300 m^2	
6	Testruimte voor sportartikelen	400 m^2	
	Totaal		

Deel III: Keuze voor een warenhuis

In dit onderdeel krijgt u steeds twee denkbeeldige warenhuizen voorgelegd. Er zijn 6 verschillende afdelingen mogelijk. Er passen echter altijd maar 4 afdelingen in het warenhuis. De 2 warenhuizen verschillen qua afdelingen. U kunt er vanuit gaan dat de afdelingen naar uw wens zijn ingevuld. Wij vragen u telkens te kiezen welke van de 2 warenhuizen uw voorkeur heeft. Als u echt geen voorkeur heeft, kunt u voor de optie 'geen van beide' kiezen.

We gaan u nu 7 van deze keuzes voorleggen.

Vraag 15:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Mode
Beauty
Wonen
Elektronica

vs.

Warenhuis 2
Vers & Horeca
Wonen
Actief/outdoor
Elektronica

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Vraag 16:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Beauty
Wonen
Elektronica
Actief/outdoor

vs.

Warenhuis 2
Mode
Beauty
Wonen
Actief/outdoor

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Vraag 17:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Mode
Vers & Horeca
Elektronica
Actief/outdoor

vs.

Warenhuis 2
Vers & Horeca
Beauty
Wonen
Actief/outdoor

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Vraag 18:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Mode
Vers & Horeca
Beauty
Wonen

vs.

Warenhuis 2
Vers & Horeca
Beauty
Elektronica
Actief/outdoor

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Vraag 19:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Mode
Vers & Horeca
Beauty
Wonen

vs.

Warenhuis 2
Mode
Elektronica
Actief/outdoor
Wonen

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Vraag 20:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Mode
Beauty
Elektronica
Actief/outdoor

vs.

Warenhuis 2
Mode
Vers & Horeca
Wonen
Actief/outdoor

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Vraag 21:

Welk van de 2 onderstaande warenhuizen zou u het liefste bezoeken? (De warenhuizen verschillen niet van elkaar op andere kenmerken)

Warenhuis 1
Mode
Vers& Horeca
Beauty
Actief/outdoor

vs.

Warenhuis 2
Vers & Horeca
Wonen
Actief/outdoor
Elektronica

Uw voorkeur:

- ☐ Warenhuis 1
- ☐ Warenhuis 2
- ☐ Geen van beide

Deel IV: De inrichting van het warenhuis

Tot slot van deze enquête vragen we u om aan te geven op welke verdieping van het warenhuis u welke afdeling het liefst zou zien. Deze vraag herhalen we 3 keer, telkens voor een andere combinatie van afdelingen.

Vraag 22:

Stel een warenhuis heeft de volgende 4 afdelingen:

- Mode
- Vers & Horeca
- Beauty
- Wonen

Op welke manier zou u de afdelingen verdelen over de verdiepingen van het nieuwe warenhuis?

Warenhuis

Verdieping	**Afdeling**
3e verd.	
2e verd.	
1e verd.	
Begane gr.	

Vraag 23:

Stel een warenhuis heeft de volgende 4 afdelingen:

- Mode
- Vers & Horeca
- Beauty
- Elektronica

Op welke manier zou u de afdelingen verdelen over de verdiepingen van het nieuwe warenhuis?

Warenhuis

Verdieping	**Afdeling**
3e verd.	
2e verd.	
1e verd.	
Begane gr.	

Vraag 24:

Stel een warenhuis heeft de volgende 4 afdelingen:

- Mode
- Vers & Horeca
- Beauty
- Actief/outdoor

Op welke manier zou u de afdelingen verdelen over de verdiepingen van het nieuwe warenhuis?

Warenhuis

Verdieping	**Afdeling**
3e verd.	
2e verd.	
1e verd.	
Begane gr.	

Vraag 25:

Stel: u gaat winkelen en u hebt van een enkele van de zes mogelijke afdelingen (Mode, Vers & Horeca, Beauty, Huis & Tuin, Elektronica, Actief/outdoor) producten nodig. Zou u dan liever naar een warenhuis gaan of zou u liever naar diverse speciaalzaken elders in het winkelcentrum gaan?

☐ Bij voorkeur naar het warenhuis

☐ Bij voorkeur naar speciaalzaken

☐ Zowel warenhuis als speciaalzaken

Hartelijk dank voor uw medewerking.

Appendix II: Survey in English

A new department store in the Netherlands

In the past few months several well-known Dutch retail chains went bankrupt. The biggest retail chain that went bankrupt is the department store chain V&D. Because of V&D disappearing from the Dutch shopping districts, there is room for a new department store chain in the Netherlands.
The University of Technology Eindhoven conducts in collaboration with Syntrus Achmea Real Estate & Finance a research concerning the preferences of consumers regarding a new department store. Filling in this survey will take approximately 10 minutes.

Thank you very much for your cooperation.

Part I: Personal characteristics

Question 1: What is your year of birth?

Question 2: What is your gender?

☐ Male ☐ Female

Question 3: What is the zip code of your residence?

Question 4: What is your highest level of education (Dutch system)?

☐ Basic education, vmbo, first years of havo/vwo, mbo-1
☐ Last years of havo/vwo, mbo-2, mbo-3, mbo-4
☐ HBO (university of applied sciences) or WO (university)
☐ Other

Question 5: What is your current annual income?

☐ No income
☐ 0 to 20,000 euro
☐ 20.000 to 40,000 euro
☐ 40,000 to 60,000 euro
☐ 60,000 euro or more
☐ Don't know, rather don't say

Question 6: How many times did you visit V&D (Vroom & Dreesmann) in the past year?

- ☐ Not once
- ☐ 1 to 2 times
- ☐ 3 up to 5 times
- ☐ 6 up to 10 times
- ☐ Over 10 times

Question 7: How many times did you visit de Bijenkorf in the past year?

- ☐ Not once
- ☐ 1 to 2 times
- ☐ 3 up to 5 times
- ☐ 6 up to 10 times
- ☐ Over 10 times

Question 8: How many times did you visit another (local) department store that is comparable to the V&D and de Bijenkorf?

- ☐ Not once
- ☐ 1 to 2 times
- ☐ 3 up to 5 times
- ☐ 6 up to 10 times
- ☐ Over 10 times

Part II: Departments and sub-departments

Departments

In a future department store, the next main product categories are possible:

1) Fashion,
2) Food,
3) Beauty,
4) Living,
5) Electronics
6) Active/outdoor.

Each of these departments has several sub-departments which can become part of the future department store. For example: Fashion has amongst others: apparel, shoes and accessories. There can also be offered certain extras at the different departments. As extras, Fashion has for instance: a personal shopper, a catwalk and a dry cleaner.
We ask you to make your ideal composition for each of the departments.

Question 9:

Suppose you may compose a fashion department of approximately 1,500 m2. Which components from the following list would you currently choose? The floor spaces do not necessarily need summing up to exactly 1,500 m2, anywhere between 1,250 and 1,750 m2 will do.

No.	Possible choices	Sq. meters	In composition (yes/no)
1	Baby and child	400 m^2	
2	Apparel (ladies & men)	800 m^2	
3	Lingerie and underwear	200 m^2	
4	Shoes	300 m^2	
5	Jewellery & watches	200 m^2	
6	Fashion accessories	200 m^2	
7	Room for a personal shopper	50 m^2	
8	Catwalk (for fashion shows)	50 m^2	
9	Virtual fitting rooms (projection screens)	50 m^2	
10	Clothing reparation	50 m^2	
11	Dry cleaning	100 m^2	
	Total		

Question 10:

Suppose you may compose a food department of approximately 1,500 m2. Which components from the following list would you currently choose? The floor spaces do not necessarily need summing up to exactly 1,500 m2, anywhere between 1,250 and 1,750 m2 will do.

No.	Possible choices	Sq. meters	In composition (yes/no)
1	Bakery	200 m^2	
2	Butchery	200 m^2	
3	Fish department	200 m^2	
4	Vegetables and fruit	200 m^2	
5	Liquor store	200 m^2	
6	Delicatessens (sausage, cheese etc.)	200 m^2	
7	Sweets	100 m^2	
8	Patisserie	100 m^2	
9	Supermarket	800 m^2	
10	Restaurant	500 m^2	
11	Bar	300 m^2	
	Total		

Question 11:

Suppose you may compose a beauty department of approximately 1,500 m2. Which components from the following list would you currently choose? The floor spaces do not necessarily need summing up to exactly 1,500 m2, anywhere between 1,250 and 1,750 m2 will do.

No.	Possible choices	Sq. meters	In composition (yes/no)
1	Perfumes	400 m^2	
2	Drugstore	300 m^2	
3	Makeup	300 m^2	
4	Visagie	100 m^2	
5	Hair dresser	100 m^2	
6	Beauty & Wellness (Spa)	800 m^2	
7	Optician	300 m^2	
8	Hearing care	300 m^2	
9	Pharmacy	300 m^2	
	Total		

Question 12:

Suppose you may compose a living department of approximately 1,500 m2. Which components from the following list would you currently choose? The floor spaces do not necessarily need summing up to exactly 1,500 m2, anywhere between 1,250 and 1,750 m2 will do.

No.	Possible choices	Sq. meters	In composition (yes/no)
1	Furniture	800 m^2	
2	Home decoration	400 m^2	
3	Garden	200 m^2	
4	Pets	100 m^2	
5	Do-it-yourself	400 m^2	
6	Florist	50 m^2	
7	Books & magazines	400 m^2	
8	Toys and gifts	400 m^2	
9	Furnishing advice	50 m^2	
10	Gift wrapping	50 m^2	
11	Photo printing (album, art etc.)	50 m^2	
12	Space for workshops (hobbies)	100 m^2	
	Total		

Question 13:

Suppose you may compose an electronics department of approximately 1,500 m2. Which components from the following list would you currently choose? The floor spaces do not necessarily need summing up to exactly 1,500 m2, anywhere between 1,250 and 1,750 m2 will do.

No.	Possible choices	Sq. meters	In composition (yes/no)
1	Computers	200 m^2	
2	Telecom and navigation	100 m^2	
3	Vision and sound	300 m^2	
4	Photography	100 m^2	
5	Appliances	500 m^2	
6	Electric tools	200 m^2	
7	Kitchen	200 m^2	
8	Personal care	200 m^2	
9	Music, movies and games	500 m^2	
10	Cinema	300 m^2	
11	Tutorials/demonstrations devices	200 m^2	
12	Installation of devices	100 m^2	
	Total		

Question 14:

Suppose you may compose an active/outdoor department of approximately 1,500 m2. Which components from the following list would you currently choose? The floor spaces do not necessarily need summing up to exactly 1,500 m2, anywhere between 1,250 and 1,750 m2 will do.

No.	Possible choices	Sq. meters	In composition (yes/no)
1	Sports	600 m^2	
2	Outdoor (cycling, hiking, camping etc.)	600 m^2	
3	Traveling (bags, suitcases)	300 m^2	
4	Travel agency	200 m^2	
5	Playground	300 m^2	
6	Test space for different sport items	400 m^2	
	Total		

Part III: Preference of department stores

In this part of the survey you will be presented multiple times two imaginary department stores. There are 6 different kinds of departments possible. However, in each department store is room for only 4 different departments. The 2 presented department stores differ in departments. You can assume that the departments are provided with all your wishes. Each time we would like you to choose the department store of your preference. If you really don´t have a preference, you can choose the option 'none of the above'.

We're now going to present you 7 of these choices.

Question 15:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Food
Beauty
Living

vs.

Dept. store 2
Beauty
Living
Electronics
Active/outdoor

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Question 16:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Food
Beauty
Electronics

vs.

Dept. store 2
Food
Living
Active/outdoor
Electronics

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Question 17:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Food
Beauty
Active/outdoor

vs.

Dept. store 2
Food
Beauty
Electronics
Active/outdoor

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Question 18:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Food
Living
Electronics

vs.

Dept. store 2
Food
Beauty
Living
Active/outdoor

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Question 19:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Food
Living
Active/outdoor

vs.

Dept. store 2
Food
Beauty
Living
Electronics

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Question 20:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Food
Electronics
Active/outdoor

vs.

Dept. store 2
Fashion
Electronics
Active/outdoor
Living

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Question 21:

Which of the 2 department stores below would you prefer to visit? (The department stores do not differ from each other on other characteristics).

Dept. store 1
Fashion
Beauty
Living
Electronics

vs.

Dept. store 2
Fashion
Beauty
Electronics
Active/outdoor

Your preference:

- ☐ Department store 1
- ☐ Department store 2
- ☐ None of the above

Part IV: The layout of the department store

To conclude this survey, we ask you to indicate at what floor you would like to see a certain department. We repeat this question three times, each time for a different combination of departments.

Question 22:

Suppose a department store has the following four departments:

- Fashion
- Food
- Beauty
- Living

How would you allocate these different departments to the floors of the department store?

Department store

Floor	**Department**
3rd floor	
2nd floor	
1st floor	
Ground floor	

Question 23:

Suppose a department store has the following four departments:

- Beauty
- Living
- Electronics
- Active/outdoor

How would you allocate these different departments to the floors of the department store?

Department store

Floor	**Department**
3rd floor	
2nd floor	
1st floor	
Ground floor	

Question 24:

Suppose a department store has the following four departments:

- Fashion
- Food
- Electronics
- Active/outdoor

How would you allocate these different departments to the floors of the department store?

Department store

Floor	**Department**
3rd floor	
2nd floor	
1st floor	
Ground floor	

Question 25:

Suppose you go shopping and you are in need of some products that are available at the six possible departments (Fashion, Food, Beauty, Living, Electronics, Active/outdoor). Would you rather go to a department store or would you rather go to various specialty stores elsewhere in the shopping area?

☐ Preferably, to the department store

☐ Preferably, to the specialty stores

☐ Both to the department store as to the specialty stores

Thank you for your cooperation.

Appendix III: Output of NLOGIT

NLOGIT Output, associated with section 5.1.1

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2797.32503
Estimation based on N =   3493, K =   6
Inf.Cr.AIC  =   5606.7 AIC/N =    1.605
Model estimated: Jun 16, 2016, 18:40:59
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
              Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  3493, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X0	-1.75820***	.19072	-9.22	.0000	-2.13201	-1.38439
X1	.63579***	.06647	9.56	.0000	.50551	.76607
X2	.30940***	.06504	4.76	.0000	.18192	.43687
X3	-.20186***	.06486	-3.11	.0019	-.32899	-.07473
X4	.25685***	.06531	3.93	.0001	.12885	.38485
X5	.17226***	.06522	2.64	.0083	.04443	.30010

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

NLOGIT Output, associated with section 5.1.2

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2722.22650
Estimation based on N =   3493, K =  12
Inf.Cr.AIC  =   5468.5 AIC/N =    1.566
Model estimated: Jun 17, 2016, 15:35:39
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
              Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  3493, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X0	-1.74118***	.19383	-8.98	.0000	-2.12108	-1.36127
X1	.64731***	.06832	9.48	.0000	.51341	.78120
X2	.31744***	.06626	4.79	.0000	.18757	.44731
X3	-.21713***	.06666	-3.26	.0011	-.34778	-.08647
X4	.26548***	.06670	3.98	.0001	.13475	.39622
X5	.18344***	.06632	2.77	.0057	.05345	.31342
Z0	-.63963***	.19383	-3.30	.0010	-1.01953	-.25973
Z1	-.45504***	.06832	-6.66	.0000	-.58894	-.32115
Z2	-.17002**	.06626	-2.57	.0103	-.29989	-.04014
Z3	-.42310***	.06666	-6.35	.0000	-.55376	-.29245
Z4	-.25242***	.06670	-3.78	.0002	-.38315	-.12168
Z5	.21805***	.06632	3.29	.0010	.08807	.34804

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

NLOGIT Output, associated with section 5.1.3

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2768.76066
Estimation based on N =   3472, K =  12
Inf.Cr.AIC  =   5561.5 AIC/N =    1.602
Model estimated: Jun 20, 2016, 11:13:59
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
               Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  3472, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X0	-1.83134***	.19796	-9.25	.0000	-2.21934	-1.44335
X1	.64026***	.06871	9.32	.0000	.50558	.77493
X2	.31014***	.06716	4.62	.0000	.17850	.44178
X3	-.24031***	.06729	-3.57	.0004	-.37219	-.10842
X4	.25765***	.06731	3.83	.0001	.12573	.38956
X5	.15237**	.06743	2.26	.0238	.02021	.28454
Z0	.23867	.25934	.92	.3574	-.26962	.74697
Z1	-.01248	.08963	-.14	.8893	-.18815	.16319
Z2	-.03772	.08845	-.43	.6698	-.21108	.13563
Z3	.19017**	.08779	2.17	.0303	.01810	.36225
Z4	-.03599	.08845	-.41	.6841	-.20935	.13738
Z5	.09624	.08802	1.09	.2742	-.07628	.26876

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

NLOGIT Output, associated with section 5.1.4

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2693.36971
Estimation based on N =   3472, K =  18
Inf.Cr.AIC  =   5422.7 AIC/N =    1.562
Model estimated: Jun 20, 2016, 14:17:58
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
               Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  3472, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X0	-1.81535***	.20105	-9.03	.0000	-2.20941	-1.42129
X1	.65150***	.07059	9.23	.0000	.51314	.78986
X2	.31763***	.06839	4.64	.0000	.18358	.45168
X3	-.25898***	.06920	-3.74	.0002	-.39462	-.12334
X4	.26834***	.06870	3.91	.0001	.13370	.40298
X5	.16543**	.06860	2.41	.0159	.03097	.29988
Z0	-.67066***	.19502	-3.44	.0006	-1.05289	-.28842
Z1	-.45509***	.06861	-6.63	.0000	-.58957	-.32062
Z2	-.18054***	.06660	-2.71	.0067	-.31107	-.05001
Z3	-.42927***	.06707	-6.40	.0000	-.56072	-.29781
Z4	-.25922***	.06703	-3.87	.0001	-.39059	-.12786
Z5	.22044***	.06677	3.30	.0010	.08958	.35130
W0	.22104	.26312	.84	.4009	-.29467	.73674
W1	-.02506	.09187	-.27	.7850	-.20512	.15500
W2	-.04913	.09002	-.55	.5852	-.22556	.12730
W3	.19432**	.09028	2.15	.0314	.01737	.37127
W4	-.06256	.09026	-.69	.4882	-.23947	.11435
W5	.10563	.08945	1.18	.2376	-.06968	.28094

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

NLOGIT Output, associated with section 5.2.1

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -4613.34880
Estimation based on N =   4869, K =  15
Inf.Cr.AIC  =   9256.7 AIC/N =    1.901
Model estimated: Jul 12, 2016, 17:29:30
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
               Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  4869, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X1A	.90533***	.09598	9.43	.0000	.71721	1.09346
X1B	1.49639***	.09359	15.99	.0000	1.31295	1.67984
X1C	.10933	.10745	1.02	.3089	-.10127	.31993
X1D	-.10152	.11275	-.90	.3679	-.32250	.11946
X1E	-.52629***	.12578	-4.18	.0000	-.77280	-.27977
X2A	1.59752***	.10843	14.73	.0000	1.38500	1.81004
X2B	.51989***	.12499	4.16	.0000	.27491	.76487
X2C	.80754***	.10236	7.89	.0000	.60691	1.00817
X2D	.66304***	.10315	6.43	.0000	.46087	.86521
X2E	.60750***	.10179	5.97	.0000	.40799	.80700
X3A	.77269***	.14084	5.49	.0000	.49665	1.04873
X3B	-.34637***	.13228	-2.62	.0088	-.60563	-.08710
X3C	.60624***	.10818	5.60	.0000	.39421	.81827
X3D	.80705***	.10211	7.90	.0000	.60692	1.00717
X3E	.73623***	.09687	7.60	.0000	.54637	.92610

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

NLOGIT Output, associated with section 5.2.2

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -4570.54385
Estimation based on N =   4869, K =  30
Inf.Cr.AIC  =   9201.1 AIC/N =    1.890
Model estimated: Jul 12, 2016, 17:30:26
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
               Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  4869, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X1A	.90557***	.09658	9.38	.0000	.71629	1.09486
X1B	1.50305***	.09416	15.96	.0000	1.31849	1.68761
X1C	.07995	.10964	.73	.4658	-.13493	.29483
X1D	-.09591	.11333	-.85	.3974	-.31803	.12621
X1E	-.58326***	.13142	-4.44	.0000	-.84084	-.32567
X2A	1.59081***	.10898	14.60	.0000	1.37721	1.80440
X2B	.50643***	.12553	4.03	.0001	.26039	.75247
X2C	.78759***	.10316	7.63	.0000	.58540	.98978
X2D	.66623***	.10333	6.45	.0000	.46370	.86875
X2E	.61652***	.10213	6.04	.0000	.41635	.81669
X3A	.78829***	.14360	5.49	.0000	.50684	1.06974
X3B	-.33993**	.13295	-2.56	.0106	-.60050	-.07935
X3C	.60504***	.10915	5.54	.0000	.39110	.81897
X3D	.82738***	.10314	8.02	.0000	.62523	1.02953
X3E	.76455***	.09865	7.75	.0000	.57119	.95791
Z1A	-.25992***	.09658	-2.69	.0071	-.44921	-.07063
Z1B	-.25873***	.09416	-2.75	.0060	-.44328	-.07417
Z1C	-.41016***	.10964	-3.74	.0002	-.62504	-.19528
Z1D	-.18630	.11333	-1.64	.1002	-.40843	.03582
Z1E	.26439**	.13142	2.01	.0442	.00681	.52198
Z2A	-.37118***	.10898	-3.41	.0007	-.58478	-.15759
Z2B	.02299	.12553	.18	.8547	-.22305	.26903
Z2C	-.36098***	.10316	-3.50	.0005	-.56317	-.15879
Z2D	-.10794	.10333	-1.04	.2962	-.31047	.09458
Z2E	-.00336	.10213	-.03	.9737	-.20353	.19681
Z3A	-.36138**	.14360	-2.52	.0119	-.64283	-.07993
Z3B	.08746	.13295	.66	.5106	-.17312	.34803
Z3C	-.21491**	.10915	-1.97	.0490	-.42884	-.00097
Z3D	.04454	.10314	.43	.6659	-.15761	.24668
Z3E	.08586	.09865	.87	.3841	-.10749	.27922

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

NLOGIT Output, associated with section 5.2.3

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -4584.90168
Estimation based on N =   4869, K =  30
Inf.Cr.AIC  =   9229.8 AIC/N =    1.896
Model estimated: Jul 12, 2016, 17:31:47
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
              Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  4869, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X1A	.90635***	.10039	9.03	.0000	.70958	1.10312
X1B	1.56353***	.09775	16.00	.0000	1.37195	1.75511
X1C	.09584	.11310	.85	.3968	-.12584	.31752
X1D	-.07859	.11699	-.67	.5017	-.30788	.15070
X1E	-.54966***	.13362	-4.11	.0000	-.81155	-.28777
X2A	1.64374***	.11315	14.53	.0000	1.42197	1.86551
X2B	.66660***	.13193	5.05	.0000	.40802	.92518
X2C	.83394***	.10795	7.73	.0000	.62237	1.04552
X2D	.75048***	.10832	6.93	.0000	.53817	.96279
X2E	.64602***	.10733	6.02	.0000	.43565	.85638
X3A	.78262***	.14265	5.49	.0000	.50302	1.06221
X3B	-.32525**	.14403	-2.26	.0239	-.60753	-.04296
X3C	.62329***	.10938	5.70	.0000	.40891	.83766
X3D	.85557***	.10616	8.06	.0000	.64749	1.06364
X3E	.73284***	.09832	7.45	.0000	.54013	.92554
W1A	-.00466	.13249	-.04	.9719	-.26434	.25502
W1B	-.40820***	.12950	-3.15	.0016	-.66201	-.15439
W1C	.04981	.14904	.33	.7382	-.24230	.34192
W1D	-.13631	.15540	-.88	.3804	-.44090	.16827
W1E	.08523	.17567	.49	.6276	-.25909	.42954
W2A	-.19538	.14829	-1.32	.1876	-.48601	.09526
W2B	-.67030***	.17511	-3.83	.0001	-1.01351	-.32709
W2C	-.07542	.14212	-.53	.5956	-.35397	.20312
W2D	-.49547***	.14314	-3.46	.0005	-.77601	-.21493
W2E	-.16215	.14150	-1.15	.2518	-.43948	.11518
W3A	-.07447	.18805	-.40	.6921	-.44304	.29409
W3B	-.13189	.19199	-.69	.4921	-.50818	.24441
W3C	-.13718	.14580	-.94	.3468	-.42295	.14859
W3D	-.24317*	.13984	-1.74	.0820	-.51725	.03091
W3E	-.01168	.13199	-.09	.9295	-.27038	.24701

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

NLOGIT Output, associated with section 5.2.4

```
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -4542.00106
Estimation based on N =   4869, K =  45
Inf.Cr.AIC  =   9174.0 AIC/N =    1.884
Model estimated: Jul 12, 2016, 17:32:06
R2=1-LogL/LogL* Log-L fncn R-sqrd R2Adj
Constants only must be computed directly
              Use NLOGIT ;...;RHS=ONE$
Response data are given as ind. choices
Number of obs.=  4869, skipped    0 obs
```

ICH	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
X1A	.90608***	.10096	8.97	.0000	.70821	1.10396
X1B	1.57035***	.09824	15.98	.0000	1.37780	1.76290
X1C	.06430	.11537	.56	.5773	-.16182	.29041
X1D	-.07300	.11756	-.62	.5346	-.30340	.15741
X1E	-.60186***	.13860	-4.34	.0000	-.87352	-.33021
X2A	1.63744***	.11360	14.41	.0000	1.41479	1.86009
X2B	.65080***	.13242	4.91	.0000	.39126	.91033
X2C	.81097***	.10876	7.46	.0000	.59781	1.02414
X2D	.75370***	.10849	6.95	.0000	.54105	.96634
X2E	.65510***	.10760	6.09	.0000	.44420	.86600
X3A	.79712***	.14553	5.48	.0000	.51188	1.08236
X3B	-.31841**	.14477	-2.20	.0278	-.60215	-.03467
X3C	.62091***	.11032	5.63	.0000	.40469	.83714
X3D	.87639***	.10735	8.16	.0000	.66599	1.08679
X3E	.76135***	.10021	7.60	.0000	.56494	.95776
Z1A	-.26246***	.09667	-2.71	.0066	-.45194	-.07298
Z1B	-.26356***	.09461	-2.79	.0053	-.44900	-.07812
Z1C	-.41447***	.10977	-3.78	.0002	-.62961	-.19934
Z1D	-.18985*	.11342	-1.67	.0941	-.41214	.03244
Z1E	.26233**	.13153	1.99	.0461	.00454	.52012
Z2A	-.36978***	.10943	-3.38	.0007	-.58427	-.15530
Z2B	.01324	.12670	.10	.9168	-.23509	.26156
Z2C	-.36646***	.10365	-3.54	.0004	-.56961	-.16331
Z2D	-.09669	.10394	-.93	.3522	-.30041	.10702
Z2E	-.00310	.10247	-.03	.9758	-.20394	.19774
Z3A	-.36013**	.14390	-2.50	.0123	-.64217	-.07808
Z3B	.08479	.13306	.64	.5240	-.17600	.34557
Z3C	-.21910**	.10943	-2.00	.0453	-.43358	-.00462
Z3D	.04751	.10343	.46	.6460	-.15521	.25023
Z3E	.07727	.09886	.78	.4345	-.11650	.27103
W1A	-.00200	.13245	-.02	.9880	-.26159	.25760
W1B	-.41121***	.12940	-3.18	.0015	-.66482	-.15760
W1C	.05818	.15002	.39	.6982	-.23586	.35221
W1D	-.13757	.15537	-.89	.3759	-.44209	.16695
W1E	.06687	.17504	.38	.7025	-.27620	.40994
W2A	-.19451	.14829	-1.31	.1896	-.48516	.09614
W2B	-.66014***	.17496	-3.77	.0002	-1.00306	-.31721
W2C	-.05675	.14272	-.40	.6909	-.33647	.22298
W2D	-.49421***	.14299	-3.46	.0005	-.77448	-.21395
W2E	-.16176	.14136	-1.14	.2525	-.43881	.11530
W3A	-.06994	.18987	-.37	.7126	-.44208	.30220
W3B	-.13360	.19268	-.69	.4881	-.51125	.24404
W3C	-.12470	.14663	-.85	.3951	-.41209	.16269
W3D	-.24588*	.14061	-1.75	.0803	-.52147	.02970
W3E	-.02512	.13277	-.19	.8499	-.28536	.23511

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

Appendix IV: Probabilities of dept. store floor compositions

In this appendix for every second column applies the following:

A=Fashion, B=Food, C=Beauty, D=Living, E=Electronics, F=Active/outdoor
1=Ground Floor, 2=First Floor, 3= Second Floor, 4= Third Floor

Also: Pi = the probability that this floor composition will be chosen

Probabilities of department store floor compositions in general Part I																
Rank	ABCD	Pi	ABCE	Pi	ABCF	Pi	ABDE	Pi	ABDF	Pi	ABEF	Pi	ACDE	Pi	ACDF	Pi
1	2143	0,1488	2143	0,1527	2134	0,1952	2134	0,1536	2134	0,2166	2134	0,2249	1234	0,0942	1234	0,1352
2	2134	0,1217	2134	0,1341	2143	0,1065	2143	0,1431	2143	0,0966	2143	0,1077	1243	0,0877	1324	0,1095
3	1423	0,0804	1423	0,0843	3124	0,0937	1423	0,0770	3124	0,0842	3124	0,0846	1423	0,0838	2134	0,0792
4	1432	0,0661	1432	0,0667	1423	0,0738	1432	0,0741	1234	0,0696	1234	0,0730	1432	0,0819	2314	0,0714
5	4123	0,0624	3124	0,0663	1234	0,0611	3124	0,0593	1423	0,0680	1423	0,0690	1324	0,0736	1243	0,0603
6	3124	0,0603	4123	0,0639	1324	0,0522	4123	0,0572	2431	0,0491	2431	0,0512	1342	0,0670	1423	0,0597
7	3142	0,0575	3142	0,0577	2431	0,0450	4132	0,0561	1324	0,0481	1324	0,0488	2134	0,0579	2431	0,0544
8	2413	0,0491	2413	0,0512	4123	0,0432	3142	0,0542	1432	0,0455	1432	0,0479	2413	0,0576	1432	0,0479
9	4132	0,0487	4132	0,0489	2413	0,0425	2413	0,0512	2413	0,0425	4123	0,0390	2143	0,0540	2341	0,0445
10	2431	0,0450	1243	0,0451	1432	0,0405	1234	0,0462	4123	0,0389	1243	0,0350	2314	0,0506	1342	0,0392
11	1243	0,0436	1234	0,0396	1243	0,0333	1243	0,0431	4132	0,0322	3142	0,0343	2431	0,0348	2413	0,0389
12	1234	0,0357	1324	0,0286	3142	0,0331	2431	0,0304	3142	0,0312	4132	0,0330	2341	0,0284	2143	0,0353
13	1342	0,0255	2431	0,0279	2314	0,0300	1324	0,0261	1243	0,0311	2413	0,0263	3214	0,0250	3214	0,0343
14	1324	0,0254	1342	0,0257	4132	0,0280	1342	0,0234	2314	0,0300	3421	0,0192	4213	0,0241	3124	0,0308
15	3421	0,0213	3412	0,0192	3421	0,0213	3412	0,0192	3421	0,0191	2314	0,0186	3124	0,0224	4231	0,0228
16	3412	0,0191	2314	0,0173	2341	0,0174	2314	0,0173	3214	0,0169	2341	0,0173	3412	0,0218	3241	0,0221
17	2341	0,0174	3421	0,0132	3214	0,0169	3214	0,0119	2341	0,0155	1342	0,0162	4123	0,0216	3421	0,0210
18	2314	0,0155	3214	0,0119	1342	0,0156	3421	0,0118	1342	0,0144	3241	0,0119	4132	0,0212	4321	0,0178
19	3241	0,0115	4213	0,0114	3241	0,0115	4213	0,0114	4231	0,0112	4231	0,0114	3142	0,0204	4213	0,0158
20	4213	0,0112	2341	0,0107	3412	0,0111	2341	0,0096	3412	0,0111	3214	0,0105	4312	0,0184	4123	0,0142
21	3214	0,0108	3241	0,0071	4231	0,0097	4231	0,0069	3241	0,0108	3412	0,0069	4231	0,0146	3412	0,0121
22	4231	0,0097	4312	0,0063	4213	0,0078	3241	0,0067	4213	0,0078	4321	0,0063	3241	0,0141	4132	0,0118
23	4321	0,0070	4231	0,0060	4321	0,0070	4312	0,0063	4321	0,0062	4213	0,0048	3421	0,0134	3142	0,0114
24	4312	0,0062	4321	0,0043	4312	0,0036	4321	0,0039	4312	0,0036	4312	0,0022	4321	0,0114	4312	0,0102

Probabilities of department store floor compositions in general, Part II															
Rank	ACEF	Pi	ADEF	Pi	BCDE	Pi	BCDF	Pi	BCEF	Pi	BDEF	Pi	CDEF	Pi	
1	1234	0,1458	1234	0,1342	1234	0,1221	1234	0,1789	1234	0,1890	1234	0,1739	2134	0,0832	
2	1324	0,1142	1324	0,1298	1243	0,1137	1324	0,1449	1324	0,1480	1324	0,1682	1234	0,0765	
3	2134	0,0848	2134	0,0848	1423	0,1086	1243	0,0798	1243	0,0905	1243	0,0833	1324	0,0740	
4	1243	0,0698	1243	0,0643	1432	0,1062	1423	0,0790	1423	0,0807	1423	0,0750	3124	0,0651	
5	1423	0,0623	2341	0,0579	1324	0,0954	1432	0,0635	1432	0,0664	1342	0,0686	2341	0,0537	
6	2431	0,0576	1423	0,0579	1342	0,0869	1342	0,0519	1342	0,0583	1432	0,0639	2431	0,0500	
7	1432	0,0512	2431	0,0540	4213	0,0412	4231	0,0389	4231	0,0412	4231	0,0376	2314	0,0492	
8	2341	0,0506	1342	0,0529	4123	0,0376	4213	0,0357	2134	0,0357	4321	0,0362	4231	0,0478	
9	2314	0,0456	2314	0,0506	4132	0,0362	2134	0,0337	4123	0,0337	2134	0,0357	4321	0,0467	
10	1342	0,0450	1432	0,0493	4312	0,0326	4123	0,0329	4321	0,0326	4123	0,0337	3241	0,0420	
11	2143	0,0406	2143	0,0406	4231	0,0243	4321	0,0320	3124	0,0239	3124	0,0239	3214	0,0399	
12	3124	0,0319	3124	0,0319	2134	0,0226	2314	0,0296	4132	0,0234	4132	0,0234	2143	0,0398	
13	3241	0,0250	2413	0,0226	2413	0,0220	3214	0,0253	4213	0,0223	2341	0,0226	3421	0,0382	
14	2413	0,0249	3241	0,0224	2143	0,0211	3124	0,0233	2431	0,0220	2314	0,0211	1243	0,0366	
15	4231	0,0241	4231	0,0216	4321	0,0200	4132	0,0220	2341	0,0193	2431	0,0211	4123	0,0355	
16	3214	0,0219	4321	0,0212	2314	0,0193	2431	0,0211	2314	0,0185	4213	0,0206	1423	0,0330	
17	3421	0,0218	3421	0,0204	3214	0,0140	4312	0,0196	2143	0,0171	2143	0,0171	1342	0,0302	
18	4321	0,0184	3214	0,0197	2431	0,0132	2341	0,0173	3214	0,0158	3214	0,0146	4132	0,0292	
19	4123	0,0147	4123	0,0147	3124	0,0127	2413	0,0161	3241	0,0140	4312	0,0138	1432	0,0281	
20	3142	0,0129	3142	0,0129	3412	0,0126	2143	0,0150	3421	0,0126	3241	0,0127	3142	0,0256	
21	4132	0,0125	4132	0,0125	3142	0,0114	3421	0,0123	4312	0,0123	3421	0,0114	2413	0,0220	
22	4213	0,0101	4213	0,0091	2341	0,0108	3241	0,0123	2413	0,0101	2413	0,0094	4213	0,0217	
23	3412	0,0077	4312	0,0075	3421	0,0077	3412	0,0076	3142	0,0079	3142	0,0079	4312	0,0175	
24	4312	0,0065	3412	0,0073	3241	0,0077	3142	0,0070	3412	0,0047	3412	0,0043	3412	0,0143	

Probabilities of department store floor compositions for males, Part I																
Rank	ABCD	Pi	ABCE	Pi	ABCF	Pi	ABDE	Pi	ABDF	Pi	ABEF	Pi	ACDE	Pi	ACDF	Pi
1	2143	0,1477	2143	0,1519	2134	0,1681	2134	0,1186	2134	0,1750	2134	0,1809	1423	0,0960	1324	0,1081
2	2134	0,0954	2134	0,1044	2143	0,1138	2143	0,1115	3124	0,0875	3124	0,0878	1432	0,0937	1234	0,0994
3	3142	0,0711	3142	0,0714	3124	0,0772	4123	0,0772	2143	0,0765	2143	0,0842	2413	0,0690	2314	0,0746
4	1432	0,0693	1432	0,0699	1234	0,0639	4132	0,0754	1234	0,0648	1234	0,0674	1324	0,0660	1423	0,0732
5	4132	0,0686	4132	0,0688	1423	0,0579	1423	0,0719	1423	0,0639	1423	0,0644	1234	0,0658	2431	0,0656
6	4123	0,0658	4123	0,0677	4123	0,0504	1432	0,0695	4123	0,0571	4123	0,0573	1243	0,0618	1432	0,0566
7	1423	0,0616	1423	0,0643	2431	0,0493	3124	0,0551	2431	0,0501	2431	0,0519	1342	0,0605	2134	0,0540
8	1243	0,0531	1243	0,0549	1432	0,0436	2413	0,0519	1324	0,0455	1324	0,0459	2431	0,0507	2413	0,0505
9	2431	0,0493	3124	0,0483	1243	0,0433	3142	0,0505	4132	0,0445	4132	0,0457	2314	0,0474	1243	0,0435
10	3124	0,0441	1234	0,0378	3142	0,0424	1234	0,0421	2413	0,0444	1432	0,0447	2134	0,0375	2341	0,0423
11	2413	0,0348	2431	0,0373	1324	0,0412	1243	0,0395	1432	0,0428	2413	0,0335	2143	0,0353	1342	0,0366
12	1234	0,0343	2413	0,0362	4132	0,0408	2431	0,0378	2314	0,0316	3142	0,0326	2341	0,0327	3214	0,0343
13	1342	0,0334	1342	0,0337	2413	0,0308	3412	0,0258	3142	0,0298	1243	0,0314	3412	0,0324	3421	0,0316
14	2341	0,0238	1324	0,0213	2341	0,0238	1324	0,0238	1243	0,0283	3421	0,0258	4312	0,0312	4321	0,0304
15	3421	0,0226	3412	0,0180	3421	0,0226	1342	0,0216	3421	0,0258	2314	0,0238	4213	0,0307	4231	0,0292
16	1324	0,0192	2341	0,0180	2314	0,0220	4213	0,0198	3214	0,0225	4231	0,0198	3421	0,0244	3124	0,0270
17	3241	0,0182	3421	0,0171	1342	0,0210	3421	0,0194	4231	0,0193	2341	0,0172	4123	0,0244	2143	0,0236
18	3412	0,0179	3241	0,0138	3241	0,0182	2314	0,0172	2341	0,0156	3214	0,0170	4132	0,0238	4213	0,0224
19	4231	0,0176	4213	0,0138	4231	0,0176	4231	0,0145	3412	0,0153	1342	0,0148	4321	0,0235	3241	0,0196
20	4213	0,0134	4231	0,0133	3214	0,0156	3214	0,0141	4213	0,0147	3241	0,0141	4231	0,0226	3412	0,0188
21	2314	0,0108	2314	0,0120	3412	0,0106	4312	0,0120	1342	0,0133	4321	0,0120	3214	0,0219	4312	0,0181
22	4321	0,0105	3214	0,0098	4321	0,0105	2341	0,0118	3241	0,0129	3412	0,0116	3124	0,0174	4123	0,0176
23	3214	0,0090	4312	0,0084	4213	0,0102	3241	0,0097	4321	0,0120	4213	0,0111	3142	0,0160	4132	0,0137
24	4312	0,0083	4321	0,0079	4312	0,0049	4321	0,0090	4312	0,0071	4312	0,0054	3241	0,0151	3142	0,0092

Probabilities of department store floor compositions for males, Part II															
Rank	ACEF	Pi	ADEF	Pi	BCDE	Pi	BCDF	Pi	BCEF	Pi	BDEF	Pi	CDEF	Pi	
1	1324	0,1118	1234	0,1139	1423	0,1281	1324	0,1466	1324	0,1492	1234	0,1550	3124	0,0743	
2	1234	0,1058	1324	0,1106	1432	0,1250	1234	0,1347	1234	0,1412	1324	0,1504	2134	0,0703	
3	1423	0,0757	2134	0,0799	1324	0,0880	1423	0,0992	1423	0,1010	1243	0,0721	4231	0,0638	
4	2431	0,0690	2314	0,0584	1234	0,0877	1432	0,0767	1432	0,0800	1423	0,0658	4321	0,0623	
5	1432	0,0600	1243	0,0530	1243	0,0824	1243	0,0589	1243	0,0657	1342	0,0601	3214	0,0556	
6	2314	0,0577	2341	0,0524	1342	0,0808	1342	0,0496	1342	0,0550	1432	0,0565	1234	0,0542	
7	2134	0,0572	2431	0,0493	4312	0,0423	4321	0,0417	4321	0,0423	4231	0,0432	1324	0,0526	
8	1243	0,0493	1423	0,0484	4213	0,0389	2314	0,0385	4231	0,0389	4321	0,0418	2314	0,0510	
9	2341	0,0474	1342	0,0442	2413	0,0333	4231	0,0371	2431	0,0333	2134	0,0405	4123	0,0503	
10	1342	0,0412	1432	0,0416	4321	0,0317	4213	0,0348	2314	0,0293	4123	0,0387	3241	0,0439	
11	2413	0,0391	3124	0,0388	4123	0,0303	2431	0,0320	2134	0,0284	2314	0,0294	2341	0,0437	
12	3421	0,0324	2143	0,0372	4132	0,0293	2134	0,0271	4123	0,0272	4213	0,0290	2431	0,0411	
13	4321	0,0312	4231	0,0341	4231	0,0282	4123	0,0267	4213	0,0265	3124	0,0276	3421	0,0402	
14	4231	0,0307	4321	0,0333	2431	0,0243	4312	0,0263	2341	0,0229	4132	0,0269	4132	0,0399	
15	3124	0,0277	3214	0,0292	2314	0,0229	2413	0,0260	3421	0,0204	2341	0,0253	4213	0,0376	
16	2143	0,0266	2413	0,0255	3412	0,0204	3214	0,0248	4312	0,0200	2431	0,0238	2143	0,0327	
17	3214	0,0265	4123	0,0253	2134	0,0177	2341	0,0207	2413	0,0198	3214	0,0206	4312	0,0291	
18	3241	0,0219	3241	0,0243	2143	0,0167	3421	0,0201	3124	0,0193	4312	0,0194	3142	0,0274	
19	4123	0,0181	3421	0,0223	2341	0,0157	3124	0,0190	3214	0,0189	2143	0,0188	1243	0,0252	
20	4213	0,0173	4132	0,0202	3421	0,0153	4132	0,0179	4132	0,0189	3241	0,0143	1423	0,0230	
21	3412	0,0145	4213	0,0190	3214	0,0129	3412	0,0127	2143	0,0132	3421	0,0130	2413	0,0223	
22	4132	0,0144	4312	0,0148	3124	0,0100	2143	0,0119	3241	0,0129	2413	0,0129	1342	0,0210	
23	4312	0,0140	3142	0,0144	3142	0,0091	3241	0,0115	3412	0,0096	3142	0,0089	1432	0,0198	
24	3142	0,0103	3412	0,0099	3241	0,0088	3142	0,0056	3142	0,0062	3412	0,0060	3412	0,0188	

Probabilities of department store floor compositions for females, Part I																
Rank	ABCD	Pi	ABCE	Pi	ABCF	Pi	ABDE	Pi	ABDF	Pi	ABEF	Pi	ACDE	Pi	ACDF	Pi
1	2143	0,1475	2134	0,1601	2134	0,2212	2134	0,1871	2134	0,2597	2134	0,2711	1234	0,1221	1234	0,1719
2	2134	0,1464	2143	0,1515	3124	0,1073	2143	0,1758	2143	0,1136	2143	0,1262	1243	0,1148	2134	0,1104
3	1423	0,0990	1423	0,1040	2143	0,0974	1423	0,0822	3124	0,0776	3124	0,0786	2134	0,0824	1324	0,1058
4	3124	0,0756	3124	0,0822	1423	0,0882	1432	0,0794	1234	0,0729	1234	0,0770	2143	0,0774	1243	0,0752
5	2413	0,0661	2413	0,0691	1324	0,0628	3124	0,0591	1423	0,0718	1423	0,0736	1324	0,0751	2314	0,0653
6	1432	0,0610	1432	0,0619	2413	0,0555	3142	0,0548	1324	0,0511	1324	0,0524	1423	0,0711	2143	0,0483
7	4123	0,0548	4123	0,0560	1234	0,0551	2413	0,0481	1432	0,0482	1432	0,0511	1432	0,0698	1423	0,0466
8	3142	0,0468	3142	0,0472	2314	0,0395	1234	0,0480	2431	0,0459	2431	0,0481	1342	0,0693	2431	0,0435
9	2431	0,0393	1234	0,0374	2431	0,0393	1243	0,0452	2413	0,0385	1243	0,0358	2314	0,0491	2341	0,0432
10	1243	0,0342	1243	0,0354	1432	0,0364	4123	0,0402	1243	0,0319	3142	0,0332	2413	0,0464	1432	0,0393
11	1234	0,0340	1324	0,0344	4123	0,0340	4132	0,0397	3142	0,0304	4123	0,0249	3124	0,0260	1342	0,0390
12	4132	0,0337	4132	0,0340	3142	0,0260	1324	0,0272	2314	0,0274	4132	0,0226	3214	0,0252	3124	0,0330
13	1324	0,0308	2314	0,0229	1243	0,0243	1342	0,0247	4123	0,0246	2413	0,0174	3142	0,0241	3214	0,0317
14	2314	0,0206	3412	0,0196	4132	0,0187	2431	0,0207	4132	0,0220	1342	0,0169	2431	0,0204	2413	0,0287
15	3412	0,0193	1342	0,0194	3421	0,0187	2314	0,0159	1342	0,0150	2341	0,0159	2341	0,0202	3241	0,0223
16	1342	0,0191	2431	0,0177	3214	0,0168	3412	0,0136	2341	0,0143	3421	0,0136	4123	0,0177	4231	0,0162
17	3421	0,0187	3214	0,0128	2341	0,0123	3214	0,0089	3421	0,0134	2314	0,0124	4132	0,0175	3421	0,0138
18	2341	0,0123	4213	0,0087	1342	0,0114	2341	0,0065	3214	0,0117	3241	0,0089	4213	0,0172	3142	0,0129
19	3214	0,0117	3421	0,0084	3412	0,0109	3421	0,0061	3241	0,0081	4231	0,0060	3412	0,0145	4123	0,0104
20	4213	0,0085	2341	0,0056	3241	0,0070	4213	0,0060	3412	0,0076	3214	0,0053	3241	0,0104	4213	0,0100
21	3241	0,0070	4312	0,0044	4213	0,0053	3241	0,0037	4231	0,0059	3412	0,0034	4312	0,0104	4321	0,0099
22	4231	0,0050	3241	0,0032	4231	0,0050	4312	0,0031	4213	0,0037	4321	0,0031	4231	0,0076	4132	0,0094
23	4312	0,0044	4231	0,0023	4321	0,0042	4231	0,0027	4321	0,0030	4213	0,0017	3421	0,0065	3412	0,0077
24	4321	0,0042	4321	0,0019	4312	0,0025	4321	0,0014	4312	0,0017	4312	0,0008	4321	0,0047	4312	0,0055

Probabilities of department store floor compositions for females, Part II															
Rank	ACEF	Pi	ADEF	Pi	BCDE	Pi	BCDF	Pi	BCEF	Pi	BDEF	Pi	CDEF	Pi	
1	1234	0,1872	1234	0,1575	1234	0,1555	1234	0,2245	1234	0,2383	1234	0,1953	1234	0,1060	
2	2134	0,1194	1324	0,1529	1243	0,1461	1324	0,1382	1324	0,1424	1324	0,1896	1324	0,1029	
3	1324	0,1118	2134	0,0864	1324	0,0956	1243	0,0982	1243	0,1109	1243	0,0909	2134	0,0911	
4	1243	0,0871	1243	0,0733	1423	0,0905	1423	0,0609	1423	0,0627	1423	0,0829	2341	0,0594	
5	2143	0,0556	1423	0,0669	1432	0,0889	1432	0,0513	1342	0,0569	1342	0,0758	2431	0,0558	
6	1423	0,0493	1342	0,0611	1342	0,0883	1342	0,0510	1432	0,0538	1432	0,0712	3124	0,0544	
7	2341	0,0491	2341	0,0596	4123	0,0461	2134	0,0405	2134	0,0432	4231	0,0325	1243	0,0493	
8	2431	0,0464	1432	0,0575	4132	0,0445	4123	0,0399	4123	0,0413	4321	0,0314	1423	0,0450	
9	1342	0,0447	2431	0,0560	4213	0,0406	4231	0,0381	4231	0,0406	2134	0,0304	2143	0,0424	
10	1432	0,0423	2143	0,0402	2134	0,0269	4213	0,0340	3124	0,0294	4123	0,0291	1342	0,0411	
11	3124	0,0346	2314	0,0374	2143	0,0253	3124	0,0284	4132	0,0286	3124	0,0207	2314	0,0392	
12	2314	0,0306	3124	0,0250	4312	0,0242	4132	0,0267	4321	0,0242	4132	0,0202	1432	0,0386	
13	3241	0,0252	3241	0,0188	4231	0,0174	3214	0,0242	2143	0,0201	2341	0,0190	3241	0,0365	
14	4231	0,0172	3421	0,0175	3124	0,0153	4321	0,0235	4213	0,0155	2431	0,0178	4231	0,0346	
15	3214	0,0148	2413	0,0164	2314	0,0146	2314	0,0212	2341	0,0146	2143	0,0141	4321	0,0340	
16	3142	0,0146	4231	0,0128	3142	0,0139	2143	0,0177	2431	0,0138	2314	0,0130	3421	0,0337	
17	3421	0,0145	4321	0,0127	2413	0,0138	4312	0,0140	3241	0,0134	4213	0,0128	3214	0,0241	
18	2413	0,0135	3214	0,0112	3214	0,0134	2431	0,0132	3214	0,0110	3241	0,0108	4123	0,0240	
19	4123	0,0110	3142	0,0106	4321	0,0107	2341	0,0131	2314	0,0097	3421	0,0098	3142	0,0217	
20	4321	0,0104	4123	0,0079	3412	0,0076	3241	0,0119	3142	0,0095	3214	0,0091	4132	0,0206	
21	4132	0,0100	4132	0,0072	2431	0,0060	2413	0,0093	3421	0,0076	4312	0,0086	2413	0,0171	
22	4213	0,0047	3412	0,0044	2341	0,0060	3142	0,0083	4312	0,0064	3142	0,0067	4213	0,0106	
23	3412	0,0036	4213	0,0035	3241	0,0054	3421	0,0074	2413	0,0043	2413	0,0057	4312	0,0090	
24	4312	0,0026	4312	0,0032	3421	0,0034	3412	0,0044	3412	0,0020	3412	0,0027	3412	0,0089	

Probabilities of department store floor compositions for age group A, Part I																
Rank	ABCD	Pi	ABCE	Pi	ABCF	Pi	ABDE	Pi	ABDF	Pi	ABEF	Pi	ACDE	Pi	ACDF	Pi
1	2143	0,1367	2143	0,1278	2134	0,1649	2134	0,1441	2134	0,2019	2134	0,1900	1234	0,1088	1234	0,1591
2	1423	0,1242	2134	0,1145	1423	0,1006	2143	0,1274	2143	0,0858	1423	0,0972	1243	0,0962	2134	0,0889
3	2134	0,1083	1423	0,1124	2143	0,0884	1432	0,1192	1432	0,0753	2143	0,0913	1432	0,0948	1324	0,0827
4	2413	0,0694	1432	0,0904	3124	0,0774	1423	0,0782	1423	0,0737	3124	0,0712	1342	0,0751	2314	0,0726
5	1432	0,0656	2413	0,0658	1324	0,0727	2413	0,0658	2431	0,0694	1324	0,0702	2134	0,0649	1243	0,0676
6	2431	0,0575	3124	0,0552	2431	0,0575	4132	0,0519	1234	0,0688	2431	0,0658	1423	0,0606	2431	0,0601
7	4123	0,0565	4123	0,0525	2413	0,0548	3142	0,0482	2413	0,0548	1432	0,0651	2413	0,0576	1432	0,0549
8	3124	0,0525	3142	0,0482	1432	0,0542	1234	0,0432	1324	0,0533	1234	0,0590	2143	0,0574	2341	0,0476
9	1243	0,0392	4132	0,0411	1234	0,0488	2431	0,0424	3124	0,0492	2413	0,0335	1324	0,0543	1423	0,0443
10	1324	0,0381	1324	0,0390	2314	0,0396	1243	0,0382	2314	0,0396	4123	0,0325	2314	0,0516	1342	0,0435
11	3142	0,0330	2431	0,0351	4123	0,0354	1342	0,0366	1243	0,0292	1243	0,0284	2431	0,0376	2413	0,0389
12	1234	0,0310	1342	0,0351	3421	0,0267	3124	0,0347	4132	0,0288	3142	0,0279	2341	0,0298	2143	0,0377
13	4132	0,0281	1243	0,0346	3142	0,0264	4123	0,0330	3142	0,0268	4132	0,0265	3214	0,0249	3214	0,0340
14	3421	0,0267	1234	0,0310	1243	0,0262	1324	0,0272	1342	0,0231	3421	0,0246	4213	0,0237	4231	0,0249
15	1342	0,0254	3412	0,0246	4132	0,0225	3412	0,0246	4123	0,0225	2314	0,0242	4132	0,0234	3241	0,0231
16	2341	0,0223	2314	0,0228	2341	0,0223	2314	0,0228	2341	0,0213	2341	0,0228	3142	0,0217	3124	0,0217
17	2314	0,0213	3421	0,0163	1342	0,0210	2341	0,0130	3421	0,0170	1342	0,0226	3412	0,0217	4213	0,0156
18	3412	0,0170	2341	0,0136	3412	0,0137	3421	0,0104	3412	0,0137	3241	0,0087	4312	0,0185	3421	0,0145
19	4213	0,0090	3214	0,0087	3214	0,0125	3214	0,0087	3214	0,0125	3412	0,0084	3124	0,0156	4132	0,0127
20	4321	0,0088	4213	0,0083	4321	0,0088	4213	0,0083	4231	0,0090	4231	0,0083	4231	0,0155	4321	0,0124
21	3214	0,0084	4312	0,0081	3241	0,0083	4312	0,0081	3241	0,0084	4321	0,0081	4123	0,0149	3142	0,0118
22	3241	0,0083	4321	0,0054	4231	0,0071	4231	0,0055	4213	0,0057	3214	0,0076	3241	0,0145	3412	0,0116
23	4231	0,0071	3241	0,0051	4213	0,0057	3241	0,0051	4321	0,0056	4213	0,0035	3421	0,0091	4312	0,0099
24	4312	0,0056	4231	0,0043	4312	0,0045	4321	0,0034	4312	0,0045	4312	0,0028	4321	0,0077	4123	0,0099

Probabilities of department store floor compositions for age group A, Part II															
Rank	ACEF	Pi	ADEF	Pi	BCDE	Pi	BCDF	Pi	BCEF	Pi	BDEF	Pi	CDEF	Pi	
1	1234	0,1462	1324	0,1563	1234	0,1226	1234	0,1809	1234	0,1648	1324	0,1760	1324	0,0892	
2	1324	0,1168	1234	0,1017	1243	0,1084	1324	0,0940	1324	0,1316	1234	0,1146	2134	0,0834	
3	2134	0,0856	2134	0,0856	1432	0,1068	1243	0,0769	1243	0,0792	1423	0,0748	3124	0,0666	
4	1243	0,0703	1423	0,0664	1342	0,0846	1432	0,0625	1423	0,0706	1342	0,0698	2341	0,0621	
5	1423	0,0626	2341	0,0649	1423	0,0683	4231	0,0622	4231	0,0571	1432	0,0617	1234	0,0580	
6	2431	0,0576	1342	0,0619	1324	0,0612	1423	0,0504	1432	0,0559	4321	0,0605	2314	0,0568	
7	2341	0,0516	2431	0,0574	4132	0,0605	4213	0,0504	1342	0,0501	1243	0,0551	2431	0,0549	
8	1432	0,0496	2314	0,0556	4213	0,0571	1342	0,0495	4123	0,0493	4123	0,0493	4321	0,0541	
9	2314	0,0454	1432	0,0548	4312	0,0459	4132	0,0377	4321	0,0459	4231	0,0397	3421	0,0429	
10	1342	0,0444	1243	0,0489	4123	0,0397	4123	0,0369	3124	0,0356	3124	0,0356	2143	0,0401	
11	2143	0,0411	2143	0,0411	4231	0,0385	3214	0,0364	4132	0,0331	4132	0,0331	1423	0,0379	
12	3124	0,0321	3124	0,0321	2134	0,0219	2134	0,0345	4213	0,0312	2134	0,0300	4123	0,0357	
13	3241	0,0249	2413	0,0236	4321	0,0203	4321	0,0328	2134	0,0300	4312	0,0234	1342	0,0353	
14	2413	0,0243	4321	0,0234	3214	0,0198	4312	0,0272	3214	0,0225	4213	0,0229	4231	0,0346	
15	4231	0,0237	3421	0,0217	2143	0,0194	3124	0,0267	3241	0,0198	2341	0,0219	1432	0,0312	
16	3421	0,0217	3241	0,0156	3142	0,0186	2314	0,0244	3421	0,0178	2314	0,0213	3241	0,0310	
17	3214	0,0213	4231	0,0149	3412	0,0178	2431	0,0196	2431	0,0175	2431	0,0194	3214	0,0295	
18	4321	0,0185	4123	0,0147	2413	0,0175	3241	0,0191	4312	0,0168	3421	0,0186	4132	0,0283	
19	4123	0,0147	3214	0,0136	2314	0,0157	2341	0,0155	2341	0,0157	3214	0,0165	1243	0,0279	
20	3142	0,0126	3142	0,0126	3124	0,0138	2143	0,0146	2314	0,0151	2143	0,0144	3142	0,0254	
21	4132	0,0119	4132	0,0119	2431	0,0122	2413	0,0131	2143	0,0144	3241	0,0138	2413	0,0241	
22	4213	0,0097	4312	0,0079	3241	0,0118	3421	0,0127	3142	0,0115	3142	0,0115	4312	0,0196	
23	3412	0,0073	3412	0,0074	2341	0,0096	3142	0,0116	2413	0,0081	2413	0,0091	4213	0,0158	
24	4312	0,0062	4213	0,0062	3421	0,0079	3412	0,0105	3412	0,0065	3412	0,0072	3412	0,0155	

Probabilities of department store floor compositions for age group B, Part I																
Rank	ABCD	Pi	ABCE	Pi	ABCF	Pi	ABDE	Pi	ABDF	Pi	ABEF	Pi	ACDE	Pi	ACDF	Pi
1	2143	0,1553	2143	0,1573	2134	0,2051	**2134**	0,1614	2134	0,2260	2134	0,2339	1234	0,0946	1234	0,1348
2	2134	0,1231	2134	0,1410	2143	0,1100	2143	0,1428	2143	0,0961	2143	0,1124	1423	0,0865	1324	0,1150
3	1423	0,0740	1423	0,0778	3124	0,0962	1423	0,0738	3124	0,0905	3124	0,0876	1243	0,0837	2134	0,0800
4	4123	0,0642	3124	0,0680	1423	0,0681	1432	0,0685	1234	0,0722	1234	0,0760	1432	0,0824	2314	0,0726
5	1432	0,0641	4123	0,0647	1234	0,0646	3124	0,0638	1423	0,0650	1423	0,0640	1324	0,0775	1423	0,0617
6	3142	0,0615	1432	0,0626	1324	0,0492	4123	0,0607	1324	0,0469	2431	0,0482	1342	0,0653	1243	0,0573
7	3124	0,0597	3142	0,0594	4123	0,0440	4132	0,0581	2431	0,0463	1324	0,0462	2134	0,0591	2431	0,0549
8	4132	0,0524	4132	0,0506	2431	0,0428	3142	0,0540	4123	0,0414	1432	0,0429	2413	0,0576	1432	0,0465
9	2413	0,0463	2413	0,0482	2413	0,0400	1234	0,0485	1432	0,0404	4123	0,0401	2143	0,0522	2341	0,0436
10	1243	0,0456	1243	0,0468	1432	0,0367	2413	0,0482	2413	0,0400	1243	0,0365	2314	0,0516	2413	0,0389
11	2431	0,0428	1234	0,0419	1243	0,0346	1243	0,0429	4132	0,0323	3142	0,0343	2431	0,0344	1342	0,0369
12	1234	0,0362	1324	0,0270	3142	0,0329	2431	0,0280	1243	0,0307	4132	0,0326	2341	0,0272	3214	0,0340
13	1342	0,0248	2431	0,0259	2314	0,0289	1324	0,0256	3142	0,0300	2413	0,0242	3214	0,0249	2143	0,0340
14	1324	0,0227	1342	0,0243	4132	0,0280	1342	0,0210	2314	0,0289	3421	0,0180	4213	0,0237	3124	0,0320
15	3421	0,0199	3412	0,0180	3421	0,0199	3412	0,0180	3421	0,0186	2314	0,0175	3124	0,0233	4231	0,0227
16	3412	0,0186	2314	0,0167	3214	0,0178	2314	0,0167	3214	0,0178	2341	0,0167	4123	0,0222	3421	0,0218
17	2341	0,0166	3214	0,0125	2341	0,0166	3214	0,0125	2341	0,0142	1342	0,0149	3412	0,0217	3241	0,0211
18	2314	0,0142	3421	0,0120	1342	0,0142	4213	0,0119	1342	0,0124	3241	0,0125	4132	0,0213	4321	0,0186
19	3241	0,0121	4213	0,0119	3241	0,0121	3421	0,0113	4231	0,0118	4231	0,0119	3142	0,0198	4213	0,0156
20	4213	0,0118	2341	0,0100	4231	0,0103	2341	0,0086	3241	0,0110	3214	0,0108	4312	0,0185	4123	0,0146
21	3214	0,0110	3241	0,0073	3412	0,0100	4231	0,0071	3412	0,0100	3412	0,0061	4231	0,0142	3412	0,0116
22	4231	0,0103	4231	0,0062	4213	0,0081	3241	0,0066	4213	0,0081	4321	0,0059	3421	0,0136	4132	0,0114
23	4321	0,0066	4312	0,0059	4321	0,0066	4312	0,0059	4321	0,0062	4213	0,0049	3241	0,0132	3142	0,0106
24	4312	0,0062	4321	0,0040	4312	0,0033	4321	0,0037	4312	0,0033	4312	0,0020	4321	0,0116	4312	0,0099

Probabilities of department store floor compositions for age group B, Part II															
Rank	ACEF	Pi	ADEF	Pi	BCDE	Pi	BCDF	Pi	BCEF	Pi	BDEF	Pi	CDEF	Pi	
1	1234	0,1462	1234	0,1394	1234	0,1254	1234	0,1831	1234	0,1939	1234	0,1849	2134	0,0834	
2	1324	0,1168	1324	0,1305	1423	0,1146	1324	0,1562	1324	0,1548	1324	0,1730	1234	0,0796	
3	2134	0,0856	2134	0,0856	1243	0,1109	1423	0,0838	1243	0,0932	1243	0,0888	1324	0,0745	
4	1243	0,0703	1243	0,0670	1432	0,1092	1243	0,0778	1423	0,0830	1423	0,0735	3124	0,0666	
5	1423	0,0626	2341	0,0591	1324	0,1027	1432	0,0632	1432	0,0657	1342	0,0686	2341	0,0540	
6	2431	0,0576	1423	0,0555	1342	0,0866	1342	0,0501	1342	0,0589	1432	0,0607	4231	0,0493	
7	2341	0,0516	2431	0,0522	4213	0,0377	4231	0,0356	4231	0,0377	2134	0,0368	2314	0,0481	
8	1432	0,0496	1342	0,0517	4123	0,0358	2134	0,0347	2134	0,0368	4231	0,0358	2431	0,0477	
9	2314	0,0454	2314	0,0500	4132	0,0332	4213	0,0327	4123	0,0310	4321	0,0332	4321	0,0470	
10	1342	0,0444	1432	0,0458	4312	0,0304	4123	0,0312	4321	0,0304	4123	0,0310	3241	0,0442	
11	2143	0,0411	2143	0,0411	2134	0,0235	2314	0,0311	2431	0,0227	2341	0,0235	3214	0,0410	
12	3124	0,0321	3124	0,0321	2413	0,0227	4321	0,0308	3124	0,0224	3124	0,0224	2143	0,0401	
13	3241	0,0249	3241	0,0233	4231	0,0217	3214	0,0237	4132	0,0208	2314	0,0212	1243	0,0382	
14	2413	0,0243	4231	0,0222	2143	0,0208	3124	0,0226	2341	0,0203	2431	0,0208	3421	0,0373	
15	4231	0,0237	4321	0,0213	2314	0,0203	2431	0,0219	4213	0,0200	4132	0,0208	4123	0,0357	
16	3421	0,0217	2413	0,0213	4321	0,0188	4132	0,0194	2314	0,0190	4213	0,0191	1423	0,0317	
17	3214	0,0213	3214	0,0200	2431	0,0134	4312	0,0177	2143	0,0177	2143	0,0177	1342	0,0295	
18	4321	0,0185	3421	0,0198	3214	0,0131	2341	0,0174	3214	0,0144	3214	0,0138	4132	0,0283	
19	4123	0,0147	4123	0,0147	3124	0,0124	2413	0,0167	3241	0,0131	3241	0,0124	1432	0,0261	
20	3142	0,0125	3142	0,0125	3412	0,0118	2143	0,0147	3421	0,0118	4312	0,0119	3142	0,0254	
21	4132	0,0119	4132	0,0119	2341	0,0106	3421	0,0119	4312	0,0108	3421	0,0102	4213	0,0220	
22	4213	0,0097	4213	0,0092	3142	0,0102	3241	0,0109	2413	0,0102	2413	0,0090	2413	0,0204	
23	3412	0,0073	4312	0,0071	3421	0,0073	3412	0,0068	3142	0,0072	3142	0,0072	4312	0,0166	
24	4312	0,0062	3412	0,0066	3241	0,0067	3142	0,0060	3412	0,0042	3412	0,0036	3412	0,0132	

Probabilities of department store floor compositions for age group C, Part I																
Rank	ABCD	Pi	ABCE	Pi	ABCF	Pi	ABDE	Pi	ABDF	Pi	ABEF	Pi	ACDE	Pi	ACDF	Pi
1	2143	0,1624	2143	0,1859	2134	0,2448	2134	0,1663	2134	0,2318	2134	0,2765	1423	0,1168	1324	0,1509
2	2134	0,1287	2134	0,1666	2143	0,1313	2143	0,1471	3124	0,1523	2143	0,1328	1324	0,1047	1234	0,1078
3	3142	0,1055	3124	0,0804	3124	0,1148	3124	0,1079	2143	0,0985	3124	0,1036	1234	0,0779	1423	0,0809
4	4132	0,0900	4123	0,0765	1234	0,0740	4123	0,1026	4123	0,0696	1234	0,0844	1243	0,0689	2314	0,0726
5	4123	0,0671	3142	0,0702	4123	0,0525	1423	0,0619	1234	0,0685	4123	0,0474	1432	0,0678	2134	0,0687
6	3124	0,0624	4132	0,0598	1423	0,0399	4132	0,0599	1423	0,0517	1243	0,0405	2413	0,0576	2431	0,0481
7	1432	0,0555	1243	0,0552	1243	0,0397	3142	0,0557	1324	0,0374	3142	0,0405	1342	0,0538	1243	0,0458
8	1243	0,0470	1234	0,0494	3142	0,0392	1234	0,0484	4132	0,0331	4132	0,0386	2314	0,0516	3124	0,0451
9	1423	0,0390	1423	0,0470	4132	0,0335	1243	0,0428	3142	0,0308	1423	0,0363	2134	0,0515	2413	0,0389
10	1234	0,0373	1432	0,0378	1324	0,0288	1432	0,0350	1243	0,0291	2431	0,0314	2143	0,0455	2341	0,0382
11	2431	0,0284	2413	0,0314	2431	0,0284	2413	0,0314	2431	0,0273	1324	0,0263	3124	0,0334	1432	0,0372
12	2413	0,0273	2431	0,0170	2413	0,0258	1324	0,0215	2413	0,0258	1432	0,0244	4123	0,0318	3214	0,0340
13	1342	0,0215	1324	0,0163	3214	0,0225	2431	0,0163	3214	0,0225	3241	0,0159	2431	0,0301	3421	0,0313
14	3412	0,0180	3214	0,0159	1432	0,0215	3214	0,0159	1432	0,0196	2413	0,0155	3214	0,0249	1342	0,0295
15	3241	0,0156	4213	0,0152	2314	0,0186	4213	0,0152	2314	0,0186	4231	0,0152	2341	0,0239	2143	0,0292
16	4213	0,0136	1342	0,0146	3241	0,0156	3412	0,0117	3421	0,0180	3214	0,0134	4213	0,0237	4321	0,0267
17	4231	0,0133	3412	0,0117	4231	0,0133	2314	0,0109	4231	0,0136	3421	0,0117	3412	0,0217	4123	0,0206
18	3421	0,0132	2314	0,0109	3421	0,0132	3421	0,0108	3241	0,0126	2314	0,0112	3421	0,0196	4231	0,0199
19	3214	0,0126	3241	0,0094	2341	0,0110	1342	0,0107	4213	0,0103	2341	0,0109	4132	0,0185	3241	0,0185
20	1324	0,0120	4231	0,0080	4213	0,0103	4231	0,0081	2341	0,0084	1342	0,0085	4312	0,0185	4213	0,0156
21	2341	0,0110	3421	0,0079	1342	0,0083	3241	0,0076	3412	0,0065	4213	0,0061	3142	0,0172	3412	0,0116
22	2314	0,0084	2341	0,0066	3412	0,0065	2341	0,0050	1342	0,0060	4321	0,0039	4321	0,0167	4312	0,0099
23	4312	0,0059	4312	0,0039	4321	0,0043	4312	0,0039	4321	0,0059	3412	0,0039	4231	0,0124	4132	0,0098
24	4321	0,0043	4321	0,0026	4312	0,0021	4321	0,0036	4312	0,0021	4312	0,0013	3241	0,0116	3142	0,0091

Probabilities of department store floor compositions for age group C, Part II															
Rank	ACEF	Pi	ADEF	Pi	BCDE	Pi	BCDF	Pi	BCEF	Pi	BDEF	Pi	CDEF	Pi	
1	1234	0,1462	1234	0,1802	1423	0,1755	1324	0,2355	1234	0,2197	1234	0,2707	1234	0,1028	
2	1324	0,1168	1324	0,1027	1324	0,1573	1234	0,1681	1324	0,1754	1324	0,1543	2134	0,0834	
3	2134	0,0856	1243	0,0866	1234	0,1170	1423	0,1263	1243	0,1056	1243	0,1301	4231	0,0667	
4	1243	0,0703	2134	0,0856	1243	0,1035	1243	0,0715	1423	0,0941	1423	0,0656	3124	0,0666	
5	1423	0,0626	2341	0,0515	1432	0,1019	1432	0,0580	1432	0,0745	1342	0,0612	3241	0,0598	
6	2431	0,0576	2431	0,0455	1342	0,0808	1342	0,0460	1342	0,0668	1432	0,0541	1324	0,0586	
7	2341	0,0516	1423	0,0437	4123	0,0288	2314	0,0342	2134	0,0392	2134	0,0392	3214	0,0539	
8	1432	0,0496	2314	0,0430	2413	0,0257	2134	0,0317	2431	0,0257	4231	0,0288	1243	0,0494	
9	2314	0,0454	2143	0,0411	2314	0,0230	4321	0,0257	2341	0,0230	2341	0,0225	2341	0,0444	
10	1342	0,0444	1342	0,0407	2134	0,0225	4123	0,0239	4231	0,0218	2431	0,0199	2143	0,0401	
11	2143	0,0411	1432	0,0360	4213	0,0218	2431	0,0218	2314	0,0206	2314	0,0191	2431	0,0393	
12	3124	0,0321	3241	0,0334	2143	0,0199	4213	0,0185	2143	0,0189	2143	0,0189	4321	0,0387	
13	3241	0,0249	3124	0,0321	4312	0,0176	2413	0,0184	4321	0,0176	4123	0,0169	2314	0,0385	
14	2413	0,0243	4231	0,0318	4132	0,0163	4231	0,0180	4123	0,0169	4321	0,0163	4123	0,0357	
15	4231	0,0237	3214	0,0282	4321	0,0155	3124	0,0173	3124	0,0122	4213	0,0144	3421	0,0307	
16	3421	0,0217	4321	0,0185	2431	0,0131	2341	0,0172	4132	0,0113	3124	0,0122	4213	0,0289	
17	3214	0,0213	2413	0,0183	4231	0,0109	2143	0,0135	4213	0,0111	4132	0,0113	4132	0,0283	
18	4321	0,0185	3421	0,0172	2341	0,0104	3214	0,0133	2413	0,0111	3214	0,0104	3142	0,0254	
19	4123	0,0147	4123	0,0147	3124	0,0100	4312	0,0100	3214	0,0080	3241	0,0100	1423	0,0249	
20	3142	0,0125	4213	0,0129	3214	0,0076	3421	0,0099	3241	0,0076	2413	0,0081	1342	0,0232	
21	4132	0,0119	3142	0,0125	3412	0,0068	4132	0,0091	3421	0,0068	4312	0,0055	1432	0,0206	
22	4213	0,0097	4132	0,0119	3421	0,0060	3241	0,0055	4312	0,0060	3421	0,0050	2413	0,0163	
23	3412	0,0073	4312	0,0061	3142	0,0050	3412	0,0039	3142	0,0039	3142	0,0039	4312	0,0133	
24	4312	0,0062	3412	0,0057	3241	0,0033	3142	0,0028	3412	0,0023	3412	0,0017	3412	0,0105	